



MONASH University

Parents' Perceptions and Involvement in the Mathematics Education of their Children

Daya Weerasinghe

MEng (Electronics & Telecommunication Engineering),
MSc (Computer Science), PGDip (ICT), PGDip (Writership and
Communication), DipEd (Secondary), BSc

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*Dedicated to my late parents
Anula Jayawardane and Cyril Weerasinghe
who valued education
and provided support to me
every possible way they could.*

May you attain the supreme bliss of nibbana!

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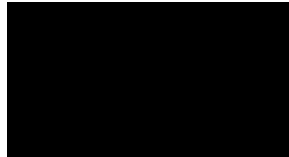
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List of abbreviations

χ^2 value	- Chi-square value
AMOS	- Analysis of Moment Structures
ANOVA	- Analysis of Variance
CET	- Cognitive Evaluation Theory
CFA	- Confirmatory Factor Analysis
CFI	- Comparative Fit Index
df	- degrees of freedom
GFI	- Goodness-of-Fit Index
LSAY	- Longitudinal Study of American Youth
NELS	- National Education Longitudinal Study
OIT	- Organismic Integration Theory
p-value	- probability value
RC	- Reverse Coded
RMR	- Root Mean squared Residual
RMSEA	- Root Mean Square Error of Approximation
RMV	- Replaced Missing Values
SDT	- Self-determination Theory
SEM	- Structural Equation Modelling
STEM	- Science, Technology, Engineering, and Mathematics
TAFE	- Technical and Further Education
TEDS – M	- Teacher Education and Development Study: Learning to Teach Mathematics
Tukey's HSD	- Tukey's Honest Significant Difference
UK	- United Kingdom
USA	- United States of America
VCE	- Victorian Certificate of Education

Abstract

The purpose of this thesis is to seek insights into how parental perceptions affect parental involvement in the mathematics education of their secondary school children and how each of these two factors affects the ways children think about their academic achievement. The study was guided by a conceptual framework, which was developed based on attributes of parental perceptions and actions, identified through the literature in the field. It also sought to understand parental practices that might possibly result in positive or negative impact on children's academic attainment.

The participants were secondary school students and their parents from three secondary schools in Melbourne, Australia and the data were gathered by means of questionnaires and semi-structured face-to-face interviews. Hence the data in this study were both quantitative and qualitative, requiring a mixed methods approach. Following a model of an explanatory sequential mixed methods design, the data were collected and analysed. Group comparisons were performed between Asian–Australian and European–Australian cultures, between male and female students, and among secondary year levels.

Similar procedures were used to analyse parents' and children's data. Quantitative data analyses were carried out with correlations, confirmatory factor analysis, independent samples *t*-tests, and ANOVA using SPSS and AMOS software packages. Qualitative data were synthesised and analysed thematically using the NVivo program.

The results were categorised into and presented under three main themes: parental motivation; parental support; and parental control. In order to distinguish the difference between parental motivation and support, the two terms were considered respectively as *motivating in the learning of mathematics* and *supporting academic success in*

mathematics. In further exploration, parental encouragement and home discussion together were categorised as parental motivation. Parental support consisted of homework involvement and provision of private tutoring. Parental control was a combination of setting up family rules, perceived parental control, and digital deprivation.

This study found that the higher the parental perceptions in mathematics education, the higher the children's perceptions in academic achievement would be. Both parents and children reported that parental encouragement and homework involvement motivate children in mathematics education. Further, parent–child discussions at home were identified as having a positive effect in academic achievement. Even though parents did not consider private tutoring as important, children thought it could be somewhat helpful. Another interesting point was the different levels of perceptions of parents and children in parental control. Parents reported that they became involved with their children to a limited extent but children felt that they were highly controlled.

Furthermore, there were differences in culture in relation to home discussion, homework involvement, provision of private tutoring, and parental control. Nevertheless, there were no differences identified in parental encouragement between the two cultures. Another key point was that neither parents nor children reported gender differences in parental motivation or support. However, even though parents reported no gender differences in parental control of their children, the children reported the opposite. Additionally, this study found that there were differences in parental perceptions and involvement according to the year level of children. The findings of this study are important not only to parents and children but also to teachers, school administrators, and education policy makers, who need to help foster the parent–child relationship vis-à-vis mathematics achievement to promote academic success.

Chapter 1: Introduction

This chapter introduces the research project and explains my interest and motivation to explore the effects of interactions between parents and children with regard to secondary mathematics education. The study aims to elucidate the impact of parental involvement resulting in either positive or negative outcomes, which may be perceived by children as support or pressure. This introduction provides the rationale for the study, gives background information, describes the participants, lists the research aims and accompanying questions, and explains its significance to both parents and children. At the end of the chapter I provide an overview of the thesis.

1.1 Rationale for the study

The impetus for this research and my motivation to conduct it emerged from reading as well as my life experiences as a student in Sri Lanka, a mathematics teacher and tutor, and an immigrant parent in Australia. The following are the specific reasons and personal experiences behind conducting this study.

In Sri Lanka, university entrance is competitive. Undergraduate education is free but positions are limited in state universities. Out of those who qualify to enter a university each year, only 15 - 18% (University Grants Commission, 2014) of the students are accorded the opportunity. The rest of the students – that is the majority of those who qualify for university education – have to pay for their education in private universities, or follow other pathways of employment, which is a burden on their parents. The effort of students, along with parental involvement in education, is high because there is a strong social tendency in families to desire that their children pursue university education.

Consequently, most students learn from tutors after school. Some students have tutoring

seven days a week and I was one of those students. In fact, tutoring is popular and there are large, medium and small scale private educational institutes everywhere across the country. Students and parents in Sri Lanka are used to this situation, where it is considered normal to have tutoring. However, there is pressure on both students and parents because students have a greater workload and parents have to earn more to pay tuition fees.

As a student in Sri Lanka and a teacher in Australia I experienced cultural differences within school communities. In the morning at the school gate when I heard Australian parents wishing that their children should “enjoy the day” or “have fun”, it reminded me of my own experiences with my parents saying “behave well” or “work hard”. Parents of my schoolmates said the same to their children. It intrigued me; I wondered whether both Australian and Sri Lankan parents meant the same thing or whether they had different expectations for their children. I am also interested in finding out about the resultant effects on children.

In Australian multicultural classrooms, it seems common for Asian students to perform well in mathematics and in relation to set tasks they are often ahead of the non-Asian students in the class. Also, I was surprised to see that many Australian students seem not to be interested in learning mathematics. I have experienced differences in attitudes towards mathematics education, classroom performance, participation, behaviour, and completing homework tasks between Asian and Australian students. As a secondary mathematics teacher such observations aroused my curiosity in finding more about cultural differences in the learning of secondary school mathematics.

With regard to parental involvement as a negative pressure on children, I have experienced some conflicts within the families of the Sri Lankan community in Australia. While many Asian parents are involved in their children’s education, most of these children have tutors

to support them in mathematics. As a mathematics tutor who visits homes, I have seen students crying when they come to the tutoring session. I learnt that they cried because of the involvement of and arguments with their parents about homework while preparing for the lesson. At times, I have heard some parents boasting about punishing or chastising their children for not achieving high marks in school tests or for not doing homework. Some of these “victims” are in Year 12 and are female. Some students face these situations mainly because of the high aspirations of immigrant parents for their children (Sue & Okazaki, 1990). Such conflicts are perfectly understandable when considering the sacrifices made and difficulties undergone by immigrant parents.

While working as a tutor, I experienced some other extreme cases of parenting among Asian groups. Some parents complained about their children’s carelessness when they had achieved a mark around 97% for a test. They wanted their children to be perfect and they inquired about the 3% lost. Sometimes they blamed their children for playing too much and confiscated items such as iPads and mobile phones, not allowing any entertainment. It is important to realise that these parents might not have achieved perfect scores for every subject when they were young. Unfortunately it seems that they expect too much from their children. Certain parents asked me to give their children more homework just because they thought that these children played too much. The following example is another exceptional situation.

In Melbourne, there are five public select-entry schools to which many parents want to send their high performing children. Some Asian parents let their children sit for select-entry school competitive examinations but they do not want to send their children to those schools because they are too far away or the children do not want to leave their present school. These parents spend money to provide private tutoring and prepare their children

for the competition, simply to find out about the level of their performance. This seems to put unnecessary pressure on children, because select-entry examinations are of higher standard than the normal study level at school. Hence, it requires a lot of effort and preparation, which is a burden on children.

Evidence around the high achievement of Asian students is available from comparisons of international studies such as the Trends in International Mathematics and Science Study (TIMSS) and the Programme for International Student Assessment (PISA). These studies indicate that students in many Asian countries perform better in mathematics than students in most European countries (Leung, 2012; Thomson et al., 2012). This same difference appears to occur between Asian–Australian students and European–Australian background students, and there is therefore interest in factors contributing to those differences.

One relevant factor is arguably the involvement of parents in their children’s education. Such involvement has captivated the attention of the world for some time. Asian parents, for example, are often reported to spend time each day in monitoring the academic activities of their children (Fu & Markus, 2014). In her controversial memoir entitled *Battle hymn of the tiger mother*, Chua (2011) depicted a Chinese model of parenting. The term “Tiger mother” self-proclaimed by Chua is sometimes used to describe an authoritarian parenting style in which parents give their children few choices and seldom ask children for opinions (Baumrind, 1967; Maccoby & Martin, 1983). It is not only Chinese mothers who act as “Tiger mothers”, for example, it seems that some non-Chinese parents from other Asian countries such as Korea, Vietnam, India, and Sri Lanka have similar mindsets. The well-prepared offspring of these “Tiger mothers” seem to be outperforming non-Asian counterparts at schools where both Asian and non-Asian ethnic background students study together (Fu & Markus, 2014).

Being mindful of the above factors and in order to explore further the influences of parents on their children's education, I am keen to explore differences between particular groups. This thesis presents a literature review, methodology, analysis, findings, and discussion of my recent study that seeks to identify the influences of parental involvement on the mathematics education of secondary school students. The following section describes the connection between myself and the study.

1.2 My background

It is important and relevant to explain my background and my relation to the study as I have been a learner and a teacher both in Sri Lanka and Australia. I also have parenting experience in the two countries and so aspects of that background are elaborated in the following narrative.

I was born in Sri Lanka and my family lived in a small village with limited infrastructure and poor transport facilities. We did not have electricity in our village until I was a Year 9 student. My parents were relatively rich compared to other people living there. My mother was a teacher of English and my father was a manager of a company. Even so they did not send me to a school in the city because they preferred to have me closer to them at home. There were no teachers in my school qualified to teach mathematics when I was a senior secondary student. Therefore, I had to have an alternative method to learn mathematics and my parents provided private tutoring for me. With a lot of effort I completed my primary, secondary and tertiary education in Sri Lanka. In terms of facilities, my childhood experiences were substantially different from those of Sri Lankan background children who were born in, or migrated to, Australia.

When I was young I was encouraged by my parents and teachers to believe that the first priority of a child's life is to be educated. Even though I accept the fact that parents are one of the most important assets in children's education, the nature of motivation and support of parents may vary among different families. Sometimes parents' involvement and their control appear to put considerable pressure on children.

My children were born in Sri Lanka and they completed their primary and part of their secondary education there before we migrated to Australia. In Sri Lanka, since they were young, I was involved in their education. While my daughter was doing well in her studies, my son appeared to be the opposite. After realising that my son would not be able to cope with the competitiveness in education in Sri Lanka I decided to migrate to Australia for him to have better opportunities. Hence, I became a migrant parent with an Asian background. In Australia, I work as a teacher of secondary school mathematics. In addition, I work as a tutor of mathematics for both primary and secondary students. With all the above experiences and observations I relate to this study as a student, teacher, parent, tutor, and researcher. The study looks at the perceptions that may influence parental actions such as those described above, which may also affect students and their learning of mathematics. The next section describes the aims of the research and the questions to be explored.

1.3 Research aims and questions

The intent of this study was to examine the perceptions of children in different *cultures* – Asian–Australian and European–Australian – who were influenced by the values, expectations, attitudes, beliefs, educational aspirations, and academic standards of parents and their actions. Further, it was to look into the similarities and differences in *gender* – male and female – and *year level of children* – all secondary year levels including Year 7

to Year 12 – with respect to the way parents encourage or constrain their children in mathematics education. Exploration of the following research questions is the foundation on which the study was built. These questions also determined the nature of research methodology and data collection. The questions are:

1. *How do parents' perceptions about and parental involvement in mathematics education affect the way children think about mathematics achievement?*
2. *To what extent do these perceptions and involvement differ*
 - (a) *between Asian–Australian and European–Australian backgrounds?*
 - (b) *between genders of children and parents?*
 - (c) *among year levels of children?*

The questions are concerned with attitudes, beliefs, expectations, aspirations, values, and academic standards as a collection of perceptions of parents, their involvement, and children's perceptions in mathematics education. The participants involved in the study are described in the next section.

1.4 The participants

The study was undertaken by means of surveys and interviews with secondary school children and their mothers or fathers of two different and highly diverse cultural backgrounds. The two groups were:

Asian–Australian - Asian background parents who live in Australia and their children who live and study in Australia were grouped as Asian–Australians. According to world regions, this study had participants from East and South Asian backgrounds.

Four dyads of those parents and their children participated in the qualitative aspects of study providing more details. They were born overseas and migrated to Australia within the last five years at the time of the interviews. Because of the recency of migration this group might still have their inherited cultural perceptions such as beliefs, attitudes, and expectations.

European–Australian - European background parents who live in Australia and their children who live and study in Australia were considered as European–Australians. Those participants were from both European Union and other European backgrounds.

Four parent-child dyads were willing to participate in the interviews. Two of those parents were born overseas and migrated to Australia with their parents when they were young, that is, about 40 to 50 years ago. The other two parents were born in Australia. The four European–Australian children were born in Australia belonging to the first or second generation of their family tree.

Accordingly, Asian–Australian participants could be considered as recent migrants while European–Australian participants were more established in the country. This was purposefully done in order to make sure that Asian participants still have their own perceptions such as attitudes, beliefs, expectations, aspirations, values, and academic standards due to the recency of their migration. The differences between groups according to years of stay in the country are excluded as a variable in this study to narrow it down to a feasible level. The two groups consist of a mix of male and female children across Year 7 to Year 12 and their male and female parents.

Data were collected from three government sector secondary schools in Melbourne with the following pseudonyms. According to data available in the ‘My School’ website in 2016, Majestic High School (Years 9 - 12) had a population of more than 800 students

(approximately equal numbers of girls and boys and about 80% from language backgrounds other than English). Prince Hill Secondary College (Years 7 – 12) had nearly 600 students (a few more than 300 girls and a little fewer than 300 boys, about 1% indigenous students, and 25% from language backgrounds other than English) and Kingswood Secondary College (Years 7 – 12) had nearly 2,000 students (about 950 girls and 1,050 boys, approximately 45% from language backgrounds other than English) (Australian Curriculum, Assessment and Reporting Authority [ACARA], n.d.).

1.5 Significance of the study

It has been argued that mathematics learning, like other subject areas, is embedded in cultural contexts (Wiest, 2002). In fact, there are many variables within a country or culture that impact on student achievement (Leung, 2012). One such variable is where parents can teach their children to love challenges, be intrigued by mistakes, enjoy effort, and keep on learning (Dweck, 2008). However, the process through which parental involvement influences student performance is not well understood (Hong & Ho, 2005). Parental involvement factors may not be able to stand alone as they are inter-related. Although the importance of parental involvement in students' education is not debatable, the kind of parental roles that are most effective is still an open question (Cai, Moyer, & Wang, 1997). The relationship between the academic achievement of children and parental involvement across ethnic groups is complex and varies across different cultures (Dandy & Nettelbeck, 2002). Some researchers argue parental involvement positively affects academic achievement (Fan & Williams, 2010; Ferguson, 2008; Wilder, 2014), while others claim parental involvement negatively affects academic achievement (Desforges & Abouchaar, 2003; Liss, Schiffrin, Mackintosh, Miles-McLean, & Erchull, 2013; McNeal,

2001). My study is focused on identifying the respective contributions of positive encouragement of parents and negative pressure on students in mathematics education.

The study examines three key areas of parental involvement in the mathematics education of secondary students. Firstly, the study sought to identify significant factors relating to parental involvement in the academic achievement of secondary students, paying more attention to senior secondary students, given that much of the research conducted on parental involvement in education is about primary students (e.g., Dandy & Nettelbeck, 2002; Phillipson & Phillipson, 2007). Many researchers view parental involvement as a key mediator between family background and cognitive and affective outcomes of schooling (e.g., Ma, 1999). However, it is unclear what components of parental involvement can affect the schooling outcomes of students.

Secondly, the study explicates the methods of motivation employed by parents in the fostering of the mathematics achievement of their children. The information relating to the roles of parents as motivator, resource provider, and monitor have been found to be important in predicting students' mathematics achievement, in contrast to the roles of parents as content adviser and learning counsellor (Cai, Moyer, & Wang, 1997). Positive attitudes can motivate students and this is another contributor that is worth consideration (Leung, 2012). Consequently, there are indications that more research should be done in this area to identify the magnitude and source of the negative effects and pressures on students. Therefore, the study examined the methods employed by parents that yield both positive and negative outcomes.

Thirdly, the study sought to discover the areas on which European– and Asian–Australian parents might focus more in their children's education rather than following traditional beliefs or the opinions of other people. My impressions are that parents from Asian

backgrounds have higher academic standards, expectations, and educational aspirations for their children's education, compared with European background parents. Much research found in this area appears to be qualitative and centred on primary students. This study was focused on secondary school students and their parents and has been conducted in the Australian context.

1.6 Overview of the thesis

The introduction in this chapter is followed by the literature review in Chapter 2 which discusses previous research in comparisons of mathematics education, parental perceptions, parental involvement and parental engagement in education, parenting styles and children's perceptions. While much evidence acknowledges the involvement of parents as being desirable for children's academic achievement, the enactment of these ideals is less straightforward, particularly in mathematics education. Many factors that affect parental perceptions influence the nature and level of parental involvement in children's education. The literature review provides a broad analysis of such factors and reviews a range of research in parental involvement in mathematics education.

Chapter 3 presents the methodology of this study in which a conceptual framework and an appropriate mixed methods design are introduced and justified. The methods of data collection including questionnaires and semi-structured face-to-face interviews with parent-child dyads are described. Data analysis techniques and interpretation methods are also described. Ethical considerations such as anonymity and confidentiality are addressed and data validity and reliability are taken into consideration. The limitations of the research study are added to this chapter.

Results of quantitative data analyses are presented in Chapter 4. Steps involved in the analyses and the use of factor analysis are described. Data were analysed under three categories, namely, parental motivation, support, and control. Analyses consisted of correlations, comparisons between ethnic groups as well as gender, and comparisons among year levels for each of the three categories.

Chapter 5 introduces the participants in this research and discusses an approach to qualitative data analysis. Results of qualitative data analyses are reported under the same three themes as in quantitative analyses: parental motivation, support, and control in Chapter 6, Chapter 7, and Chapter 8 respectively.

Finally, Chapter 9 provides a discussion about the study overall, which identifies whether the findings are consistent with other studies and where there are deviations. Answers to research questions, recommendations, some suggestions for future work, and a conclusion are also presented.

Chapter 2: Literature Review

The previous chapter introduced my motivation as researcher to study the positives and negatives of parental involvement in the mathematics education of secondary school students in Australia. Mathematics is often considered a universal subject in schools and students learn the same content or concepts with diverse teaching and learning practices (Shimizu & Kaur, 2013) across the globe. Research in the past suggests that there is a relationship between parental involvement and the mathematics achievement of adolescent children. This involvement motivates some students to achieve positive outcomes while it creates a negative pressure on others. Of course, it is not parental involvement alone that determines academic success or failure. It is my interest to investigate parental involvement factors that affect the academic achievement of children and my aim is to provide understandings and patterns that could help parents strike a balance between the resulting positive encouragement and negative pressure.

Of course, parents play an important role in the learning and academic achievement of their children. While parental involvement and parenting styles influence children's learning and academic achievement in a number of ways (Gonzalez & Wolters, 2006), children's perceptions of their achievement consist of two different categories based on positive academic attainment and negative impacts on children.

Many variables and influences have been identified in the literature and even within each variable there are often conflicting views on the significance and even the direction of the influence of the variable. In this chapter I review international comparative studies, demographics in teaching and learning, parental perceptions, parental involvement, parental engagement, parenting styles, and children's perceptions in mathematics

education. In addition, other related factors such as parental socio economic status and level of education are briefly discussed.

In this study based on Asian and Australian mathematics education, it is important to review previous studies to identify the various components of parent-child involvement that affect children's achievement and their perceptions in mathematics education. Table 2.1 provides an overview of areas found in the literature, which are applicable to parents and children. Moving forward with the existing literature, each of the areas in the table is discussed in the subsequent sections.

Table 2.1

Overview of Areas Related to Parent–child Involvement and their Perceptions in the Literature

Comparisons in mathematics education	Parental perceptions	Parental involvement	Parenting styles	Parental engagement	Other factors	Children's perceptions
international comparative studies	attitudes	parental encouragement	authoritative	school	socio economic status	positive outcomes
	beliefs	home discussion	authoritarian	-involvement		
demographics	expectations	homework involvement	indulgent	-communication	parents' level of education	negative pressure
-culture	aspirations	provision of private tutoring	uninvolved	-participation		
-gender	values	family rules				
-year level	academic standards	perceptions of control				
		material deprivation				

2.1 Comparisons in mathematics education

This section discusses the comparisons in mathematics education. In particular, it includes international comparative studies on contexts of culture and gender and demographics of mathematics education such as culture, gender, and the year level of children. The first sub-section describes international comparative studies in mathematics education.

2.1.1 International comparative studies

Apart from research information available in the literature, useful sources of information of cross-cultural comparisons of mathematics learning include international studies, such as Trends in International Mathematics and Science Study (TIMSS) and Programme for International Student Assessment (PISA). While TIMSS tests knowledge and skills based on the curriculum, PISA assesses students' capacity to solve problems encountered in real life (Wu, 2010). Researchers, practitioners, and policy makers have generated a significant debate with the publication of results of these tests (Philipson & Renshaw, 2013). In particular, the major areas of interest as explained by Philipson and Renshaw are types of schools, teaching practices, curriculum frameworks, sociocultural values, and conditions contributing to children's academic achievement.

Yet, it is critical to ensure that the cultural values and educational contexts of the countries involved are taken into account when writing questions for these tests. Unfortunately, as reported by Leung (2012), this is not always the case. In a recent article, he argued that international studies of mathematical achievement have influenced mathematics education worldwide, with much attention being paid to ranking countries in order of achievement. The result is that most people focus on the positions and scores of individual countries without considering the factors impacting their achievement.

In another study, Thomson et al. (2012) explained that these research studies collect extensive background information that addresses concerns about the quantity, quality and content of instruction along with additional information. They highlighted Singapore, Korea, and Hong Kong as the top-performing countries for Year 4 mathematics of TIMSS 2011. Considering Australia's achievement score for Year 4 mathematics in 2011, Thomson et al. argued that the score was significantly higher than that of the 27 participating countries, but below that of 17 countries, including most of the Asian countries. They also argued that the performance in 2011 was higher than that in 1995, while there was no significant difference from the results of 2007. In Australia, the results show a considerable decline in interest in mathematics from Year 4 to Year 8. In terms of variation within Australia, Year 4 students in the Australian Capital Territory achieved significantly higher than students from all other states except Victoria.

East Asian students are known to be the best performers in mathematics in TIMSS and PISA studies. A recent study known as "Teacher Education and Development Study: Learning to Teach Mathematics" (TEDS –M) indicated some positives about the content and pedagogical knowledge of East Asian teachers (Shimizu & Kaur, 2013). Given these points, for both Year 4 and Year 8, Korea and Singapore were the top-performing countries for mathematics for TIMSS 2011 (Kaur, Areepattamannil, & Leong, 2013; Thomson et al., 2012). Chinese Taipei was another top-performing country for Year 8 mathematics. Australia's achievement score was significantly higher than that of the 27 participating countries, and below that of 6 countries, including high performing Asian countries. They also pointed out that Australia's average Year 8 mathematics score in TIMSS 2011 was not significantly different from the score in 1995, although there had been some small fluctuations over the 16 years. As with the younger students, the performance of Year 8

students in the Australian Capital Territory was significantly higher than that of students in all states other than New South Wales.

Data presented in this way is of interest to both the media and politicians who then use it in a similar manner. However, missing in this simplistic view of the data are aspects about the nature of those studies and the contextual factors that affect the performance of students in each country. When using data from international studies, Leung (2012) argued that ranking of countries or changing of position in ranking in two different cycles of studies should not be considered seriously. He explained that it is impossible to expect international studies to produce answers for national problems in education though he argued that that international studies still provide a rich data set for individual countries to seek answers for their own issues. Also, the international benchmarks provided in comparative studies help participating countries to locate their children's performance in an international setting (Kaur et al., 2013).

Thomson et al. (2012) reported gender differences in TIMSS assessment among Australian students. In mathematics there were no significant gender differences at either Year 4 or Year 8. At Year 4, male students liked learning mathematics to a greater degree than female students. They also expressed greater confidence in learning mathematics. As Thomson et al. reported, at Year 8, almost half of the female students surveyed said they did not like mathematics. However, male students liked learning mathematics and expressed greater confidence in learning mathematics than their female peers. In another study, analysing the gender factor of TIMSS-2003 for eight participating countries from Asia-Pacific region, Dindyal (2008) highlighted that at Grade 8 level, the overall performance of female students was better than that of male students except in Japan and Korea.

While these data may be useful if used appropriately, Leung (2012) argued that there are limitations regarding what can be learned from large-scale international studies. In particular, there are technical problems such as language equivalence in the translation of instruments, item difficulty involving limitations in setting test items, and the fact that international studies rely on paper-and-pencil tests in measuring achievement. In terms of comparability of the findings, he explained that there are serious contextual issues related to the way in which mathematics is taught, such as the starting age of schooling or the use of decimals involving currencies among the participating countries. For example, decimals are not used at all in Japanese currency. Hence, Japanese students miss perhaps one of the easiest methods of learning decimals in practice.

Importantly, as Leung (2012) highlighted, there are many variables within a country or culture that impact student achievement. Many of these variables are interrelated so it is difficult to isolate the effect of individual factors. The nature of these large-scale studies is such that only a broad picture about the performance of different countries can be achieved. Leung pointed out that rigorous methodologies are adopted in studies such as TIMSS and PISA in order to overcome some of these issues. Hence, within the limitations posed by their nature, these studies provide interesting results concerning student achievement.

Analysing the results of international studies, Leung (2012) emphasised that there is a group of countries that share a common culture and which consistently performed well in these studies. He argued that though cultural values may be important there is no obvious relationship between culture and student achievement. According to his findings, background factors such as per capita income, education level of parents, teachers having a degree, student/teacher ratio, class size, emphasis on mathematics homework, etc. cannot

explain student achievement, but positive attitudes can motivate students. This is where a growth mindset comes in. Indeed, having a growth mindset (Dweck, 2008) is important for children in their academic achievement as explained in Section 2.1.1. Teachers and parents need to help children develop the mindsets and practices that will serve them well on their path to academic achievement. Dweck (2016) explained that the knowledge that children can develop their abilities, along with the knowledge of how to do it, is an important part of their journey of education.

Focussing once again on international comparative studies, it is observed that there is a wide range of diversity in performance within countries. Analysing the results of such studies in the Australian context, Sullivan (2011) explained that the scores of some states in Australia are close to the leading countries. Even though Australia is not at the top of these rankings, he argued that, as a cohort, Australian schools are not failing. However, Sullivan explained that the results of students in the Northern Territory and Tasmania were substantially lower than those from the other states and territories. He pointed out the necessity of improving overall results in the country. In view of achieving better results, Sullivan emphasised the following example from Japan. Considering the fact that Japanese students overall perform well in mathematics in international comparative studies, he described that the focus of Japanese mathematics lessons is often on the intensive study of particular examples, with students working on a single task for a whole lesson. Consequently, the students have the opportunity to hear a range of strategies for completing such tasks devised by other students and then evaluate their own strategy against other suggested strategies.

In a recent publication on TIMMS 2015, Thomson, Wernert, O'Grady, and Rodrigues (2016) reported that with an average score of 517 points on the TIMSS Year 4

mathematics scale, Australian students significantly outperformed students in 20 other countries, such as Italy, Spain, and New Zealand. However, Australian Year 4 students were outperformed by students in 21 other countries, including Northern Ireland, Ireland, England, and the United States, as well as the participating East Asian countries: Singapore, Hong Kong, Korea, Chinese Taipei, and Japan. Further, they reported that Australia's 2015 Year 4 mathematics score was significantly higher than the corresponding score in 1995. However, this was due to a single increase recorded in TIMSS 2007 with no decline in the following years. It was reported that for the past three cycles, Australia's Year 4 mathematics scores have remained the same (Thomson et al., 2016). Further, the authors elaborated that nine per cent of Australian Year 4 students achieved the advanced international benchmark in mathematics. Also, seventy per cent of Australian Year 4 students achieved the Intermediate international benchmark, the proficiency standard for Australia.

Likewise, as Thomson et al. (2016) reported, with an average score of 505 on the TIMSS Year 8 mathematics scale, Australian students significantly outperformed students in 21 other countries, such as Italy, New Zealand, and Malaysia. However, Australian Year 8 students were outperformed by students in 12 other countries, including Canada, Ireland, England, and the United States, as well as the top five countries from Asia: Singapore, Korea, Chinese Taipei, Hong Kong, and Japan. Australia's result declined in TIMSS 2007 and was followed by a recovery in TIMSS 2011 (Thomson et al., 2016). Further, Thomson et al. reported that Australia's 2015 Year 8 mathematics score is exactly the same as the corresponding score in 1995. Seven per cent of Australian Year 8 students achieved the advanced international benchmark in mathematics. Sixty-four per cent of Australian Year 8 students achieved the Intermediate international benchmark.

Even though the data from international studies are useful as an indicator of comparative strengths and weaknesses that can help to inform policy discussions, in a policy forum Schmidt and McKnight (1998) reported some criticisms of TIMSS. One of these criticisms has been that the results are not robust and should not be used to inform policy discussions. However, they argued that the differences in achievement are consistent with and seem to reflect curricular differences. Notably, Schmidt and McKnight (1998) pointed out that curricular and systematic differences are legitimate variables that policy can affect. A second criticism has been that the sampling at the end of secondary school is inadequate and invalidates the TIMSS results. Hence, they argued that the sampling and population definition were more problematic at the end of secondary school.

These discussions imply that each individual participating country can make use of the results of international comparative studies to improve the performance of their own students and also to improve the quality of teaching. It is also important to find out the areas to be improved by analysing results deeply. In addition to educational policy makers, principals, and teachers, parents also can make use of international comparative studies to encourage their children to perform well in their mathematics studies. The next sub-section describes different demographic groups in mathematics education.

2.1.2 Demographic groups of mathematics education

In this study demographic features such as culture, gender, and year level of students were investigated with respect to parental involvement. The following are some of the interesting findings from the literature that were influential in the design of the research model.

Culture

In a study on demographic groups Hall, Davis, Bolen, and Chia (1999) assessed cultural and gender differences in mathematics performance by scores on the math-concepts and math-computation sections of the California Achievement Test among 5th and 8th grade students in the United States. In both grades, the Caucasian students scored significantly higher in their performance than the African-American students, but there were no significant gender differences. In a longitudinal study using self-report data from 2,088 sixth-grade students in 11 middle schools in North Carolina, Bowen, Hopson, Rose, and Glennie (2012) included three demographic variables: race, gender, and income to examine the influence of students' perceived parental school behaviour expectations on their academic performance. They found that race and gender moderated the impact of parental expectations because of differences in the way expectations are communicated and perceived. Further, higher income parents were found to be more educated and they often had higher expectations than lower income parents.

As Cole (2010) suggested “culture refers to the full range of socially inherited (extragenetic) accomplishments of past human activities that serve as crucial resources for the current life of a social group” (p. 462). Consequently, culture has an important role in shaping education and any educational reforms (Cole, 2010; Phillipson & Renshaw, 2013). However, it is equally important to note that pedagogical practices of high performing countries or cultures in international comparative studies cannot be automatically transferred or adopted in another culture (Seah, 2011).

As parents of diverse cultures have various intervention strategies, they act differently when it comes to the education of children (Hong & Ho, 2005; Phillipson & Phillipson, 2007; Yamamoto & Holloway, 2010). Western parents are likely to have more flexible

expectations and appear to put less pressure on the academic achievement of their children than Asian parents (Dandy & Nettelbeck, 2002). In a study with a sample of 249 college students in the USA, Suizzo and Soon (2006) investigated parental academic socialisation among European–Americans, Asian–Americans, African–Americans, and Latinos. They found that emotional support and active involvement were rated by all ethnic groups as the most frequent practices used by parents. However, European–Americans rated those measures significantly higher than did Asian–Americans, who reported demandingness practices as the most frequent. Overall, the study of Suizzo and Soon suggested that academic socialisation practices vary for adolescents in different ethnic groups.

In a study of 83 Asian–American and European–American high school students in the USA, Fu and Markus (2014) found that these students mentioned their mothers as a source of pressure and also as a source of support. In particular, Asian–American students were more likely than European–American students to describe their mothers as a source of pressure but they did not necessarily experience this pressure as negative. However, both Asian–American and European–American students described their mothers as a source of support. As described by Fu and Markus, “While European–American parents give their children wings to fly on their own, Asian–American parents provide a constant wind beneath their children’s wings” (p. 747).

Focusing on a nationally representative sample of four ethnic groups including 12,721 Asian-American, Hispanic, Caucasian, and African-American 10th grade students and their parents in the USA, Fan, Williams, and Wolters (2012) investigated parental involvement in predicting school motivation across ethnic groups. They analysed how different dimensions of parental involvement similarly or differentially linked to various constructs of school motivation in each group. Their results indicated positive relations between

parental aspirations for children's education and student school motivational constructs such as academic self-efficacy, intrinsic motivation, and engagement in mathematics and English. However, Fan et al. found that such constructs across ethnic groups were negatively associated with school–parent communication regarding student school problems.

Therefore, in comparing Asian and Australian students' performances in mathematics with respect to parental involvement, ethnic or cultural differences can be considered as an important factor. Further, the research on gender and year level of students has yielded interesting findings.

Gender

In the USA in 1990, Fennema compiled a list about gender differences and showed that differences in mathematics achievement existed but were reducing and varying by socio-economic status and ethnicity, school, and teacher (Fennema, 1995). One of her findings was that teachers tend to structure classrooms to favour male students' learning. Later, Bowen et al. (2012) argued that parental expectations about behaviour are often found to be more protective for girls than for boys. After reviewing a range of studies in gender equity and mathematics education, Vale and Bartholomew (2008) noted significant gender differences, favouring males in affective factors and senior secondary mathematics participation. However, researchers have continued to monitor gender differences in achievement and participation at the senior secondary level and revealed a widening gap favouring males in primary and secondary mathematics education (Atweh, Vale, & Walshaw, 2012; Forgasz, 2008; Vale, 2010). These discrepancies are discussed further below.

With 714 students in the ninth grade of public schools in Albania, Kashahu (2013) found that academic achievement was associated with gender. Even though the differences were very small, her results showed that the girls had higher achievements than boys. Later, Kashahu, Bushati, Dibra, and Priku (2014) conducted a quantitative study to examine the relationship between different forms of parental involvement and their children's academic achievement based on the child's gender. The sample included randomly selected parents of 14 or 15 year-old students from 21 public schools in Albania ($N = 369$). The study found that parents supported girls more than boys. Also, there was a tendency of parents to discuss school problems more with girls than with boys. There were similar findings in a study which involved 165 mother-child dyads in the USA as discussed by Else-Quest, Hyde, and Hejmadi (2008). Given the discrepancies in findings regarding gender across cultures, it seems important to explore gender differences in parental involvement in mathematics education as well as the influence of culture and context.

In another study, Lazarides, Rubach, and Ittel (2017) analysed bidirectional effects between children's and parents' perceptions in values in mathematics education and mathematics-related career plans considering students' gender as a moderator of these relations. The study was conducted in Germany with longitudinal data from 475 students in 11th and 12th grades. Interestingly, the results of this study showed two-way effects for boys only. This means, when boys have higher perceptions in mathematics education parents also have higher perceptions. Similarly, when parents have higher perceptions in mathematics education boys have higher perceptions too.

In a longitudinal investigation of American youth focused on students from Grades 7 to 10, Leedy, LaLonde, and Runk (2003) argued that even though the male and female students seemed to be supported by parents equally, there were still issues associated with gender

bias. They also added that parents believed their young daughters must work harder to achieve higher grades in mathematics, while parents of young sons emphasised the importance of mathematics. According to another longitudinal study on adolescent life transitions, Frome and Eccles (1998) reported that parents believed that their daughters had lower mathematical ability than parents believed about their sons. Also, they found that mothers overestimated the mathematical abilities of their sons and underestimated the mathematical abilities of their daughters. In an international longitudinal study with participants from Australia, Canada, and the United States ($Ns = 358, 471$, and 418 respectively), Watt et al. (2012) found stereotypic gender differences in educational aspirations and career plans only among the Australian sample. At time 1, those students were in Grades 9 and 10 and at time 2, they were in Grades 11 and 12. Watt et al. argued that male adolescents were more likely than female counterparts to aspire to STEM related occupations.

In an introduction of single-sex mathematics classes in a Victorian coeducational high school in 1993 followed by 1996, Leder and Forgasz (1997) found that the parents of daughters were less supportive of the program. They found that mothers of sons supported the program expressing the necessity of special attention to boys as boys' education in the school was suffering. Leder and Forgasz also noted that there was less support from parents for the single-sex program in 1996, implying such a program was unnecessary in a coeducational setting and mixed settings were better than single-sex settings.

From the analysis based upon a three-year study with 114 parent-child dyads in Hawaii including Grade 3 and 4 students: Olson, Olson, Okazaki, and La (2010) found that mothers tended to provide more encouragement to sons while fathers did the same to daughters, showing parental attachment to children of opposite gender. Further, using data

from a longitudinal study on adolescents' mathematics achievement from Grades 8 to 12 in the USA, Muller (1998) found that the girls talked with their parents about school more than the boys did. She reported that the students had more frequent conversations about their high school with their mothers than with their fathers. However, more boys discussed high school with their fathers than did the girls. Muller (1998) pointed out that boys might discuss school more with their fathers because boys experienced more school-related behavioural problems. She found that gender differences in mathematics achievement test scores were small but consistent among senior students. These studies also suggest a need to explore parental involvement across year levels.

Year level/ Grade

Parental involvement tends to decline in students' middle and high school years (Hoover-Dempsey et al., 2005). Muller (1998) argued that the relationship between parental involvement and student achievement was similar for male and female students at junior school levels but declined over the years from Grade 8 to 12. The results showed no relationship between parental involvement and the academic achievement of senior students because older adolescents generally seek more autonomy from their parents. Therefore, older adolescents would be more likely to reject parents' attempts at involvement. Further, Muller explained that parents tended to withdraw from involvement as the content of the curriculum becomes complicated with the increase in year levels. Hence, it is of interest to find out more about how parents change their involvement in children's mathematics education over time.

Parental involvement in homework seems to vary with the student's year level. Analysing the results of his longitudinal study from the data collected from 3,116 students representing Grades 8 to 12 in 52 randomly selected schools across the USA, Ma (1999) explained that parent-child home discussion, in general, showed a pattern of increasing

over year levels. Home expectations, which include setting rules, prohibitions, limitations, and assigned work, in contrast, decreased consistently over grades while home–school communication was relatively stable. There was a lower homework effort in higher grades (Trautween, Lüdtke, & Kastens, 2006) and the effect of parental involvement varied with the student’s age (Patall, Cooper, & Robinson, 2008).

From a 10-year longitudinal study of how children’s achievement beliefs and values change through the elementary and secondary school years in the USA, Wigfield and Eccles (2000) found that children’s ability-related beliefs became more negative and declined over the years. Further, they found that elementary school students valued mathematics more than did high school students.

Secondary school education in Australia is from Year 7 to Year 12 and parent–child relation regarding education seems to vary with the age of a child. Hence, this study aims to find whether there are any differences in parental involvement and children’s achievement across year levels.

2.2 Parental perceptions

There are studies which show that perceptions parents have for their children’s academic achievement influence children’s perceptions, effort, and outcomes (e.g., Hoover-Dempsey et al., 2005; Topor, Keane, Shelton, & Calkins, 2010; Wilder, 2014). Hence, in addition to parental perceptions, in this literature review parental involvement and children’s perceptions in mathematics education are included. Parental perceptions are based on attributes such as parents’ attitudes and beliefs (Fulton & Turner, 2008; Hornby & Lafaele, 2011; Pritchard, 2004), expectations and educational aspirations (Jeynes, 2011; Phillipson, 2010, 2013), and values and academic standards (Phillipson & Phillipson, 2007; Seah,

2011) that affect students' achievement. Parental involvement in children's education varies for each child depending on the factors above which are further discussed in the following sections.

2.2.1 Attitudes and beliefs

It can be assumed that parental approaches to their involvement in the mathematics learning of their children are influenced by their attitudes, beliefs, and understandings of mathematics and mathematics education (Pritchard, 2004). Further, Pritchard argued that there is "a common belief that mathematical ability is an inherited 'talent' with which you are born ... [and this is] popular among the adult population and it is generally deemed more acceptable to fail in this area than in other curriculum areas" (p. 479). Her study of parental attitudes and beliefs in mathematics and mathematics education in New Zealand, which surveyed parents of a small, inner-city primary school, reported that they considered it important for their children to succeed in mathematics, but at the same time believed that the children should be able to enjoy and understand what they were doing. As McLeod (1992) explained, the attitude toward mathematics is just a positive or negative emotional disposition toward mathematics.

The distinction between the activities parents partake in and the attitude parents have toward education was highlighted by several studies. For example, Hall et al. (1999) claimed that parental attitudes appeared to be influential in the students' performance in mathematics. Further, Hall et al. suggested that, although parents' beliefs and attitudes about mathematics influenced their child's performance, the relationship was complex and might vary with ethnic background. In another study, Rimm-Kaufman, Pianta, Cox, and Bradley (2003) found parents' positive attitudes towards education and school were associated with the child's increased academic performance.

Parents' beliefs about various issues can act as barriers to effective parental involvement. Parents who believe that their role is only to get children to school and then children should take over responsibility for their education may not be actively involved in either school-based or home-based parental involvement (Hornby & Lafaele, 2011). Ule, Zivoder, and du Bois-Reymond (2015) interviewed parents of lower secondary school students in eight European countries and found that parents are generally ready to support their children by investing a large amount of emotional, social, and economic resources throughout their educational journey. As Ule, Zivoder, and du Bois-Reymond described, many parents believe that education is the most promising and secure path towards a prosperous future for their children. In a previous publication of this study, Weerasinghe and Panizzon (2015) noted that some parents reported their children put in all their effort into mathematics education but they believed that their children could do better if they tried harder. This paradox is more evident from parents among Asian backgrounds than European backgrounds. Hence, this study involves parental involvement and its relation to their perceptions such as attitudes and beliefs. The next section discusses parental expectations and aspirations for their children's academic achievement.

2.2.2 Expectations and aspirations

Parental expectation is characterised as beliefs or judgements that parents have about how their children's achievement can develop realistically and parental aspiration is defined as desires, wishes, or goals that parents have formed regarding their children's future attainment (Hanson, 1994). While some studies use expectation and aspiration interchangeably (e.g., Fan & Chen, 2001), early studies have combined them to a single measure for analytic purposes (e.g., Bandura, Barbaranelli, Caprara, & Pastorelli, 1996). Notably, in a study with a total of 171 parents and their adolescent children aged from 11

to 19, Kirk, Lewis-Moss, Nilsen, and Colvin (2011) found parental expectations were a factor that influenced the educational aspirations of children.

Discrepancies in children's expectations and aspirations were examined by Boxer, Goldstein, DeLorenzo, Savoy, and Mercado (2011) using a socioeconomically diverse population of middle school students ($N = 761$). They found that children who aspired to achieve more than they expected to were likely to have more economically disadvantaged backgrounds and poorer academic performance. Thus, aspirations and expectations of children are potentially critical influences on their future (Boxer et al., 2011). Likewise, in another study with a nationally representative sample of 11 year-old children in the USA ($N = 1,115$), Rutherford (2015) found that middle school children who had expectations that did not match their parents' aspirations for them had a lower sense of well-being.

Parental expectations and aspirations in the literature show that these two perceptions are closely connected to academic achievement. Using data from 780 students from a primary school in Hong Kong and their parents, Phillipson and Phillipson (2012) found that, by directly communicating their academic expectations to their children, parents helped their children to actualise their cognitive ability which could improve academic achievement. As Phillipson (2013) argued, "parental expectations deriving from their values, cultural and religious background, and social capital have been considered as a major influence on their children's development and achievements" (p. 87).

In another study of direct and indirect longitudinal effects of parental involvement on student achievement using a nationally representative sample of 24,599 eighth graders from 1,052 schools in the USA, Hong and Ho (2005) randomly selected a sample of 1,500 students from Asian-American, African-American, Hispanic, and White groups with a total of 6,000 students for their analysis. They concluded that across all ethnic groups the

higher the hopes and expectations of parents with respect to the educational attainment of their child, the higher the expectations of the child and greater their academic achievement.

Previous research suggested that parental aspirations for their children's academic achievement had a positive influence on children's performance (Fan & Chen, 2001; Jeynes, 2005, 2007). Hence, it may be important to enhance parental aspirations to promote children's academic achievement (Jeynes, 2011). Apparently, parents' educational expectation of and future aspirations for their children vary across different cultures. One can argue that parents with higher aspirations may be involved more with their children's education and social development. Moreover, it is often observed that parents from Asian backgrounds have higher aspirations for their children's education compared with European background parents. In terms of the role of parental factors in children's academic achievements, Dandy and Nettelbeck (2002) argued that much research in this area had been primarily qualitative, and little had been conducted in the Australian context. In response to this gap, in a survey of 239 Chinese, Vietnamese, and Anglo-Celtic Australian parents of primary school children aged 6 to 14 years in South Australia, Dandy and Nettelbeck found most parents had high expectations of their children's academic performance. They also found that Anglo-Celtic Australian parents seem to put less emphasis on academic achievement while having more flexible expectations when compared to Chinese- or Vietnamese-Australian parents. However, Dandy and Nettelbeck stated that it is impossible to conclude that these factors are solely responsible for ethnic group differences in academic achievement.

In a recent study of parental aspirations and children's mathematical achievement using longitudinal data from a sample of German school children from Grades 5 to 10 and their parents ($N = 3,530$), Murayama, Pekrun, Suzuki, Marsh, and Lichtenfeld (2016) found that

the two variables were linked by positive reciprocal relations (i.e., parents and children had mutual influence on each other) over time. Hence, they suggested that high academic achievement of children may lead parents to adopt high aspirations. They also found that when parental aspirations exceeded parental expectations this had negative reciprocal relations with or deleterious effects on children's mathematics achievement. Unrealistically high parental aspiration, or over-aspiration as described by Murayama et al. (2016), seems to be detrimental for children's achievement.

Hong and Ho (2005) also argued that parental educational aspiration is one of the most powerful factors enhancing student educational aspiration. Thus, the higher the hopes and expectations of parents with respect to the educational attainment of their child, the higher the student's own educational expectations and, ultimately, the greater the student's academic achievement. In addition to parental educational aspiration, the greater the parent-child communication, the higher the student's perceived control and, consequently, the higher the student's academic achievement. Hong and Ho then argued that parental communication had a stronger effect on students' locus of control than did parental aspiration. That is, active parent-child communication regarding school programs, activities, and class studies appears to influence students' sense of controlling their own destiny more than the students' sense of their parents' educational expectations.

Parent-to-child expectations were explored in the majority of previous studies. Conversely, in a longitudinal study of kindergarten students in the USA ($N = 22,666$) Briley, Harden, and Tucker-Drob (2014) tested connections between children and parents and found strong evidence that child-to-parent effects do influence educational expectations. As a result, expectations of parents and characteristics of children seemed to be bi-directional. Analysing the National Education Longitudinal Study of 1988 (NELS: 88) in the USA,

Zhang, Haddad, Torres, and Chen (2011) found a reciprocal relationship or mutual influence between parental expectations and children's expectations. Also, they found reciprocal relations between both parents' and children's expectations and academic achievement. In the analysis they used two waves of longitudinal data from 14,376 students and their parents over a four year period from eighth grade and 12th grade.

Considering the above studies, parental expectations and aspirations are another two variables relevant for this study of parental involvement. Next, parental values and academic standards are reviewed using existing literature.

2.2.3 Values and academic standards

Seah (2016) introduced three different aspects of association between values and mathematics education, namely values through mathematics education, values of mathematics education, and values for mathematics education. Further, Seah and Andersson (2015) argued that values might be volitional in character, and values in mathematics education not only motivate and guide decisions and actions but they also provide the individual with the will and determination to continue valuing. As they defined the term,

Values are the convictions which an individual has internalised as being the things of importance and worth. What an individual values defines for her/him a window through which s/he views the world around her/him. (Seah & Andersson, 2015, p. 269)

Researchers in mathematics education have highlighted the importance of cultural values when discussing high performing countries in international comparative studies (Seah, 2011). In a study based on cross-cultural comparison with 158 parents of students from two Chinese and one primarily Anglo-Celtic primary schools in Hong Kong, it was argued that parents of different cultures have different values in the upbringing and education of

their children (Phillipson & Phillipson, 2007). They described differences in parental involvement and parental attitudes toward academic standards as a function of culture.

Using responses of 230 Chinese–Australians who are citizens or permanent residents in Australia, Mu (2014) found that “their commitment to mathematics learning is influenced by the values and expectations that they gain through their habitual Chineseness and reproduce through their family inculcation and upbringing” (p. 597). Further, Dandy and Nettelbeck (2002) found that parents of Asian origin set higher academic standards for their children than parents of Anglo–Celtic origin. To assess parents’ standards for their child’s academic performance, they used two questions based on two numeric scores: expected score, which is what their child would be likely to achieve; and satisfied score, which is what they would be satisfied with their child achieving. In order to analyse results, Dandy and Nettelbeck used quantitative techniques and calculated the difference between the expected score and the satisfied score. This differential score was assumed to be an index of parents’ academic standards.

In the present study, all of the above parental attributes have been integrated together as one factor known as parental perceptions, which include attitudes, beliefs, expectations, aspirations, values, and standards. Those parental perceptions were investigated together with parents’ involvement in and the impact on their children’s intended approaches to their mathematics education. The next section is a review on parental involvement.

2.3 Parental involvement

Despite the inability of researchers to uniquely or clearly define parental involvement (Wilder, 2014), it is apparent that parental involvement can be characterised as the level of engagement of a parent in their child’s education both at school and home. However, Luo,

Aye, Hogan, Kaur, and Chan (2013) explained that parental involvement has been conceptualised as “the degree to which parents are interested in, knowledgeable about, and take an active part in the child’s life” (p. 275). Research on parental involvement suggests that there is a significant relationship and a positive association between parental involvement and the academic achievement of their children of all ages (e.g., Fan et al., 2012; Hill & Tyson, 2009; Hong & Ho, 2005; Hornby & Lafaele, 2011; Moroni, Dumont, Trautwein, Niggli, & Baeriswyl, 2015; Phillipson & Phillipson, 2012; Spera, 2005; Topor et al., 2010). Specifically, children whose parents are more involved in their education perform better than children whose parents are involved to a lesser degree (Topor et al., 2010). These findings indicate that the construct of parental involvement in the education of their children is multidimensional and complex. Collectively, the way that parents view their role in their children’s education, the belief that parents have in their own ability to help their children succeed at school (Hornby & Lafaele, 2011) or lack of confidence of parents regarding their academic competence, and parents’ views about their children’s intelligence as well as how children learn and develop their abilities (Hoover-Dempsey & Sandler, 1997) are critical aspects in the study of parental perceptions and their involvement in children’s mathematics education.

In secondary schools, academic achievement is usually measured using test scores or school grades even though these traditional gauges may not provide an exact measure of the knowledge or aptitude of a child. Rather, test scores and school grades tend to direct students along future pathways of higher education or employment. The outcome though is that such measures may cause parents to be actively involved in the academic achievement of their children. However, it has been argued that there is no one best way for parental involvement and there is a clear need to move from the idea that parents are the same, with the same needs and that children should be treated the same (LaRocque, Kleiman, &

Darling, 2011). In particular, such an approach misses the complexity of needs and roles that students and parents from diverse backgrounds play in the education process. While some parents seem to be heavily involved in the education of their children, others are involved less, depending on culture, social class, and family-school relations (Hoover-Dempsey et al., 2005).

Further, in this section I discuss the effects of parental involvement on students' academic growth during secondary school years. When considering factors that affect students' academic achievement, parental involvement has been identified as significant (Fan, 2001; Fan & Williams, 2010; Gonzalez & Wolters, 2006; Sirvani, 2007), though researchers argue that the parental involvement in the academic achievement of their children is not clearly defined and is multidimensional (Fan, 2001; Gonzalez & Wolters, 2006). Research literature in this area has revealed inconsistent results, showing the need for further investigation of these dimensions.

Based on the results of a study with 314 students from 20 urban and rural schools in the UK, Harris and Goodall (2008) argued that parental engagement in children's learning in the home makes the greatest difference to student achievement. They also added that most of the schools involved parents in school-based activities in a variety of ways. Thus, parents were involved in their children's education both at home and at school. Another important study that gives insights into the effects of parental involvement was reported by Ma (1999). Based on a national sample from the Longitudinal Study of American Youth (LSAY), he explained that parents participated in their children's education both at home and at school though it is unclear what components of parental involvement especially affected the schooling outcomes of the children. Ma (1999) suggested parental involvement is a process that improves children's cognitive skills so that they are more

likely to succeed in academic work. His study results showed that not only did different types of parental involvement have distinct effects at each time point, but they also had various effect patterns over time. Therefore, the conceptualisation of parental involvement seems to be multidimensional and developmental.

With regard to home and school, important parental activities include parents' communication with their children about education and school matters (Fan & Williams, 2010), parents' participation in school activities (Fan & Williams, 2010; Harris & Goodall, 2008) and parents' communication with teachers about their children (Hornby & Lafaele, 2011). In the home learning environments, parents can engage in supervision and provide help with homework (Harris & Goodall, 2008). Parents have different methods of encouraging and motivating their children in education. Some parents provide tutors for extra support (Bray, 2003; Dindyal & Besoondyal, 2007). In some situations parents are involved in material deprivation (Sacker, Schoon, & Bartley, 2002), which is defined as circumstances denying households' access to certain material goods, though it may lead to unhappiness among children. Perceived parental control (Fulton & Turner, 2008; Wallston, Wallston, Smith, & Dobbins, 1987) and family rules at home (Fan & Williams, 2010), which can be defined as what is allowed and is not allowed in a family, are other aspects of parental involvement. The effects of the above-mentioned parental involvement dimensions may vary and affect students' achievement. Hence, these factors are included in the conceptual framework of this study, which is introduced in Chapter 3.

In a research study on parent's communication with their children, with 158 parents of students from three primary schools in Hong Kong, Phillipson and Phillipson (2007) described parents as mediators of their children's growing sense of competence, which may include aspects of the children's cognitive capabilities and parental involvement with

children at home and at school. Taking the Vygotskian view, they explained further that parents can be both effective communicators and reflectors of their children's ability. This feature is common for parents in any culture.

Parents who believe that the way they bring up their children will have considerable impact on their development are much more likely to be positive about parental involvement than parents who believe they can have little impact on their children's development (Hornby & Lafaele, 2011). Researchers have argued that parental involvement significantly improves the performance of lower achieving students of all ages including high school students (Cox, 2005; Sirvani, 2007). However, older children are less keen about parents' school involvement, such as parents going on class trips, which may be due to adolescents wanting to become independent of their parents (Eccles & Harold, 1993). The tendency for parental involvement to be greater for parents of younger children may be because younger children are more positive about their parents going into the school (Hornby & Lafaele, 2011). Therefore, the age of children can be a barrier to the involvement of parents at the school since this involvement decreases as children grow older, and is at its lowest level for children of secondary school age.

Hong and Ho (2005) advanced these research findings by addressing the multidimensional, longitudinal, mediational, and ethnic variation issues related to parental involvement and academic achievement in the USA. Their study used a randomly selected sample of 6000 students, including 1500 from four ethnic groups and three types of questionnaires, one for each student, and two other questionnaires for parents and teachers of the student. They used data from the base year (1988) and the first (1990) and second (1992) follow-up surveys. Hong and Ho (2005) described parental involvement as parental aspiration, expectation, interest, and attitudes and beliefs. Importantly, their research emerges from

longitudinal studies in contrast to cross-sectional research that predominates in the field. According to them, parental involvement factors such as home and school communication and parents' educational aspiration for their children have a longitudinal effect on student academic growth.

Although researchers have consistently reported the positive effect of parental involvement on student achievement, Hong and Ho (2005) argued that the process through which parental involvement influences student performance is not well demonstrated or understood. Besides, the findings of McNeal's (1999) study indicate parental involvement is a salient factor in explaining behavioural but not cognitive outcomes. Further, McNeal (2012) argued that there were conflicting findings between parental involvement and the academic performance of children. Consequently, little is known about how parental involvement may indirectly affect achievement via change in student attitude and motivation, which is further explored in this study.

The above research studies suggest that parental involvement has a number of dimensions and the effects of these dimensions change with the age of child. Though the researchers were able to show that there is a relation between parental involvement and the academic achievement of children, pointing out a single dimension and analysing its effect has been complicated as the results change with the growth of a child, and may involve the child's perceptions as a mediating factor. As a result of parental involvement, some students achieve positive academic outcomes while others suffer negative pressure. Thus, this study includes children's perceptions in academic achievement, as part of the research model.

The following sub-sections discuss each of the above parental involvement factors in more detail.

2.3.1 Parental encouragement

When parents are involved, students report more effort, concentration, and attention. Some parents encourage and motivate their children by rewarding them for their academic achievements. However, it is not only high achievers but also low achievers that need to be encouraged and motivated frequently. Although parental monitoring of homework and use of extrinsic rewards in reaction to grades are linked to extrinsic motivation, providing positive encouragement and praise is linked to intrinsic motivation (Gonzalez-DeHass, Willems, & Holbein, 2005). Similarly, Dweck (2008) argued that parents can teach their children to love challenges, be intrigued by mistakes, enjoy effort, and keep on learning. As a result, children can have life-long strategies to build and develop their own confidence. Thus, the commitment is to growth, which takes time, effort and mutual support.

On the one hand, to assess the relationships between perceptions of parenting and student's academic motivation and success, Fulton and Turner (2008) conducted a survey using a series of questionnaires involving 245 students aged 17–22 years in the USA. Their findings indicated that parenting may influence the development of motivational beliefs during childhood and adolescence. Students whose parents were involved in academic activities of their children were more likely to take personal responsibility for their learning than other students. It was found that such students adopted a mastery goal orientation to learning where they were likely to seek challenging tasks, persist through academic challenges, and experience satisfaction in their schoolwork (Gonzalez-DeHass et al., 2005). In addition, the results of Gonzalez-DeHass et al. indicate that parenting is related to students' academic motivation, and that students' academic motivation is related to academic success.

On the other hand, in another study based on the relation between perceived parenting practices and achievement motivation in mathematics, Gonzalez and Wolters (2006) found that parents' involvement in the academic lives of their adolescent children was not associated with the more intrinsic forms of achievement motivation. Their study failed to find that parental involvement at school and in academic activities at home was related positively to a mastery orientation, which refers to a child's desire to become competent on a task. That is, students who viewed their parents as active at their school or involved with their academic work at home were not more likely to report adopting intrinsic reasons for completing their homework. In the same way, the findings failed to show a link between parent involvement and students' feelings of relative autonomy. These findings contradict earlier research in the USA with 302 younger children who were 11–14 years old. In that study Grolnick and Slowiaczek (1994) argued parents are a key resource for children's school success.

Various studies have identified a focus on parental encouragement by ethnically Asian parents. Cai, Moyer, and Wang (1997) argued that Asian parents often motivate their children to achieve academic success and this encouragement may significantly contribute to the success of Asian students. Interestingly, in a comparison study of students in China and Australia, it was found that the students in China had stronger perceived parental encouragement and higher perceived parental expectations than ethnically Chinese students in Australia (Cao, Bishop, & Forgasz, 2007). The authors also found that parents of Chinese speaking students and other non-European students in Australia have similar levels of parental encouragement as each other but significantly higher levels of parental encouragement than parents of students of English speaking background in Australia. This perhaps connects to their migrant status. Therefore, parental encouragement is considered

as a way of positive involvement in children's education. Discussion at home is another area of parent-child involvement.

2.3.2 Home discussion

Communications between parents and children about schooling and school activities are associated with home discussion. Some researchers have found that such discussion has a major positive impact on the academic achievement of children (Aldous, 2006; Bishop & Forgasz, 2007; Ingram, Wolfe, & Lieberman, 2007; Kashahu et al., 2014). In a comprehensive review of research on parental involvement, Desforges and Abouchaar (2003) reported home discussion as the most significant factor, having an impact on children's academic achievement. Regardless of social class, they argued that the more parents and children conversed with each other about education, the more the students achieved in school. Their report on their review of the literature on parental involvement showed a strong gender effect because females reported considerably more home discussion than males. Further, there were ethnic group differences in the degree of home discussion (Desforges & Abouchaar, 2003; Sui-Chu & Willms, 1996). They reported that Asian and Pacific island families engaged significantly less than European families in home discussion. This indicates the need to look into culture and gender in greater detail.

The importance of schooling and education is conveyed to the child through active parent-child communication (McNeal, 2001). Hence, home discussion may determine the degree to which parents and children actively engage in conversations pertaining to education.

Parental involvement in the homework of their children is identified as another factor supporting children's education.

2.3.3 Homework involvement

One of the most common, dominant, and controversial ways parents involve themselves with their children at home is by helping them with homework (Moroni et al., 2015; Phillipson, 2013). Homework is an important part of the daily lives of students and parents and can be viewed as a link between home and school (Moroni et al., 2015). In a study with three Grade 8 teachers and 115 of their students in Singapore, Kaur (2011) found six functions of homework from the perspectives of children. These functions can be of importance to a parent who strives for his/her children's academic achievement. They are: "improving/enhancing understanding of mathematics concepts, revising/practising the topic taught, improving problem-solving skills, preparing for test/examination, assessing understanding/learning from mistakes and extending mathematical knowledge" (p. 187).

While homework provides an opportunity for students to consolidate and expand what they have learned at school (Kaur, 2011), it also helps parents to monitor and be involved in the education of their children. On the one hand, Phillipson (2013) argued that direct help with homework and setting rules about homework completion improve academic achievement while homework assistance exerts excessive pressure on children, interfering with their autonomy and negatively affecting academic performance. On the other hand, in the study conducted by Fan and Williams (2010), the findings pertaining to parents' involvement at home differ in accordance with the subjects. While there were no significant links between parental advice and self-efficacy towards mathematics or intrinsic motivation for mathematics, they found parental advice at home was positively associated with improved sense of self-efficacy towards English, intrinsic motivation in English, and academic engagement. These studies imply the need to further identify factors which contribute to the development of the parent-child relationship through which students' academic and cognitive outcomes can be affected.

Describing the situation parents faced when trying to help their children with homework, Peressini (1997) pointed out that many parents simply did not recognise the mathematics that their children were learning, while some parents thought that their children were not getting enough homework. When children brought home mathematics assignments in which the mathematical context was not clear, or large amounts of traditional mathematics was not required, many parents were dismayed and did not realise the significance of these assignments. In addition, parents were unsure of the consequences that current mathematics education would have for their children, and as a result, the tension that parents experienced in watching their children learn mathematics increased. This may be one of the reasons why parents tend to provide supplemental education such as tutoring for their children, which is another form of parental support that differs among cultures.

In most if not all cultures, students seek support at home from their parents for their homework. Katz, Kaplan, and Buzukashvily (2011) described homework as a unique academic activity that is administered at school but is considered at home. In the home learning environments, parents can engage in supervision and provide support with homework (Harris & Goodall, 2008). However, the links between parental attitudes, students' homework and students' achievement are complex and often debated. Several studies have identified and investigated factors related to parental involvement in students' homework.

In a study about parent–child discussion about homework conducted in the USA and Sweden, Wingard and Forsberg (2009) found that parents became involved in their children's homework in two ways, namely, involvement through anticipating and planning the activity of homework, and involvement by directly participating in the accomplishment of the homework task itself. Wingard and Forsberg (2009) also explained that every family

with schoolchildren was affected by a complex set of variables with regard to parental involvement in homework on a daily basis. These variables include a child's own willingness and orientation to do homework, the amount and type of homework the child receives, and the child's needs and expectations for homework help. Thus, the factors related to involvement in homework that could affect both parents and children were further investigated and included in my study design.

Based on a survey with 709 parents in the USA, Cooper, Lindsay, and Nye (2000) described three dimensions of parental involvement in students' homework. These were autonomy support, direct involvement, and elimination of distractions. All these dimensions were related to different parenting styles. In addition, Cooper et al. found a fourth dimension, parental interference, for students in higher grades. In another study drawing data from two large scale studies ($N = 1274$ and $N = 1911$) in Germany, Dumont et al. (2012) viewed parental homework involvement as a multidimensional construct. Three dimensions identified by them were perceived support, conflict, and parental competence. Their research found that perceived parental support and perceived parental competence to help with homework were positively related to the academic achievement of students, while perceived parental homework interference and perceived homework-related conflict were negatively related to academic outcomes.

Other parental involvement factors have been positively or negatively associated with students' homework. With the data collected from 165 mother-child dyads in the USA, Hyde, Else-Quest, Alibali, Knuth, and Romberg (2006) argued that frequency of homework had a positive effect on mathematics achievement while length of homework had a negative effect for some students. These findings on frequency of homework were supported by Trautwein (2007) in a study on homework variables and achievement with

24,273 (Study 1) and 2,216 (Study 2) year 9 students in Germany. The study by Kashahu et al. (2014) found parental involvement with homework in both mathematics and native language studies had moderate positive effects on children's academic performance. Based on a study with 709 students and 82 teachers in the USA, Cooper, Lindsay, Nye, and Greathouse (1998) found weak relations between the amount of homework assigned and students' achievement. They also found positive relations between the amount of homework students completed and students' achievement, especially at Grades 6 to 12. Further, the time parents spent helping their children with mathematics homework (Pezdek, Berry, & Renno, 2002) or the time students spent on homework (Trautwein, 2007) was unrelated to students' achievement. Even though direct involvement and guidance were positively related to students' achievement (Xu, 2004), monitoring of homework by parents was negatively related (Bempechat & Shernoff, 2012; Patall et al., 2008). There was a lower homework effort in higher grades (Trautwein, Lüdtke, Kastens, & Köller, 2006) and the effect of parental involvement varied with the student's age (Patall et al., 2008).

In fact, few studies found no relation between parental involvement in homework and academic achievement of their children. In a meta-analysis of 50 studies, Hill and Tyson (2009) argued that the involvement pertaining to homework was not consistently related with achievement. However, they found that assisting with homework was the only type of involvement that demonstrated an association with achievement but that was also weak. In another meta-analysis of 14 studies, Patall et al. (2008) argued that the overall effect of parental involvement in homework was small and often not significant. They also explained that homework involvement was not equal across all circumstances. Also, the type of homework involvement provided by parents and the subject matter were other important moderators.

Overall, there are differences and inconsistencies in the above studies. Further research is needed in the area of parental involvement in the homework of their children. Another way of being involved with children's education is provision of a tutor.

2.3.4 Provision of private tutoring

Private supplementary tutoring, or private tutoring in short, is a business (Kinyaduka, 2014), which exists in developing and developed countries and is conducted to supplement the mainstream school education system. This is also referred to as private tuition (Dindyal & Besoondyal, 2007; Ireson & Rushforth, 2014), shadow education (Bray, 2003; Bray & Lykins, 2012), or organised parallel learning activities outside formal school (Matsuoka, 2015) to enhance students' educational competencies. The instructors are usually school teachers who need extra income or any other qualified professionals who are able to teach particular subjects (Kinyaduka, 2014). In a study conducted in Mauritius, Dindyal and Besoondyal (2007) found that students relied on private tutoring when they wanted to do better in mathematics. These students mentioned that they can choose a private tutor but they cannot do the same with a classroom teacher. Further, their choice of a tutor is based on the recommendations of parents or friends, which are again based on advice from other parents, the popularity of the tutor, or feedback from other sources.

While low achievers use private tuition as a means of improving performance and obtaining higher grades in examinations, high achievers seek tuition to be more competitive in high stakes examinations (Bray, 2007). Yet, the learners have to pay for the service of the instructor, accumulating an additional cost to their parents. However, as Dindyal and Besoondyal (2007) described, some parents force their children to take tuition in mathematics, which is a common practice in Mauritius. According to my own childhood experience I can recall similar actions of some parents in my memories of Sri Lanka. The

following quote from Dindyal and Besoondyal elaborates parents' views about private tutoring:

They [parents] claimed that private tuition is important in this competitive world of today because one way to progress and climb up the social ladder is through education. [Further], they claimed that they will do anything to make sure that their children get all the facilities that they themselves did not get. Much of the concern also centred on the fact that mathematics is a key subject in the school curriculum. A certificate without a good result in mathematics is not very valued. (Dindyal & Besoondyal, 2007, p. 13)

Private tutoring can be categorised into three different types: one-to-one instruction by a privately-paid teacher either at the teacher's or at the student's home, small group instruction in a classroom setting, or profit-oriented, school-like organizations where professional teachers lecture in huge auditoriums (Bray, 2007; Hof, 2014). Kinyaduka (2014) listed the countries where private tutoring is mushrooming: Japan, Malaysia, Mauritius, Brazil, Cambodia, Egypt, Guinea, Hong Kong, Korea, Malta, Morocco, Myanmar, Singapore, Sri Lanka, Taiwan, Zimbabwe, and Tanzania. In particular, private tutoring has co-existed with highly competitive education systems in East Asian countries such as Korea, Japan, Taiwan, Hong Kong, and Singapore (Bray, 2007; Dindyal & Besoondyal, 2007).

Poor families who cannot afford to send their children to private schools send their children to private tutors to bridge the gap (Kinyaduka, 2014). Analysing the situation Kinyaduka questioned why students of reputable private schools have private tutoring if the school provides adequate formal education. In an earlier study, Bray (2007) argued that the need for supplementary education to complete the education provided by the formal education means that it is an impaired system. As a solution, he suggested either to develop the formal education system so that it does not require a complementary system or to

formalise and legalise this shadow education system to operate under and maintain accepted standards of education.

Lee (2013) showed that private tutoring positively affects low-achieving students in their attention to school lessons but has no effect for middle and upper-achieving students. As a negative effect, she pointed out that private tutoring may reduce students' self-learning time or students' attention in class, which confirmed findings by Dindyal and Besoondyal (2007). They claimed, "Students taking private tuition are neglecting school work and the value system is such that the work done by private tutors takes precedence over the work done by regular teachers in schools" (p. 16).

Exploring private tutoring and PISA results, Areepattamannil and Kaur (2013) found that private tutoring was negatively associated with academic achievement. PISA is not curriculum driven. As they described, students who are provided with private tutoring may not have received lessons according to the criteria measured in PISA, which are based on real life problems. Instead, their lessons are focussed on the school-based curriculum. Hence, Areepattamannil and Kaur (2013) suggested that private tutoring may not be helpful for adolescents in their preparation to meet challenges in adulthood.

The above analysis of literature on private tutoring suggests that mainstream education not only in some public schools but also private schools does not provide adequate education and having private tutoring is an option for the children. Hence, support factors such as homework involvement and provision of private tutoring can also be included under parental involvement in the conceptual framework introduced in the next chapter.

Parents set up family rules to control their children, expecting them to focus on their studies, which is another way of parental involvement in the education of their children.

The next sub-section introduces family rules investigated in previous studies.

2.3.5 Family rules

Family rules at home were found to be both positive and negative predictors in relation to parental involvement and home supervision. Previous research found parental monitoring as a factor which was positively related to academic achievement and could protect children from exposure to external factors that detract from academic endeavours (Henry, Merten, Plunkett, & Sands, 2008). The following is an example from the literature.

In a study using 10th grade students' data from the Educational Longitudinal Study of 2002 (ELS 2002) in the USA, Fan and Williams (2010) found that the rules for watching television positively predicted students' academic engagement and intrinsic motivation. Thus, a family requires rules even though the above reason may not be the only one for having them. To assess family rules, parents were asked to indicate whether family rules existed and were enforced for their 10th grade child regarding four items. Those rules concerned maintaining a certain grade average, doing homework, doing household chores and watching television. The four variables were treated individually in the analysis. According to the results, Fan and Williams (2010) found that the majority of the families reported certain types of family rules. They argued that as parents limit their children's access to television, it is possible that children would spend more time engaging in constructive learning activities that they enjoy and this in turn would enhance their intrinsic motivation and engagement in studies. In contrast, Fan and Williams found that the parental enforcement of rules for maintaining certain grade point averages was negatively related to intrinsic motivation due to pressure on students. Hence, in this study, setting up family rules is also included as an aspect of parental involvement.

Another factor closely related to family rules is perceptions of control, which is introduced in the following sub-section.

2.3.6 Perceptions of control

Perceptions of control is defined as the belief that one can determine one's own internal states and behaviour, influence one's environment, and/or bring about desired outcomes (Wallston et al., 1987). In relation to parents and children, Fulton and Turner (2008) investigated the relationships between perceptions of parenting and the academic motivation of students. The primary purpose of their investigation was to determine whether parental warmth, autonomy granting, and supervision predict students' perceptions of control. In this context, autonomy can be considered as an individual being responsible for or having a choice in his or her actions.

For their study on students' academic motivation, Fulton and Turner (2008) asked participating students to recall parenting practices from their senior year in high school. Findings of the study revealed different models of perception of control for males and females. For females, warmth, autonomy granting and supervision were significantly related to perceptions of control. In contrast, for males, only warmth and autonomy granting were significantly related to perceptions of control. In comparison, it appears that supervision was a strong predictor of perceptions of control for females only. In this study, however, the information about parenting was gathered only from children and was retrospective. Therefore, strong conclusions cannot be made from their results.

The importance of parental warmth and autonomy granting has been corroborated in work by Gonzalez, Holbein, and Quilter (2002) and Grolnick and Ryan (1989) who found parental warmth and involvement to be related to academic motivation. Also, autonomy granting has been found to be positively related to children's autonomy in academic activities (Grolnick & Ryan, 1989), motivation, and achievement (Ginsburg & Bronstein, 1993). This pattern is consistent with the longstanding view that students desire greater

autonomy and less direct involvement by parents as they advance through adolescence (Eccles & Harold, 1993). Taken together, these findings suggest that the benefits to intrinsic motivation provided by increased parent involvement in school activities among younger adolescents may dissipate by the time students reach high school. Thus, perceived parental control is included as a factor of parental involvement in the conceptual framework.

Another way parents control their children is by material deprivation as explained in the following sub-section.

2.3.7 Material deprivation

Material deprivation experienced by the child at home is lack of material benefits that are considered to be basic necessities. In their work, Sacker et al. (2002) showed that socio economic status had its impact, in part negatively, through material deprivation, and in part, through attitudes and behaviours towards education. They suggested that material deprivation would affect parental involvement and aspirations in children, although on average, material conditions improved over time. Those parents living in financial and material hardship may have fewer resources of their own for interacting with and investing in their children. Therefore, material deprivation, renamed as digital deprivation, for the appropriateness of this study is also categorised under parental involvement.

As a whole, the above sub-sections discussed various possible areas of parental involvement in children's education. Over the decades, a number of researchers have discussed the importance of such parental involvement for achieving the academic success of their children. In fact, parents have different strategies when engaging with their children. Within the same family, the parenting styles of mother and father may not be the same. Different parents may involve themselves differently with their children for

numerous reasons. The next section discusses such parenting styles and their impact on the education of children.

2.4 Parenting styles

Parenting styles play an important role in child rearing. Gonzalez and Wolters (2006) described parenting styles as patterns or configurations of parenting behaviours. Based upon observations and interviews of children attending a university child care system and their parents, Baumrind (1967) initially conceptualized three different types of parenting styles: authoritative, permissive, and authoritarian. Later, permissive parenting was identified as two different parenting styles, which were then introduced as permissive-indulgent and permissive-uninvolved by Maccoby and Martin (1983). Consequently, there are four different parenting styles, which involve combinations of acceptance and responsiveness on the one hand and demand and control on the other (Santrock, 2007). These four types are shown in Table 2.2 and described below.

Table 2.2

Parenting Styles

	Demanding (expect more)	Non-demanding (expect less)
Responsive (supportive)	Authoritative (propagative)	Indulgent (permissive)
Non-responsive (less supportive)	Authoritarian (totalitarian)	Uninvolved (neglectful) (permissive)

Sources: (Baumrind, 1967; Maccoby & Martin, 1983)

2.4.1 Authoritative parenting

Authoritative parenting is democratic, autonomy supportive, and propagative (Gonzalez & Wolters, 2006). Hence, such parents are found to be demanding but responsive.

Authoritative parenting has been associated with more adaptive motivational beliefs and

attitudes and has direct effect on mastery goals (Sepehrianazar & Babaee, 2014) of both parents and children. Gonzalez and Wolters (2006) explained that authoritative parents are democratic, firm, communicative, nurturing, and supportive of independence or autonomy granting. Adolescents of such parents tend to be happy, capable, and successful and they tend to adopt goals that reflect intrinsic motivations (Ginsburg & Bronstein, 1993; Gonzalez & Wolters, 2006), such as improving their abilities, the enjoyment of learning, and overcoming a challenge, resulting in high academic performance. In addition, Gonzalez and Wolters described authoritative parents as individuals who nurture exploration and individuality, openly communicate with their children, constructively respond to behavioural issues, enforce rules, and stress learning as a responsibility of both child and parent. This type of parent may allow children to be a part of making the rules of the household (Ginsburg & Bronstein, 1993).

An authoritative parenting style has been shown to be beneficial to the development of adolescents. Using scores on the dimensions of support and control of 688 parents of adolescents in the Netherlands, Huver, Otten, Vries, and Engles (2010) found authoritative to be the preferred parenting style. Accordingly, extraverted, agreeable, and less emotionally stable individuals were most likely to be authoritative parents. Such parents also may allow for their child to express his or her individuality through the extra-curricular activities and elective courses he or she chooses to learn at school (Steinberg, Lamborn, Dornbusch, & Darling, 1992). While encouraging them to be independent, authoritative parents place controls and limits on the actions of their children (Santrock, 2007).

In their study on the impact of parenting practices on adolescent achievement, Steinberg et al. (1992) involved 6,357 adolescent students who were 14–18 year olds in the USA.

Longitudinal data were collected on students' school performance and engagement in two consecutive years, 1987 and 1988. With the results, the researchers were able to demonstrate that the students who were raised in authoritative homes performed better in school than their peers. Hence, it can be assumed that authoritative parenting is beneficial for children in order to be successful in school education.

2.4.2 Authoritarian parenting

Authoritarian parenting is totalitarian, where parents hold total authority. Such parents stress conformity, obedience, and respect for authority (Gonzalez & Wolters, 2006). They appear to be demanding but not responsive (Sepehrianazar & Babaei, 2014). Authoritarian parents may choose extra-curricular activities, class schedules, and social events for their child with no input from the child at all (Dornbusch, Ritter, Leiderman, Roberts, & Fraleigh, 1987). Findings from a study by Gonzalez and Wolters (2006) showed authoritarian parenting as a positive predictor of students' adoption of performance approach goals. As a result, those students who see their parents as strict and dictatorial adhere to a clear set of parent-defined rules and tend to focus on doing their school work in order to outperform others. In this method of parenting, parents place demands on the child but the child cannot express his/her views, which exerts pressure on children.

2.4.3 Permissive–indulgent parenting

In the literature, permissive parenting or indulgent parenting is also referred to as permissive–indulgent parenting. These parents are supportive but do not expect much (Sepehrianazar & Babaei, 2014). Hence, this kind of parenting involves little enforcement of rules, few demands on children, and a general acceptance of behaviour, whether it is good or bad (Gonzalez & Wolters, 2006). The adolescent children of permissive–indulgent

parents have few or no chores, and receive little direction regarding academic activities from their parents (Steinberg et al., 1992).

Gonzalez and Wolters (2006) described permissive–indulgent parenting as being associated with a generally less adaptive pattern of motivation. Perhaps the lack of guidance that often characterises a permissive–indulgent parent does not encourage or model the inherent interest in mastering education and developing self-set standards for high achievement. Interestingly, Gonzalez and Wolters found that permissive–indulgent parenting was not associated with decreased feelings of autonomy. Contrary to expectations, students who viewed their parents as being more permissive also reported a greater focus on performance approach goals (Gonzalez & Wolters, 2006). Hence, this parenting style also seems to work well with adolescent children.

2.4.4 Permissive–uninvolved parenting

Permissive–uninvolved parents are less supportive of and have no expectations of their children (Sepehrianazar & Babaee, 2014). Indeed, they are neglectful parents and as a result, they are seen as exercising little control over the child.

For cohesion in parenting, it may be essential that parents agree to cooperate with children when combining various factors of their individual parenting styles. Sepehrianazar and Babaee (2014) suggested that parents use the authoritative style in the upbringing of their children. Generally, parents seem to be a combination of all four of the above parenting styles because they act differently in different situations. Hence, this grouping of parents into four groups appears to be unrealistic although this categorisation shows parents' behaviour in various circumstances. This implies that parenting styles are not necessarily parental actions. Therefore, parenting styles have not been used as a factor in the model for this study.

The next section describes parental engagement with their children for academic attainment. However, at this point it is important to make a clear distinction between parental involvement and parental engagement. Unfortunately, researchers often use these terms without clear definitions and even interchangeably. In this thesis parental engagement is considered as the ‘engagement with school’ rather than the ‘engagement with the child’.

2.5 Parental engagement

Many studies in the literature do not clearly distinguish parental involvement and parental engagement. Hence, parental engagement in children’s education is an ambiguous construct. In an article on parental involvement and parental engagement, Goodall and Montgomery (2014) pointed out that many stakeholders seemed to understand parental engagement in various ways. They proposed it as a continuum that moves from parental involvement with school to parental engagement with children’s learning at school. Consequently, the term parental engagement is used to encapsulate a broader conception of the role of parents in children’s learning. Emerson, Fear, Fox, and Sanders (2012) argued that parental engagement consists of partnerships between families, schools, and communities. In addition, they suggested that parental engagement strategies have enormous impact when they are focused on linking the behaviours of families, teachers, and students to learning outcomes.

While involving parents in school activities has an important social and community function (Epstein & Natalie, 2004), it is the engagement of parents in learning in the home that seems most likely to result in a positive difference to learning outcomes. Parental engagement in children’s learning in the home makes the greatest difference to student achievement (Harris & Goodall, 2008). With regard to parents’ involvement,

communication and participation at school, Harris and Goodall (2008) found that while parents, teachers, and pupils tend to agree that parental engagement is a ‘good thing’, they also hold different views about the purpose of engaging parents. In their study in the UK with 314 students aged 11–18 years from 20 urban and rural schools, Harris and Goodall (2008) found that although most schools involved parents in school-based activities in a variety of ways, it seems that parental involvement in school has little, if any, impact on the subsequent learning and achievement of young people. In an earlier study with 140 students from 9th to 11th grade students who enrolled in an Algebra course in a public high school in the USA, Gonzalez and Wolters (2006) failed to find that parental involvement at school was related positively to student motivation. That is, students who viewed their parents as active at their school were not more likely to report adopting intrinsic reasons for completing their mathematics work.

In contrast to the above two studies, in another study in the USA with 15,325 students from 10th grade, Fan and Williams (2010) found parental participation in extracurricular activities with their children was positively linked to students’ sense of self-efficacy, which is one’s own ability to complete tasks and reach goals, in mathematics and academic engagement. Results in these parental engagement studies are contradictory and require further investigation though that is beyond the scope of this study.

In relation to partnerships between schools and communities, in a study involving eight high schools and one laboratory school in the USA, Peressini (1997) argued that parents and mathematics teachers often struggle to establish relationships that are beneficial for their children and students. He also pointed out that the parents who participated in his study realised that children of all ages were encountering different kinds of mathematics than they did during their own school years. Peressini described children’s classrooms as

places where students could be observed completing various authentic mathematical tasks, often without the direct assistance of their teacher, using an assortment of manipulatives and technological tools and engaging in small group debate. As a result, these classrooms were centres of bustling activity in which students appeared to have more freedom than students in a traditional classroom, as their teachers encouraged them to arrive at their own mathematically sound conclusions.

At secondary school level, however, Peressini (1997) who surveyed both parents and mathematics teachers, noted that parents rarely came to the school to observe mathematics classes, while classroom observations were more common at primary school levels. He pointed out that when parents are engaged with school-related activities, they might be able to strengthen the bond between home and school and demonstrate that they value their children's education. A possible consequence of this involvement might be that children would set higher academic goals and feel more confident about their ability to achieve these goals (Fan & Williams, 2010).

When parents perceive that teachers are not open to involving parents (Hoover-Dempsey & Sandler, 1997), this acts as a barrier to parental involvement at school and they are less likely to get involved. Similarly, schools that are welcoming to parents and make it clear that they value parental involvement develop more effective parental involvement than schools that do not appear inviting to parents (Hornby & Lafaele, 2011). Therefore, parents' perceptions of invitations from schools are considered crucial in developing effective parental involvement.

While the literature often highlights that parental engagement makes a significant difference to educational achievement and learning, it is still necessary to know more about the ways in which parental engagement can be enhanced and facilitated across different

sectors of society. However, parental engagement with school, teachers, or community may not be the same as direct involvement with child. Thus, parental engagement has been excluded from this study.

2.6 Socio-economic Status (SES)

Parental involvement is related to the education level and occupations of parents and their socio-economic status and culture (Bloom, 1980; Harris & Goodall, 2008) and these powerful social and economic factors prevent many parents from fully participating in schooling. Due to its relationship to income, social class affects the educational opportunities open to children, which relates indirectly to children's development (Sacker et al., 2002). Socio-economic status is one of the structural characteristics of a family (Blondal & Adalbjarnardottir, 2009) and it is one of the non-school factors (Harris & Goodall, 2008) with regard to parents and children. Study after study has shown that socio-economic status mediates both parental involvement and student achievement (Atweh et al., 2012; Davis-Kean, 2005; Ginsburg & Bronstein, 1993; Harris & Goodall, 2008; Kirk et al., 2011), although less is known about how the effects of socio-economic indicators are mediated by family processes. However, socio-economic status did not interact significantly with the year level of the student according to Ma (2009), who found the effect of socio-economic status to be small and constant across year levels. Nevertheless, Harris and Goodall (2008) identified socio-economic factors as barriers for many parents that prevent them from participating in school activities. Their study was qualitative in design and collected in-depth, case-study data from 20 schools and 314 respondents in the UK.

In a study to find the influence of parent education and family income on child achievement, Davis-Kean (2005) used data from a national, cross-sectional study of

children in the USA. The 868 students participating in the study were 8–12 years old. In this sample 49% were non-Hispanic European–American and 47% were African–American and the rest were from other ethnic groups. According to the results of her analysis, Davis-Kean (2005) found that the socio-economic factors were related indirectly to children’s academic achievement through parents’ beliefs and behaviours. Furthermore, she explained that the link between socio-economic factors and children’s academic achievement varied among ethnic groups and she pointed out the importance of future studies to further examine those differences. In the study by Boxer et al. (2011), the authors found that adolescents who were at socioeconomically disadvantage were likely to believe that they were not able to achieve the level of academic achievement that they wanted to. Perhaps such attitudes were based on their perceptions of feedback for themselves as described by Boxer and his colleagues.

In an article on analysing the influence of parents’ socio-economic status, Vellymalay (2012) reported a substantial body of evidence which confirms that parents from higher socio-economic levels show greater involvement in their children’s education than parents from lower socio-economic levels. With regard to parents’ socio-economic status and levels of parental involvement, Vellymalay’s (2012) findings were also in agreement with previous findings. His study, carried out in Malaysia, involved 80 primary school students aged 8 to 11 years. Similar to his previous study on parents’ level of education in 2011, the students involved were of Indian ethnicity. Additionally, he pointed out the need for future research to examine the relationship between parents’ socio-economic status and parental involvement in ensuring the academic success of their children.

Describing parental involvement in children’s academic lives, Pomerantz, Moorman, and Liwack (2007) pointed out that in the national surveys in the USA about 70% of parents

help their children with homework at least once a week, regardless of their SES, level of education or ethnicity. In Japan, Matsuoka (2015) explored how private tutoring varies with socio-economic status. The study was intended to empirically test whether the structure of formal education affects students' participation in private tutoring. The study utilised a nationally representative dataset consisting of 10th grade students. According to the results of multilevel logistic regression analyses students in high SES schools were more likely to seek private tutoring than those in schools of lower SES. Another finding was that higher SES students tended to take private tutoring, especially if they were in high SES schools. Even though SES seems to affect parental involvement in education it cannot be considered as an action of parents. Hence, SES was not included as a factor of parental involvement.

The next section describes parents' level of education, which is another factor discussed in previous studies.

2.7 Parents' level of education

Several aspects of parents' life contexts can act as barriers to parental involvement. One such aspect is the level of education that a parent has obtained. Parents' level of education can influence their views on whether they have sufficient skills and knowledge to engage in different aspects of parental involvement (Green et al. 2007; Hornby & Lafaele, 2011). In the past, little research has been carried out on parents' level of education and their involvement in the education of their children, yet the few studies done have validated the fact that parents' level of education is an important factor in promoting parental involvement in children's educational attainment (Ireson & Rushforth, 2014; Vellymalay, 2011).

In one such study, Feinstein and Sabates (2006) found an association between the duration of mother's full-time education and her attitudes and behaviours towards children's education. Mothers' education in the study was measured as the age at which they left full-time education. In an article on barriers to parental involvement in education, Hornby and Lafaele (2011) found that the parents without university degrees felt in some ways inferior to the teachers who they assume are better qualified than them and therefore such parents are reluctant to work closely with teachers.

Using data collected through a survey of 1,170 parents whose children were in Year 6, Year 11, and Year 13 and from interviews of 58 parents in the UK, Ireson and Rushforth (2014) found that more home support was provided for children in Year 6 by parents with higher education levels. They also pointed out that parents were less knowledgeable about the secondary curriculum and they felt that they were less able to offer support. In his study, Vellymalay (2011) used questionnaires to obtain data from 150 randomly chosen primary school students studying in national schools in Malaysia. The students selected for this study were of Indian ethnicity. He found that the higher the standard of parents' education, the higher the educational aspirations held by the parents regarding the academic achievement of their children. The findings of the study indicate a moderate relationship between parents' level of education and the strategies implemented by parents to be involved in the education of their children. Moreover, parents with a higher level of education tended to utilise various strategies at home and at school to foster academic excellence in their children. As a result, it appeared that parents with more education may have better skills for managing the education of their children. In contrast, Kirk et al. (2011) found that parents have high expectations for their children despite their level of academic attainment. As seen above, parents' level of education seems to be related to parental involvement but it is not a parental action. If parental involvement is defined as

parental actions then parents' socio-economic status or level of education may not be considered as factors to be further investigated in this study.

The following section reviews studies of children's perceptions regarding their own academic achievement.

2.8 Children's perceptions

Educational expectations of children are associated with parents' involvement in their learning and children's own academic achievement (Muller, 1998), even though parental involvement may matter more for some children than for others (Pomerantz et al., 2007). In this study, parental perceptions in mathematics education interpreted from the point of view of children or the way children think about mathematics attainment was considered as children's perceptions. They may be attributes such as achievement related goals, expectations of success, academic choice, self-concept, self-confidence, emotions, attitudes, values, and beliefs.

Learning mathematics is not only a cognitive (thinking/ knowing) (Bloom & Krathwohl, 1956) but also an affective (emotion/ feeling) process (Anderson & Krathwohl, 2001). As McLeod (1992) stated, affect plays a significant role in mathematics learning and instruction. He suggested three categories of affect in mathematics education: beliefs; attitudes; and emotions. McLeod further argued that beliefs are developed over a relatively longer period and they are cognitive and stable, emotions are affective and often appear and disappear, and attitudes are in between the other two. A fourth construct, values, has been added to the list of affect in mathematics education by De Bellis and Goldin (1999). According to FitzSimons, Seah, Bishop, and Clarkson (2001), values in a mathematics

classroom are an inherent part of the educational process at all levels and they described values as follows:

In mathematics classroom sessions, as in all teaching, values are a crucial component of the classroom affective environment, and thus are a crucial influence on the ways students choose to engage (or not) with mathematics.
(p.202)

For adolescents, it appears that cognitive-affective variables become crucial with regard to academic behaviour (Gonzalez-Pienda et al., 2002), perceptions, and achievement. Viewed as a whole, previous research found evidence that higher parental involvement contributes to an increase in children's academic competence and achievement. Hence, the study investigated children's academic attainment as an output of parental involvement.

The next two sections discuss the resulting positive outcomes of and negative pressure on students' achievement due to parental involvement in mathematics education.

2.8.1 Positive outcomes

Parents make critical contributions to students' achievement. In previous studies, researchers have found that parental involvement yields positive and significant effects on intrinsic motivation, self-concept and self-efficacy, academic aptitudes, causal attributions, and school performance. Intrinsic motivation which exists within and drives the spontaneous behaviours of individuals has been argued to be important for adolescents' cognitive development (Ryan & Deci, 2000a). Those who demonstrate intrinsic motivation engage in academic tasks due to the enjoyment of the tasks and the desire to learn (Fan & Williams, 2010). Further, Fan and Williams (2010) explained that studies have indicated that intrinsic motivation has positive associations with children's achievement, persistence and effort, self-efficacy, and achievement motivation.

Although it has generally been suggested that parents have positive influences on their children's educational outcomes, much of the research has not fully considered the differential effects of various aspects of parental involvement on different elements of achievement motivation (Gonzalez-DeHass et al., 2005). Therefore, more specific information is needed to understand which parental actions and behaviours contribute to promoting and shaping the development of adolescents' senses of self-efficacy, engagement and intrinsic motivation (Fan & Williams, 2010).

In a study about parental involvement, Gonzalez-Pienda et al. (2002) claimed that self-concept was statistically and predominantly causally related to academic achievement, while self-efficacy refers to individuals' beliefs in their ability to produce desired results as well as to learn and perform (Fan & Williams, 2010). Self-efficacy consistently predicts academic achievement (Bong, 2008) due to its effects on effort and persistence, because students who demonstrate greater senses of self-efficacy are more likely to put forth the necessary effort and persist longer when facing academic challenges (Fan & Williams, 2010). While both academic aptitude and self-concept have accounted for achievement, Gonzalez-Pienda et al. (2002) claimed that the effect of self-concept was predominant. Further, they found that attribution was not causally related to self-concept or academic achievement when the task involved finding the roots of success. However, self-concept and causal attributions were found to be significantly and reciprocally related when the task involved finding origins accounting for failure (Gonzalez-Pienda et al., 2002). Parents' involvement had significant effects on students' cognitive, emotional, and behavioural engagement in school. The results of the study by Mo and Singh (2008) confirmed the importance and significance of parents' involvement in middle school students' school engagement and performance. The study has implications for practice and

provides empirical support for creating school structures that would foster parents' continued interest and engagement in their children's education (Mo & Singh, 2008).

Parental involvement also has effects on school performance through helping the child in school work and providing resources for skill development (Ma, 1999). In fact, various aspects of parental involvement have differential effects on students' academic outcomes (Domina, 2005; Fan, 2001; Jeynes, 2005). For example, while the quality of parent and teacher interactions has predicted improvements in student behaviour and achievement (Fan & Williams, 2010), the quantity of interactions has predicted the contrary (Izzo, Weissberg, Kasprow, & Fendrich, 1999). Even though parental involvement has a number of positive outcomes, sometimes it can place excessive pressure on children, as discussed in the next section.

2.8.2 Negative outcomes

During the twelve or thirteen years of schooling and interacting with parents, teachers, and peers, students face emotional situations and negative pressure, which need to be accounted for. Emotions such as anxiety and fear have negative effects on mathematical performance. Analysing students' narratives about their relationship with mathematics, Di Martino and Zan (2013) showed a correlation between fear of mathematics and fear of failure. In another study with 60 students in a province in Turkey, Ural (2015) found the fear of mathematics was due to the grading system in mathematics. In addition, Ural reported a significant relation between fear of mathematics and the educational level of parents.

Generally, the criterion for academic achievement is test scores or school grades. However, it may not be possible to judge the mathematical knowledge or aptitude of a child by the test scores alone. Nonetheless, test scores and school grades help to direct students towards

future pathways of higher education or employment. Hence, there is pressure on children for high academic performance from parents, teachers, and peers too.

Substantial numbers of students see mathematics as a school oriented-task and have limited perceptions of the value of mathematics (Sullivan, Tobias, & McDonough, 2006). Sullivan et al. argued that the value of mathematics had given higher achievers a rationale for perseverance but this was not so for the other students. Further, Sullivan et al. (2009) pointed out that students might benefit if they wanted to focus on the mastery of the content rather than wanting to please their teachers and parents.

Previous findings regarding younger children suggest that increased parental involvement in school activities may enhance intrinsic motivation (Grolnick & Slowiaczek, 1994). In contrast, Fan and Williams (2010) did not find an association between parent participation in school functions and adolescents' intrinsic motivation. It is possible that adolescent children might assume that while their parents are participating in school functions they will be communicating with teachers and other participant parents. During such communications, parents may be able to find out information about their children's academic performance. As a result, the adolescents might feel pressure to perform better than or avoid being inferior to their classmates, thus eliciting forms of achievement motivation that are extrinsic rather than intrinsic (Gonzalez & Wolters, 2006).

In a previous study, Fan (2001) demonstrated that parents' academic aspirations for their children had a greater effect on students' academic growth while communication and volunteering in school had lesser effects, and contact with schools had negative effects. Additionally, as adolescents desire more independence and autonomy, Fan and Williams (2010) argued that it is possible that students would feel as if their actions were being examined and restricted when their parents obtained information from teachers or other

parents. Because of such negative pressure, parents' participation in school functions may be perceived as controlling by adolescents (Fan & Williams, 2010).

Moreover, Domina (2005) found that attending conferences and parent organisation meetings, volunteering, and checking homework were positively related to students' academic achievement. In contrast, students' motivational orientations were negatively associated with parental surveillance of homework, as this was considered to be excessively controlling (Ginsburg & Bronstein, 1993). Indeed, when examining achievement over time, these factors demonstrated negative relationships (Fan & Williams, 2010).

School dropout, giving up or failing can be other possible outcomes of negative pressure. Parental involvement decreased the likelihood of dropping out within authoritative families, but not among permissive-neglectful families (Blondal & Adalbjarnardottir, 2009). Further, the quality of the relationship or the bond between parents and their child seems to better predict the likelihood of the child's staying in school than do specific parental actions that are aimed directly at the child's education.

From the results of their longitudinal study, Blondal and Adalbjarnardottir (2009) found that adolescents who perceived their parents as being more authoritative fared better at school than adolescents who perceived their parents as being more authoritarian or permissive-uninvolved. This applied to both males and females, regardless of their socio-economic background and previous academic achievement. These findings are important, since school dropout is a risk factor for the well-being of the young.

In their longitudinal analysis, Bowen et al. (2012) suggested that higher dropout rates among ethnic minority students can be explained by the relationship between minority status and poverty. Moreover, students from low-income families dropped out at 10 times

the rate of students from higher income families. In contrast to dropping out, Bowen et al. (2012) argued that when students perceived that their parents expected them to perform well in school, they were more likely to avoid problem behaviour and excel academically.

Another reason for some students dropping out of school at an earlier stage of schooling can be private tutoring. Children receiving private tutoring may be able to perform better in school than children from low income families because they do not have the facilities to keep up with the tutored peers (Kinyaduka, 2014).

Instead of dropping out of school some students decide not to study senior mathematics, which may also be a negative outcome. In his research, Ma (1999) used data from a longitudinal study of American youth from Grades 8 to 12. Research questions were based on students' gender and family socio-economic status, prior mathematics achievement, prior attitude towards mathematics, and the effects of different types of parental involvement. His analysis employed data from a student questionnaire. From the results he reported that mathematics participants had higher socio-economic status than mathematics drop-outs at every grade level. In addition, while female participants achieved consistently better than their peers who dropped out of mathematics, male participants had a more positive attitude toward mathematics than male drop-outs since the early grades of high school. However, it was only in the final year of high school that a disproportionate number of females dropped out of advanced mathematics. Ma argued that a large number of students, many of them female, did not take advanced mathematics because of their negative attitude towards mathematics. Many accounts of gender differences in mathematics suggest that females drop out of mathematics as a gradual process that occurs during the entire high school career. Nevertheless, Ma found that both achievement in

mathematics and attitude towards mathematics were the most important factors affecting participation in or dropping out of advanced mathematics.

Further, in Victorian schools, by the end of Year 11 some students who learn Maths Methods give up the subject and enrol in Further Mathematics, which is considered to be an easier subject for Year 12. This is possibly because they find it hard to grasp the concepts in Maths Methods, though they initially wanted to follow the subject. In some cases parents select subjects for their children and it may be the reason of giving up after some time or failing in the end. Another possibility can be the difficulties in understanding the course of study or the curriculum and how it is taught in schools. Although researchers have begun to explore the effects of mathematics curriculum, Ma (1999) argued that the amount of time students receive mathematics instruction and the amount of time they spend on a particular concept is inadequate. However, the result is more than just under-performance in mathematics. Ma explained that inadequate preparation in mathematics affects individuals in their ability to survive economically in future. Further, considering children's perceptions, he argued that attitudes are important in mathematics participation, suggesting that efforts around improving cognitive skills alone may not necessarily lead to increased mathematics participation. The implication is that if parents spend more time on improving their children's attitudes towards mathematics, then this is likely to have an impact on their achievement.

In addition to the conceptual framework presented in the next chapter, there are some theories which can be used as the theoretical framework of this study. The next section introduces applicable theories.

2.9 Theories related to the study

Several theories that contribute to this study and are briefly discussed in this section seem to be partially related to some of the main areas of interest. Out of the most related, self-determination theory (SDT) (Ryan & Deci, 2000a) is foundational to understanding the notion of academic achievement of children in this study. Self-determination means acting with a sense of choice, volition, and commitment, and it is based in intrinsic motivation and integrated extrinsic motivation (Deci & Ryan, 2010). People have a need to perceive that they have autonomy – choices and control over their actions, competence – being good at something, and relatedness – connected to others through positive relationships. Based on these three basic psychological needs of humans and when these three needs are supported, people are intrinsically motivated. As Ryan and Deci (2000b) defined, intrinsic motivation is engaging in a task for the rewards inherent in the task, such as interest, pleasure, satisfaction, and enjoyment, and extrinsic motivation is engaging in a task for the rewards outside of the task, such as grades, avoidance of a punishment, attainment of recognition, or approval, or tangible rewards like toys. Further, intrinsic motivations do not require reinforcements but extrinsic motivation has to be prompted by external factors. Hence, intrinsic motivation is autonomous but extrinsic motivation is more controlled.

In contrast to intrinsic and extrinsic motivation, amotivation is the term used to represent having no motivation, that is, “to have no intention to pursue a goal or engage in a behaviour” (Deci, Ryan, Schultz, & Niemiec, 2015, p. 114). A reason for amotivation identified within SDT is the inability to see a connection between the action and outcomes, which may be due to the lack of skills or knowledge necessary to act, or not experiencing a sense of competence to act (Ryan, Williams, Patrick, & Deci, 2009). As Deci and Ryan

(2012) pointed out, when people are autonomously motivated they learn in a deeper way, perform better, and persist longer than when they are controlled or amotivated.

Within the large framework of SDT, a sub theory known as Cognitive Evaluation Theory (CET) introduced by Deci (1975) focuses on the determinants of intrinsic motivation. As Ryan et al. (2009) stated, “the theory argues that events that are perceived to negatively impact a person’s experience of autonomy or competence will diminish intrinsic motivation, whereas events that support feelings of autonomy and competence will enhance intrinsic motivation” (p. 110). This implies that both feelings of autonomy and competence are prerequisites in promoting intrinsic motivation. As argued by Luo, Aye, Hogan, Kaur, and Chan (2013), perceived parental involvement and autonomy support were positively associated with the academic achievement and well-being of children.

Another sub theory of SDT, referred to as Organismic Integration Theory (OIT) was introduced by Ryan and Deci (2000b) to detail several forms of extrinsic motivation. In order to represent the determinants and consequences of extrinsic motivation, Figure 2.1 illustrates the OIT taxonomy of motivation, arranged from left to right in terms of the extent to which the motivation for an individual’s behaviour emanates from him/herself. This taxonomy includes varied types of regulations of extrinsic motivation, each of which has unique characteristics and associated processes (Ryan & Deci, 2000b).

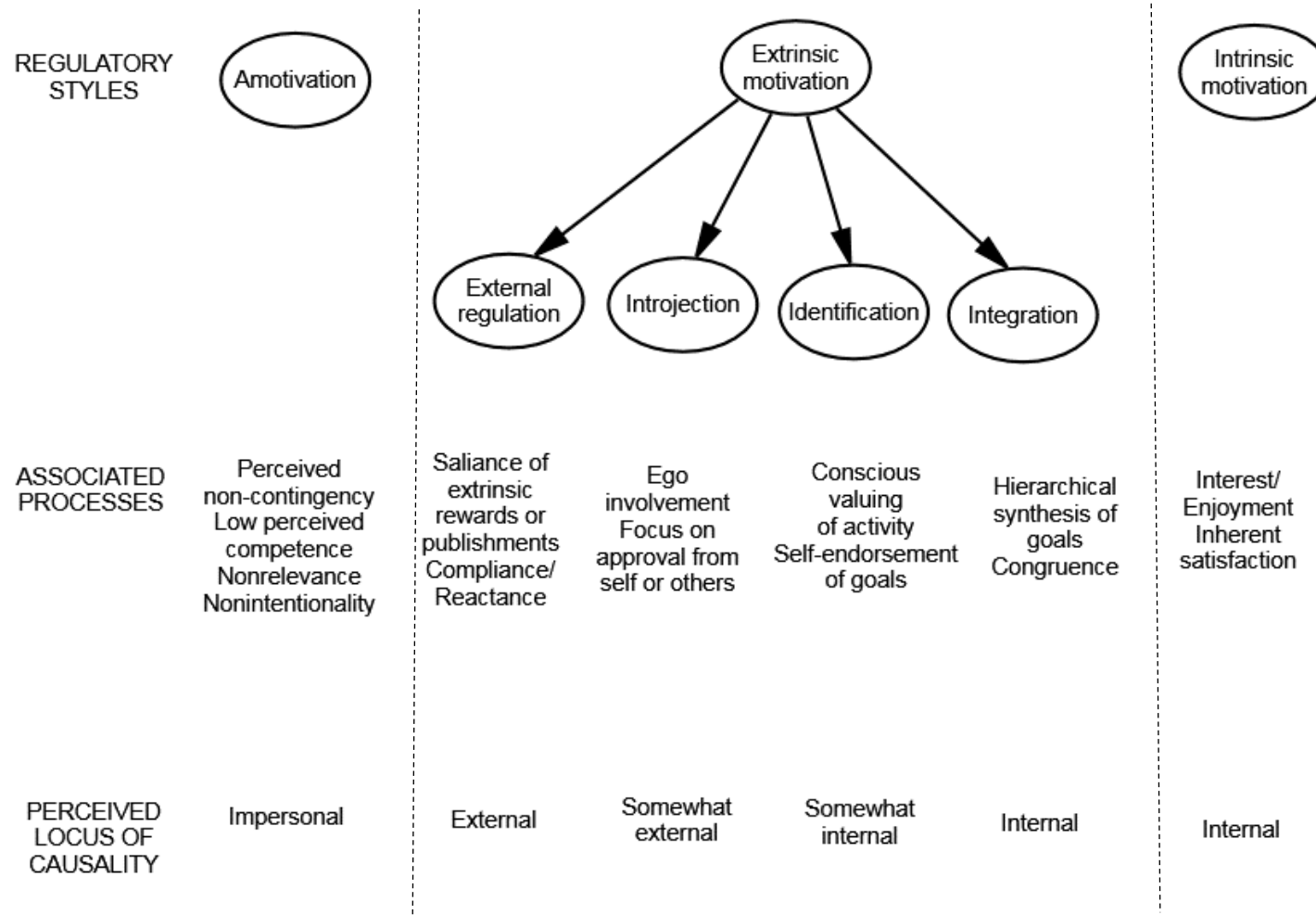


Figure 2.1. A taxonomy of human motivation (Ryan & Deci, 2000b).

Deci and Ryan (2010) stated that when parents tend to support the satisfaction of their children's basic psychological needs, the children will be self-determined. In education settings, teachers need to support students' three psychological needs (Perlman, 2013). Hence, this study considered the possibilities of applying self-determination theory, which provides a framework for understanding the complexities in parental perceptions, their involvement, and children's perceptions in mathematics education.

A variety of constructs have been posited by motivation theorists to explain motivation and achievement. In addition to self-determination theory, expectancy-value theory has been another perspective on the nature of achievement motivation (Wigfield & Eccles, 2000, 2002), which developed through decades with the seminal work of Atkinson (1957). When defining the constructs in models of motivation, Wigfield and Eccles (2000) assumed expectancies and values to influence achievement choices, performance, effort, and persistence. Thence, ability and expectancy beliefs are crucial to the expectancy-value theory of motivation. Researchers who have adopted this theory propose that:

Individuals' expectancies and beliefs for success and the value they have for succeeding are important determinants of their motivation to perform different achievement tasks, and their choices of which tasks to pursue. (Wigfield & Eccles, 2002, p. 91)

Further, Wigfield and Eccles (2002) argued that when individuals do tasks with intrinsic motivation, they will enjoy important psychological consequences themselves, most of which are positive.

This research is also informed by the theory of relative functionalism (Sue & Okazaki, 1990) which has been used to describe the achievements of Asian–American students. Functionalism emphasises the adaptiveness of the mental or behavioural processes. As

Henry et al. (2008) explained, quality of life, employment or educational opportunities, violence, war, or persecution, were the reasons for migration. Further, these researchers pointed out, optimism for an improved quality of life and educational opportunities for children tend to be the common priorities. In fact, migrants experience difficulties in upward mobility and issues with status in society if they belong to minority ethnic groups in their new country. It is likely that the recency of migration is a salient factor in influencing the attitudes of migrant parents. Such parents are likely to be more involved in their children's education than other parents because academic achievement seems to be an important indicator of the future prospects for immigrant families. The theory of relative functionalism explores the extent to which migrants adopt the cultural traits or social patterns of another country. Sue and Okazaki (1990) argued that education is increasingly functional as a means for mobility when other avenues such as sports, politics, entertainment, and so forth, are blocked. They also argued that the academic achievement of children of Asian-American migrants can be attributed not only to Asian cultural values but also to their migrant status.

Similarly, in their study in an Australian context with primary school students, Dandy and Nettelbeck (2002) explained the enactment of this theory thus "immigrants attempt to exploit opportunities not available in their homelands, with the ultimate goal of upward social mobility by way of education" (p. 621). In explaining the outperformance of Asian students in countries such as Australia and America, Dandy and Nettelbeck (2002) and Sue and Okazaki (1990) considered Asian background students as immigrants. Of course it is not just migrants who take an interest in their children's education. Comparatively, according to the 2000 Census data in the USA, more than 25% of Asian-Americans over age 25 had bachelor's degrees in comparison to 15.5% of overall residents in the country (Vartanian, Karen, Buck, & Cadge, 2007).

Due to the wide scope of parental involvement, no single study can address every aspect of this construct. Out of the factors identified and described in this literature review, this study focuses only on parental perceptions, parental involvement, and children's perceptions with respect to culture, gender, and year level. It is important to conceptualise the connections among the factors and attributes in the design. With the introduction of a conceptual framework, the next chapter sets the scene for an appropriate research methodology.

2.10 Summary

This chapter reviewed literature related to the study. A broad range of factors have been identified as contributing to parents and children's actions, perceptions, and comparisons in mathematics education. These include: parental perceptions, parental involvement, parenting styles, parental engagement, demographics, socio economic status, parents' level of education, and children's perceptions.

Attributes which contribute to parental perceptions were identified as parental attitudes, beliefs, expectations, values, educational aspirations, and academic standards. Hence, the factor 'parental perceptions' was used to represent all of these affective variables. The possible inclusions among parental actions that can be categorised as parental involvement factors were parental encouragement, home discussion, homework involvement, provision of private tutoring, setting up family rules, perceived parental control, and material deprivation. Children's perceptions can either positively or negatively affect their mathematics learning.

Past researchers have used various definitions of parent involvement. At the same time, these researchers have used different measures of parental involvement even for a given

definition. Measuring a variety of factors under the same name and measuring the same factor with different metrics seems to lead to complex arguments and obvious inconsistencies. As a whole, early research in the field has shown a variety of inconsistent and conflicting findings. While some studies found that parental involvement had no apparent effect on children's achievement, others found striking, positive outcomes. Nevertheless, a few other studies found a negative relationship under certain circumstances.

Out of all the areas of parent-child interactions in education, the research questions in this study emerged from the identified gaps in the literature. The overall study focuses on parental perceptions, parental involvement, and children's perceptions on parental involvement in secondary school mathematics education as applied to members of the Asian and European background population in Australia and the gender of parents and children.

Chapter 3: Research Methodology

This research study focused on gaining insights into parents' involvement in the mathematics education of their children and how this involvement can be supportive for, or a pressure on, children. Hence, it is of interest to study the parent–child interaction or relationship in mathematics education within different cultures, gender, and year levels. While reviewing research on parental involvement factors and parenting styles, it was found that the theories and concepts employed in previous studies are inter-related and parental involvement factors are directly or indirectly related to the academic achievement of the parents' children. Because of such complexities in the concepts discussed in literature, the methodology of this research involved a conceptual framework and a sequential explanatory mixed methods design to analyse and interpret the data gathered.

The following sections of this chapter argue the need for conceptual framework, and describe the development of the conceptual framework, the research paradigm and approach, sequential explanatory mixed methods design, mixed methods sampling, research participants, survey design and data collection, data analysis techniques and interpretation, ethical considerations, and validity and reliability. The final section provides a summary of the chapter.

3.1 Need for a conceptual framework

The motivation to explore parental involvement in the mathematics education of children followed the exploration of concepts related to parents' influence once it was decided to conduct the research. Firstly, this study aimed to identify factors of parental involvement which positively or negatively affect secondary school children and influence their mathematics education due to parental attributes such as attitudes, beliefs, expectations,

aspirations, values, and academic standards. Secondly, the differences in parental involvement due to cultural background, gender, and year level were investigated. Thirdly, the study looked into the details of parental involvement factors to find out which areas can cause positive and/or negative outcomes on children. Finally, all the findings were combined and discussed to explore the balance between positive and negative outcomes of parental involvement in the education of their secondary school children in the Australian context.

While qualitative data are appropriate to answer research question 1, quantitative data are preferable to find answers to research question 2 (see Section 1.3 above). Hence, this study has a mix of both quantitative and qualitative research questions, which suggests mixed methods research design. Using the information in literature, general beliefs, and the researcher's experience as a student, parent, teacher, and tutor the following conceptual framework described in Section 3.2 was developed to guide and clarify the research process. Hence, the design of this framework is a combination of prior research and experiential knowledge. Notably, as Johnson and Onwuegbuzie (2004) described, a mindfully created design might help effectively answer research questions in mixed methods. Further, Ravitch and Riggan (2012) explained that the use of a conceptual framework might shape the design and direct the study in its evolution.

3.2 Development of conceptual framework

A theoretical perspective may or may not be present in a mixed methods design (Creswell, Plano Clark, Gutmann, & Hanson, 2003), though this study involves a conceptual framework to understand the connections among parental attributes or perceptions, factors of parental involvement, and children's perceptions, which are further described in this section. As Punch (2014) explained, a conceptual model is a representation of main

concepts or variables and their presumed relationship with each other. The model in this study is used to guide the design of instruments, the gathering of the data, and the interpretation of the data.

Factors in the literature, which are directly related to parents and children, such as parental encouragement, family rules, home discussion, homework involvement, and perceptions of control, are included in the proposed conceptual framework. Material deprivation is another factor in previous studies which refers to the inability of individuals or households to afford consumption goods and activities. With regard to parents and children in the study of this digital era, for the appositeness to this study, this factor was modified and used as digital deprivation which is defined as inaccessibility to social media and equipment such as computer games, television, and mobile phones. Students may not be able to access such equipment due to non-availability within premises or prohibition by parents. In addition to the factors mentioned above, another factor known as the provision of private tutoring, which is common at present and appeared in the literature was added to the list. Hence, the following list of factors were explored in the study.

1. Parental encouragement
2. Home discussion
3. Homework involvement
4. Provision of private tutoring
5. Family rules
6. Perceived parental control
7. Digital deprivation

Parental perceptions together with the above seven parental involvement factors, may affect children's perceptions and have a level of impact on these young people's academic

achievement in mathematics education. Children's perceptions may be associated with a collection of both positive and negative outcomes as a result of the combination of parental perceptions and parental involvement. Hence, the conceptual framework consists of parental perceptions, seven parental involvement factors, and children's perceptions.

The possible connections among parental perceptions and involvement factors together with student outcomes are displayed in the conceptual framework in Figure 3.1, which shows how these factors may be related. In the conceptual framework, parental attributes such as attitudes, beliefs, expectations, aspirations, values, and academic standards are collectively considered as parental perceptions. These attributes may influence parental involvement and children's perceptions. Children's perceptions due to the seven parental involvement factors may also be divided into positives and negatives depending on how these factors influence children.

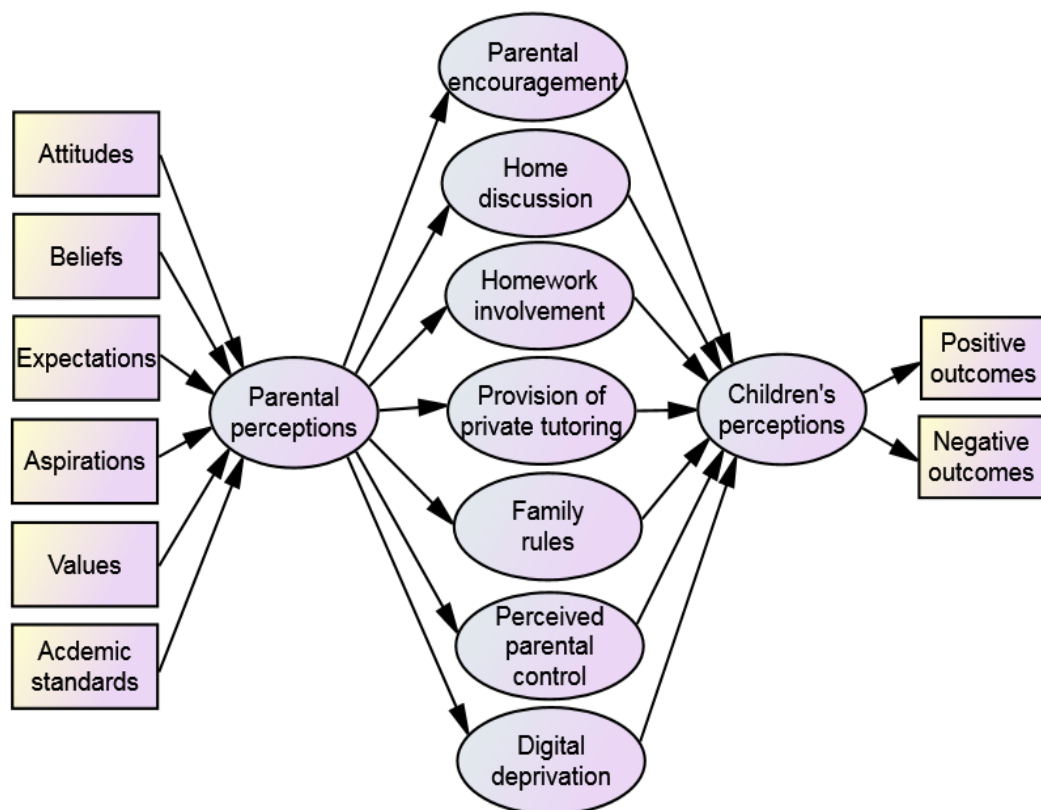


Figure 3.1. Conceptual framework of parental involvement and their relation to the academic achievement of children.

Even though the conceptual framework guides and shapes the study, initial quantitative results may be inadequate by themselves to describe positive and negative outcomes of students. The research questions in this study are not only confirmatory but also exploratory (Teddlie & Tashakkori, 2009). Therefore, qualitative data can be used to explain quantitative results. As a result, the study involves a mixed methods approach.

3.3 Research paradigm and approach

A worldview or paradigm is a set of assumptions about the world (Punch, 2014) which has implications for research methods. Tashakkori and Teddlie (1998) described four paradigms: positivism, postpositivism, pragmatism, and constructivism, and later Teddlie and Tashakkori (2009) added another paradigm to the list, the transformative perspective. They also described that pragmatism and transformative perspectives are linked to, and advocate the use of, mixed methods while searching for practical answers to questions that intrigue the researcher.

Pragmatism and transformative perspectives have quite divergent characteristics. In pragmatism, values play an important role in conducting research and interpreting results while in a transformative perspective, all aspects of research are guided by understandings of social (in)justice (Teddlie & Tashakkori, 2009). As noted in the literature, many researchers have proposed pragmatism as the best paradigm for justifying the use of mixed methods (e.g., Johnson & Onwuegbuzie, 2004; Morgan, 2007; Tashakkori & Teddlie, 1998).

A mixed methods design draws on a pragmatic worldview where the researcher bases inquiry on the assumption that the collection of diverse types of data can provide a comprehensive understanding of research questions (Creswell, 2009; Richards & Morse,

2007). Pragmatists believe that values are important in conducting research and the use of that both quantitative and qualitative methods provide a better description and understanding in relation to commonalities and compatibilities in the study (Barbour, 2014). Hence, mixed methodologists are interested in collecting and analysing both narrative and numeric data working within the pragmatist paradigm (Teddlie & Tashakkori, 2009) where the researcher decides what to study based on personal value systems and the existing literature.

Mixing quantitative and qualitative methods can compensate for the perceived shortcomings of stand-alone quantitative or qualitative methods as mixed methods are often employed with the aim of providing a more complete picture or enhancing coverage (Barbour, 2014; Creswell & Plano Clark, 2007). As a result, mixed methods research, either in parallel or sequential phases, can answer research questions that other methodologies cannot, provides better inferences, and presents a greater diversity of divergent views (Teddlie & Tashakkori, 2003). Hence, the strengths of both quantitative and qualitative research may facilitate the best understanding or answers to the research questions (Hesse-Biber, 2010).

As Yin (2009) explained, case studies may be a part of mixed methods research, and can help to further investigate entities being surveyed. The purpose is to understand data that are complex and can be approached only in context (Richards & Morse, 2007). Hence, qualitative data in this study were used for the purpose of understanding social phenomena while quantitative data sought to determine relationships, effects, and causes (Wiersma, 1991). As a result, both research methods were involved and, in fact, the two methods were expected to be supportive of each other, resulting a better approach to the study as described below.

Firstly, quantitative survey research provided a numeric description of trends, attitudes, or opinions of the population to be studied by investigating a sample of the population (Creswell, 2009). This survey was cross-sectional using questionnaires for both parents and their secondary students. Data were collected with the intent of generalising from a sample to a population. The questionnaires consisted of both closed-ended questions including dichotomous, Likert scale, multiple choice, and checklist types, and some open-ended questions.

Secondly, qualitative case studies, which are detailed, holistic and in-context studies (Punch, 2014), further investigated the research questions and sought a range of different kinds of evidence, which could be abstracted and collated to get the best possible answers (Gillham, 2009). Interviewing is the most prominent data collection tool in qualitative research, with multiple case studies and participant observation being the central data collection technique in ethnography (Punch, 2014). Thus, a parent and child from a few families were interviewed and observed, so as to explore the cases in depth. The hallmark of interviewing is the use of open-ended questions which allow respondents to focus on issues of the greatest importance to them, rather than being directed in the way the researcher is interested (Barbour, 2014). Hence, the aim is to understand the cases, maintain vigorous interpretations, and draw conclusions (Stake, 1995) from qualitative data.

In this study, which is primarily quantitative, there are aspects of the phenomenon that cannot be directly monitored. That is why the study began with a survey and in a second phase, focused on qualitative, open-ended, and face-to-face interviews to collect detailed views from participants, and observations. The following section describes the mixed methods design process, which guides the study.

3.4 Mixed methods design

The goal of this research design is to rely as much as possible on the participants' views of the situation being studied. A mixed methods approach was chosen because of its ability to include both quantitative close-ended response data and qualitative open-ended personal data, minimising the limitations of each individual method.

Creswell (2014) described three basic mixed methods designs, namely, convergent parallel mixed methods, explanatory sequential mixed methods, and exploratory sequential mixed methods. Out of the three designs, this study is based on explanatory sequential mixed methods. Implementing a sequential design with the quantitative component first and the qualitative second added value in understanding the results of both methods (Hesse-Biber, 2010). In sequential explanatory design, quantitative data collection and analysis are implemented prior to qualitative data collection and analysis while either type of data can be given priority or both can be of equal priority. The sequential quantitative and qualitative components in this study are equally important. Hence, the appropriate notation $QUAN \rightarrow QUAL$ is applicable (Creswell, 2015). The stage of integration was at the interpretation phase of the analysis. Accordingly, the procedure involved administering surveys, analysing survey data and in a second phase, conducting interviews and analysing interview data. Then the findings of both quantitative and qualitative data were integrated and interpreted by bringing the findings together as shown in Figure 3.2.

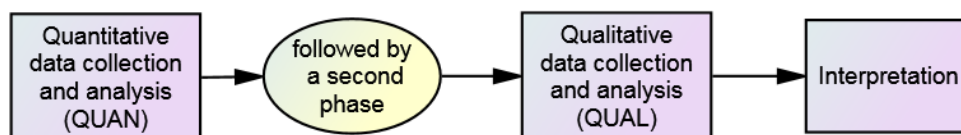


Figure 3.2. Explanatory sequential mixed methods design.

As the quantitative survey data and the qualitative interview data were collected and analysed separately, in this thesis, the quantitative statistical results are reported in Chapter 4 and then the qualitative findings are described in Chapters 5, 6, 7, and 8. The interpretation process is presented as a discussion in Chapter 9, which also provides answers to the research questions.

3.4.1 Mixed methods samples

As explained by Kemper, Stringfield, and Teddlie (2003), there are two types of sampling techniques in mixed methods: probability sampling and purposive sampling. The combination of probability and purposive sampling procedures is commonly used in mixed methods where quantitative and qualitative findings are equally important. While probability sampling focuses on breadth of information from numeric data, purposive sampling focuses on depth of information from narrative data (Teddlie & Tashakkori, 2009). In this study, larger samples in the quantitative study were selected through probability sampling whereas smaller samples in the qualitative study were selected through purposive sampling. Probability sampling enhances generalisability or external validity by extrapolating findings to a larger population. Out of the different kinds of probability sampling techniques, cluster sampling was considered applicable to this study as the sample includes different groups of students in terms of culture (Asian/European backgrounds), gender (male/female) and year level (7 to 12).

Participating parents and children were recruited through cluster sampling, which consists of a random sample of groups within a population (Kemper, Stringfield, & Teddlie, 2003). Hence, the schools with a considerable multicultural population were selected and invited to participate in the survey, and the students and their parents who responded to the questionnaires were cluster samples. Participants were purposively selected for interviews

in the qualitative study. They were strategically and intentionally selected specific cases who were able to provide rich information and help the researcher to understand the phenomenon under exploration (Creswell, 2015; Patton, 2015). Kemper et al. (2003) described this technique as typical case sampling. Sampling decisions were crucial at this stage as these cases were expected to generate a wealth of information, which was needed to address the research questions.

3.4.2 Research participants and data collection

There were different groups or clusters of participants in the probability sample of this study. They were both male or female secondary students from Year 7 to Year 12 and their male or female parents from the sets of Asian and European backgrounds who live in Australia. However, the purposive sample selected from the probability sample included senior secondary students from Years 10, 11, or 12 only because it seemed that parents involve differently with junior and senior secondary students. The participants were male or female students and their parents from the two sets of ethnic backgrounds. Responses from parents and children were gathered using two questionnaires which were similar to each other. Interview questions for parents and children were also similar.

With the permission of education authorities and principals, the consent forms and invitation letters were sent to schools and hard copies of the student questionnaire were distributed to secondary students in three different schools without being selective regarding their ethnic background, gender, or secondary year level. Students were asked to take a copy of the parental questionnaire home and hand it back to their teacher with at least one of the parents' responses. Then the researcher collected responses to the questionnaires filled out by both parents and children. In addition, it was possible to get permission from school principals to upload the questionnaires and make them available on

school websites. This was convenient and enabled students and parents to respond to the questionnaires whenever it suited them.

After the survey using both student and parent questionnaires, from the participants who completed the survey I interviewed a purposefully selected sample of four families (parent and child separately) from each group of European–Australian and Asian–Australian backgrounds. Hence, there were sixteen interviews in total. Interviews were the main means of collecting qualitative data though it was of interest to use responses to the descriptive questions in the questionnaires too. The interviewed participants were also participants in the surveyed sample. This ensured comparison between similar categories of data from both qualitative and quantitative types (Creswell, 2014). According to culture, gender, and year level survey participants can be clustered as shown in Table 3.1.

Table 3.1

Group Differences in Quantitative Survey Data of Both Parents and Children

Culture		Gender	Year level of children	
European-Australian	Asian-Australian			
Children (33)	Children (91)	Male (57)	Year 7 (10)	Year 10 (25)
		Female (67)	Year 8 (8)	Year 11 (49)
			Year 9 (12)	Year 12 (20)
Parents (30)	Parents (55)	Male (40)	Year 7 (12)	Year 10 (19)
		Female (45)	Year 8 (14)	Year 11 (14)
			Year 9 (12)	Year 12 (14)

Note. Four children did not provide personal information.

When responding to the questionnaire, parents provided data about their children. With respect to ethnic group, gender, and year level, distributions of those parents' data were less varied when compared to children's data as shown in Table 3.1. For Years 7 and 8 groups more parents responded to the survey than their children. Conversely, for Years 10,

11, and 12 groups more children responded than their parents. The Year 9 group had a similar number of parents and children. In the final analysis, calculations in *t*-tests and ANOVA were based on mean values, thus minimising the possible effects on results due to these group differences.

With the qualitative data, a total of eight pairs were involved resulting sixteen interviews. Among those participants, there were imbalances in the type of parent–child dyads in European–Australian and Asian–Australian groups, gender of children, and year level of children as shown in Table 3.2. When taking a look at different types of dyads, it was observed that there were missing categories too. The requirement in this study was to conduct semi-structured interviews with parent–child dyads. Hence, gender differences of those dyads were not strictly taken into consideration.

Table 3.2

Group Differences in Qualitative Data

Group		Gender of children	Year level of children
European–Australian	Asian–Australian		
Mother-daughter (1)	Mother-daughter (2)	Male (3)	Year 10 (4)
Mother-son (1)	Mother-son (1)	Female (5)	Year 11 (3)
Father-daughter (2)	Father-daughter (0)		Year 12 (1)
Father-son (0)	Father-son (1)		

In particular the data according to the year levels of children who participated in interviews can be considered as relevant to senior secondary students. In fact, this was due to purposive sampling. As observed in Year 7 to Year 12 classrooms and experienced with those students, it was evident that the learning needs and methods differed with age. Hence, it was appropriate to split them as junior secondary and senior secondary students

to reduce the threats to validity and reliability. As a result, this study focused more on senior secondary students.

Further, while conducting face-to-face interviews, each case or participant was observed for more details and the data were noted. Indeed, as Cohen and Manion (1994, p. 107) contend: “Whatever the problem or the approach, at the heart of every case study lies a method of observation”. Therefore, observations during the interview process or during any other opportunity that arose when working with students and parents were recorded as field notes.

3.4.3 Survey instruments

Questionnaires are the most commonly used method of collecting survey data. There are three prerequisites to design any survey which can be considered as the specification of the exact purpose of the enquiry, the population on which it is to focus, and the resources that are available (Cohen & Manion, 1994). In this study, the purpose of the enquiry was to explore views of students and parents about parental involvement in mathematics education. The population, upon which the survey is focused consisted of secondary students and their parents from four schools in Melbourne, Australia. The schools have a multicultural population of students. For the surveys, previously used instruments (Phillipson, 2006; Whetsel, Hoover-Dempsey, Sandler, & Walker, 2002) were adapted to form parents’ questionnaire and a similar questionnaire was developed for children.

The questionnaires were developed ensuring that the questions were relevant, unambiguous, non-repetitive and easy to answer. Also, multiple choice questions were given sufficient response categories for each participant to make a choice to reduce the amount of non-responses (de Vaus, 2014), which might create difficulties in analysis. Only the necessary questions were included and the length of each questionnaire was kept to 20

minutes approximately. The following Tables 3.3 and 3.4 provide some of the Likert scale questions, which show the similarity between questionnaires for parents and children. Both complete questionnaires are provided in Appendix A.

Table 3.3

Likert Scale Questions Extracted from the Parents' Questionnaire

No	Statements	Strongly agree	Agree	Disagree	Strongly disagree
1.	My child puts all his/her effort into school-related tasks.	①	②	③	④
2.	My child can get better marks if he/she tries harder.	①	②	③	④
3.	My child appreciates my feedback about his/her work.	①	②	③	④

Table 3.4

Likert Scale Questions Extracted from the Children's Questionnaire

No	Statements	Strongly agree	Agree	Disagree	Strongly disagree
1.	My parents believe I put all my effort into school-related tasks.	①	②	③	④
2.	My parents believe I can get better marks if I try harder.	①	②	③	④
3.	I appreciate my parents' feedback about my work.	①	②	③	④

Foddy (1993) advocates using a variety of options in Likert scale type items to include neutral, ambivalent, or no opinion responses. There was no such option or filter given in parents' and students' questionnaires so as to enforce a selection to indicate the direction of the opinion. Regarding other types of questions, the following are some of the multiple choice questions extracted from parents' questionnaire. Similar questions were included in the children's questionnaire.

Q3. What is the gender of your child?

- ☐ Male
- ☐ Female

Q4. What is the year level of your child?

- ☐ Year 7
- ☐ Year 8
- ☐ Year 9
- ☐ Year 10
- ☐ Year 11
- ☐ Year 12

Q5. What is your ethnic background?

- ☐ European–Australian
- ☐ Asian–Australian
- ☐ Other (please specify)_____

For some questions in both questionnaires, one or more responses could be selected. Q7 and Q8 are examples from the parents' questionnaire as shown below.

Q6. Does your child learn mathematics from a tutor?

- ☐ Yes
- ☐ No

If the answer is Yes, go to Q7 and if the answer is No, go to Q8.

Q7. Your child has a tutor to provide extra support in mathematics because (*please tick all the relevant answers*)

- ☐ you are too busy to help him/her.
- ☐ you cannot remember your mathematics.
- ☐ it is difficult to teach one's own child.
- ☐ you want your child to do well in class.
- ☐ your child has to compete with students who have tutors.
- ☐ learning from school is not enough to achieve good results.
- ☐ your child requested you to provide services of a tutor.

Q8. Your child hasn't a tutor to provide extra support in mathematics because (*please tick all the relevant answers*)

- ☐ your child is doing well and doesn't need a tutor.
- ☐ you can help your child without a tutor.
- ☐ your child prefers to learn from you.
- ☐ you cannot afford to pay a tutor.
- ☐ your child refuses to have a tutor.
- ☐ your child doesn't like mathematics.
- ☐ learning from school is enough for a child.

The following open-ended questions for parents and similar questions for children were also included in the questionnaires to gather more data. For those questions, the respondents were expected to formulate their own descriptive answers.

Please write down in the space provided if you have anything more to add or any other concerns about tutoring.

Please write down in the space provided if you have anything more to add or any other concerns about your involvement in mathematics education of your child.

Once each questionnaire had been developed, pilot testing was done with a group of parents and children to check timing and to evaluate all the questions before the questionnaires were distributed among parents and children or made available on school websites. Out of the three schools in this study, two schools agreed to provide a link on the school website facilitating online access to parents' and children's questionnaires. Printed questionnaires were also provided especially for parents who requested hard copies. Only the printed questionnaires were administered at the other school, enabling collection of parents' and children's data.

3.4.4 Interview questions

Another two sets of similar open-ended questions were compiled for families (parents and children) for which it was planned to collect answers during the structured interview process (Cohen & Manion, 1994) in which the content and procedures were organised in advance. Some examples of the interview questions for parents and children are shown below and the complete set of questions is shown in Appendix B.

Interview questions for parents:

1. One of your friends says that parents must help their children with homework. What are your views about this? What are your rules about your child's mathematics homework?
2. What are your future expectations about your child? What do you expect your child to do when he/she finishes school?

Interview questions for children:

1. One of your friends says that parents must help their children with homework. What are your views about this? What are your parents' rules about mathematics homework?
2. What are your parents' future expectations about you? What do they expect you to do when you finish school?

Responses from both parents and children for similar questions were gathered to compare and contrast the responses. Interviews of parent-child dyads were conducted on the same day one after the other at the same location. They had no opportunity to discuss between the time gap. All the interviews were conducted in English and were recorded using two digital audio recorders, one as a backup, and the audio files were transcribed, then checked several times before being analysed. The analysis process is described in the following section.

3.5 Data analysis techniques and interpretation

The original survey data from online questionnaires were automatically recorded in Qualtrics, which was the software used to develop the instruments. The data from hard copies were also entered manually into the Qualtrics database. After finishing quantitative data collection, the parent and student data files were imported into two SPSS files. To analyse quantitative data, descriptive and statistical analysis techniques such as correlation, cross-tabulation, independent samples t-test, and analysis of variance (ANOVA) were used. In order to further analyse quantitative data, confirmatory factor analysis (CFA) and structural equation modelling (SEM) were involved using the IBM SPSS AMOS Graphics [Version 22.0.0] software package. With the qualitative data, interviews were transcribed and content analysis techniques such as coding and querying were employed using the QSR NVivo for Windows [Version 10.0.138.0] software package to organise data. Then, data were synthesised and described using thematic analysis. The above processes are described in detail in Chapter 4 and 5.

Finally, the results of both quantitative and qualitative analyses were integrated together and interpretations were given to answer each research question. As an overall design of this study, the model in Figure 3.2 was developed further, as shown in Figure 3.3, which was adapted from Creswell (2015), Ivankova and Stick (2007), Tashakkori and Teddlie (2003), and Teddlie and Tashakkori (2009).

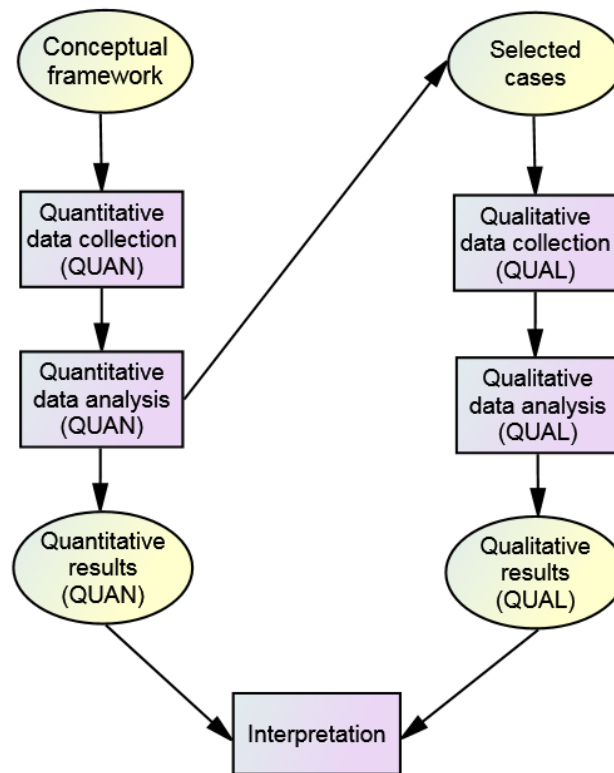


Figure 3.3. Detailed explanatory sequential mixed methods design.

Using this model, the conceptual framework guided quantitative data collection, and then analysis helped case selection for qualitative data collection. Both quantitative and qualitative results were used in data interpretation and in finding responses to the research questions.

3.6 Ethical considerations

After obtaining permission from relevant authorities (Monash University Human Research Ethics Committee and the state Department of Education and Technology) to carry out the research in schools, an information sheet about the research and a consent form were distributed among principals of selected schools to get their permission to carry out the survey and interviews in schools. All questions were answered to their satisfaction. The principals had the opportunity to view any recordings and they had the right to veto some or all of that material. They could also withdraw from the study at any time without

prejudice. After permission had been granted by a principal, an information sheet, consent form, and the links to the parent and child surveys were published on the school website or handed over to students. The responses were handled ensuring the confidentiality of participants all the time. These documents are attached to Appendix C.

3.6.1 Anonymity

The most important feature of anonymity is that information provided by participants should not reveal their identity. A participant is considered anonymous when the researcher or another person cannot identify the participant from the information provided (Cohen & Manion, 1994). In the survey of this study, participants' privacy had been guaranteed but it is acknowledged that interviewees cannot be anonymous.

3.6.2 Confidentiality

For the participants agreeing to a face-to-face interview confidentiality had been promised to protect their right to privacy and steps taken to ensure this. The real names of participants or any other personal details of identification were not used in the thesis. Instead, pseudonyms have been used for participants and their schools when they are described in this thesis and other publications. Although the researcher may know who has provided the information or be able to identify participants from the responses, the participants were assured that the information would not be linked to the real individual who gave it. The data are stored in a password protected computer and the printed data are kept in a locked cabinet until those data are destroyed 5 years after the study.

3.7 Data validation within mixed methods design

As with stand-alone methods, mixed methods studies also need to establish the validity of the results from quantitative measures and the trustworthiness of the qualitative findings. Traditional approaches to validity as well as reliability should still be used in both

quantitative and qualitative forms of data collection, analysis, and interpretation in mixed methods. Notably, the act of integrating quantitative and qualitative approaches raises additional validity issues that need to be identified and minimised.

Over the years, researchers and writers have developed alternative terms for validity within mixed methods designs. Specifically, terms such as ‘inference quality’ (Tashakkori & Teddlie, 2003) and ‘legitimation’ (Johnson & Onwuegbuzie, 2004) are widely used in the literature. However, Creswell and Plano Clark (2007) recommended the use of the term ‘validity’ in mixed methods research because it is commonly used in both quantitative and qualitative studies. They defined, “validity, within a mixed methods context, as the ability of the researcher to draw meaningful and accurate conclusions from all of the data in the study” (p.146). The following sections describe validity, reliability, and potential threats to validity and reliability.

3.7.1 Validity

In both quantitative and qualitative studies, validity serves the purpose of checking on the quality of the data and the results (Creswell & Plano Clark, 2007). The use of a qualitative sample drawn from the quantitative sample increased the validity of data in this particular study. Validity focuses on the generalisability and accuracy of the findings (Wiersma, 1991), which then allows drawing meaningful and accurate conclusions (Creswell & Plano Clark, 2007). In explanatory sequential mixed methods designs, a large sample for the quantitative and a small sample for the qualitative research are recommended by Creswell and Plano Clark. As Wiersma (1991) explained, validity involves two concepts simultaneously: internal validity – the extent to which the results can be accurately interpreted – and external validity – the extent to which the results can be generalised to

populations and conditions. After assuring the validity of data it is important to consider the reliability of data too.

3.7.2 Reliability

Punch (2014) as well as Wiersma (1991) described reliability as the consistency of the research and the extent to which studies can be replicated. Furthermore, reliability can also be described as internal reliability, which refers to the extent to which data collection, analysis, and interpretation are consistent given the same conditions, and external reliability, which deals with the issue of whether or not independent researchers can replicate studies in the same or similar settings (Wiersma, 1991). Therefore, reliability is a necessary characteristic for validity. As reliability focuses on replicability, it is more applicable to quantitative data than qualitative data.

3.7.3 Threats to validity and reliability

There were threats to trustworthiness of each of the quantitative and qualitative data types. This section highlights the potential threats to validity and reliability, in this explanatory sequential mixed methods design, which arose during data collection and analysis, were identified as threats, and minimised during the process.

When looking at quantitative data, firstly, the main threat was sample size. To increase the number of participants, reminders were sent to school principals and then teachers were asked to remind students to complete the online survey and also to request their parents to do the same. In total, 128 children and 85 parents participated in the survey. Secondly, parent-child dyads were impossible to identify from the responses provided, but contact details that were volunteered by interested participants were used when meetings needed to be organised for face-to-face interviews. If dyads had been identifiable, further analysis would have been possible with more findings. Thirdly, even though the researcher

visualised and tried to think of a complete scenario for each question, the responses in the questionnaires were limited only to the number of options provided with the questions. Fourthly, there was no neutral option provided in Likert scale type questions. This helped to increase the number of usable responses. However, there might be occasions where the participant genuinely had no opinion but was compelled to provide an answer because of the non-availability of the neutral option. Finally, imbalances were observed within groups of culture, gender, and year level as shown in Table 3.1 in section 3.4.2.

There were some common threats to both quantitative and qualitative data. First, it was found that there might be issues in validity and reliability due to cultural values, or stereotypes they might have about themselves when responding to questionnaires and interviews. There are some cultures or customs in which people want to please others. In doing so, some participants might not have provided genuine responses. In this study some parents might have been hoping not to insult their children by their responses. Some children might have been in the same situation as parents. Therefore, participants were reminded about the confidentiality of the data gathered and asked to feel free with their responses. Second, again related to customs or mores, some questions might have been answered in a particular way because of the way the questions were asked or worded. Hence, care was taken to ask unbiased questions where possible. Yet, it was anticipated that there could be some limitations in the data collection of this study. Third, there might have been occasions where both parents and children wanted to please the interviewer. These discrepancies have been minimised by inviting participants who were strangers to the interviewer. Fourth, whether or not the parental involvement in the mathematics education of their children could be considered positive or negative was determined by inferences made by the researcher from the data provided by the participants. There were

no direct questions or answers in questionnaires or interviews which could be used to categorise positives and negatives.

3.8 Limitations of the study

During the analysis stage it was realised that there were several methodological limitations in this study that needed to be noted. I acknowledge these limitations but the following are my responses to the issues that arose.

Firstly, one of the strongest limitations attributable to the results is the nature of the sample which is skewed towards parents who volunteered to participate and seemed to be highly motivated to support their children. Also, children were asked to participate if they wished and the participated volunteers could be some of the better students in a classroom, leading the study towards skewness. However, it was impracticable to gather responses from all the children and their parents in a school. Secondly, only four schools in Melbourne, Australia were approached to participate in the study and only three principals consented to involve students and their parents. As a result, this research was conducted in three schools, and the thesis is based on a study with only 128 secondary school children and 85 parents. Hence, it must be acknowledged that the sample is not representative of the population in the country. While the results from the sample of participants used in this study provide some interesting insights, it would be ideal if a larger number of participants could be studied across all year levels from both urban and country schools in all states of Australia. The results would then enable generalisability and be more significant. Thirdly, it would be more meaningful to divide secondary school students into lower, middle, and upper secondary school students to find any differences as the age differences could be an issue in data analysis. Fourthly, it was impossible to track a child and the parent from the same family unless they had provided contact details in the online questionnaires. I

requested contact details only if they were willing to participate in an interview and most of them had not provided personal details. Consequently, I lost the opportunity to incorporate some of the important theories in educational psychology.

Further, this study involved a conceptual model with seven parental involvement factors of interest. The incompleteness of such a model can affect the findings of the study. For example, in previous studies, the socio economic status (Davis-Kean, 2005; Harris & Goodall, 2008; Vellymalay, 2012) and school involvement (Fan & Williams, 2010; Gonzalez & Wolters, 2006; Harris & Goodall, 2008) of parents were considered as parental involvement factors, which were not included in the conceptual model. Socio economic status was omitted because it was not a variable within the three participating schools. School involvement of parents was omitted from the model as it might not be considered a direct parental involvement factor in the mathematics education of children. Finally, the non-homogeneity of the Asian–Australian or European–Australian groups would be an issue and a limitation in this study as described below.

According to TIMSS and PISA, it is observed that not all Asian countries or all European countries have performed in mathematics at the same levels. There are Asian countries as well as European countries which perform at varying levels achieving highest to lowest rankings. Hence, the categorisation of Asian–Australian and European–Australian groups needed more attention and might be sub-divided in a larger study for better results.

The processes of quantitative and qualitative data analysis techniques are explained and the results from this study are presented in the next chapters which provide the base for the answers to the research questions posed.

3.9 Summary

In this chapter I have provided a rationale for the methodology that was applied to this research and described the use of a conceptual framework and explanatory sequential mixed methods design to study parental involvement in the mathematics education of children. The process involved collecting qualitative data after a quantitative phase of data collection to explain the quantitative data in greater depth. In the first phase quantitative data were collected from secondary school children and their parents using two questionnaires. In the second phase purposively selected parent–child dyads were interviewed to collect qualitative data. Qualitative and quantitative data were analysed separately and at a final stage both types of data were connected to further explain the findings. Validity and reliability of the data and limitations were also discussed. Use of mixed methods enhanced the quality of this research project, providing interesting results that can be useful for parents who are involved in the education of their children.

Chapter 4: Quantitative Data Analyses

Quantitative analyses in this study describe the processes involved in finding possible answers to research questions using data from parents' and children's questionnaires. Due to the nature of the second question, quantitative data seemed appropriate. Before moving forward with the analyses, the following provides a recall of the research question 2 in this study.

To what extent do parents' perceptions about and parental involvement in mathematics education affect the way children think about mathematics achievement differ

(a) between Asian–Australian and European–Australian backgrounds?

(b) between genders of children and parents?

(c) among year levels of children?

To begin, I found correlations among items related to parental perceptions, parental involvement factors, and children's perceptions. Each of the above factors with items of appropriate correlations were involved in the processes of determining emerging relationships. Then, several statistical techniques were used to analyse data with respect to ethnic background, gender, and the year level of students. Steps involved in each process and the results are presented in this chapter.

The conceptual framework used to guide the study and the factors of interest are discussed in Chapter 3. These factors were investigated and the results are presented in this chapter.

First, each of the parental involvement factors shown in the conceptual framework in Figure 3.1 was subjected to the same procedures and tests using responses from the parents' questionnaire. Second, similar procedures and tests were involved with each of the factors using data from the children's questionnaire. Hence, the analyses include both parents' and children's data because they represent different perspectives. Results were

then compared and contrasted to distinguish any similarities and differences in parental perceptions of mathematics education, parental involvement, and children's perceptions of achievement in particular to cultural background, gender of parents and children, and the year level of the children. The initial analysis processes used with the above seven parental involvement factors were quite repetitive and it was impossible to define and set boundaries to those factors to distinguish them from each other. In particular, when dividing items in questionnaires among the seven parental involvement factors and the parents' and children's perceptions factors, some items seemed to be suited for inclusion in more than one factor. Hence, such items were included in several factors.

The use of mixed methods in this study was advantageous in the processes of data analysis as the themes emerging from the qualitative data were able to lead the quantitative data analyses too. Data in the transcribed interviews were coded, checked, and re-coded several times using NVivo program to ensure that the data were grouped into relevant nodes according to emerging themes. Both parents' and children's responses to interview questions suggested that parents act as motivators, supporters, and controllers in the education of their children. After examining both quantitative and qualitative data, the conceptual framework in Figure 3.1 was improved to show how parental involvement factors were categorised into motivation, support, and control, as shown in Figure 4.1. Parental motivation was a combination of parental encouragement and home discussion. Homework involvement and provision of private tutoring together were considered parental support. Setting up family rules, perceived parental control, and digital deprivation were combined as parental control. Perhaps, parental support can also be a form of parental motivation of children. In this study parental motivation refers to motivate children in learning mathematics while parental support represents the provision of support for children to do mathematics.

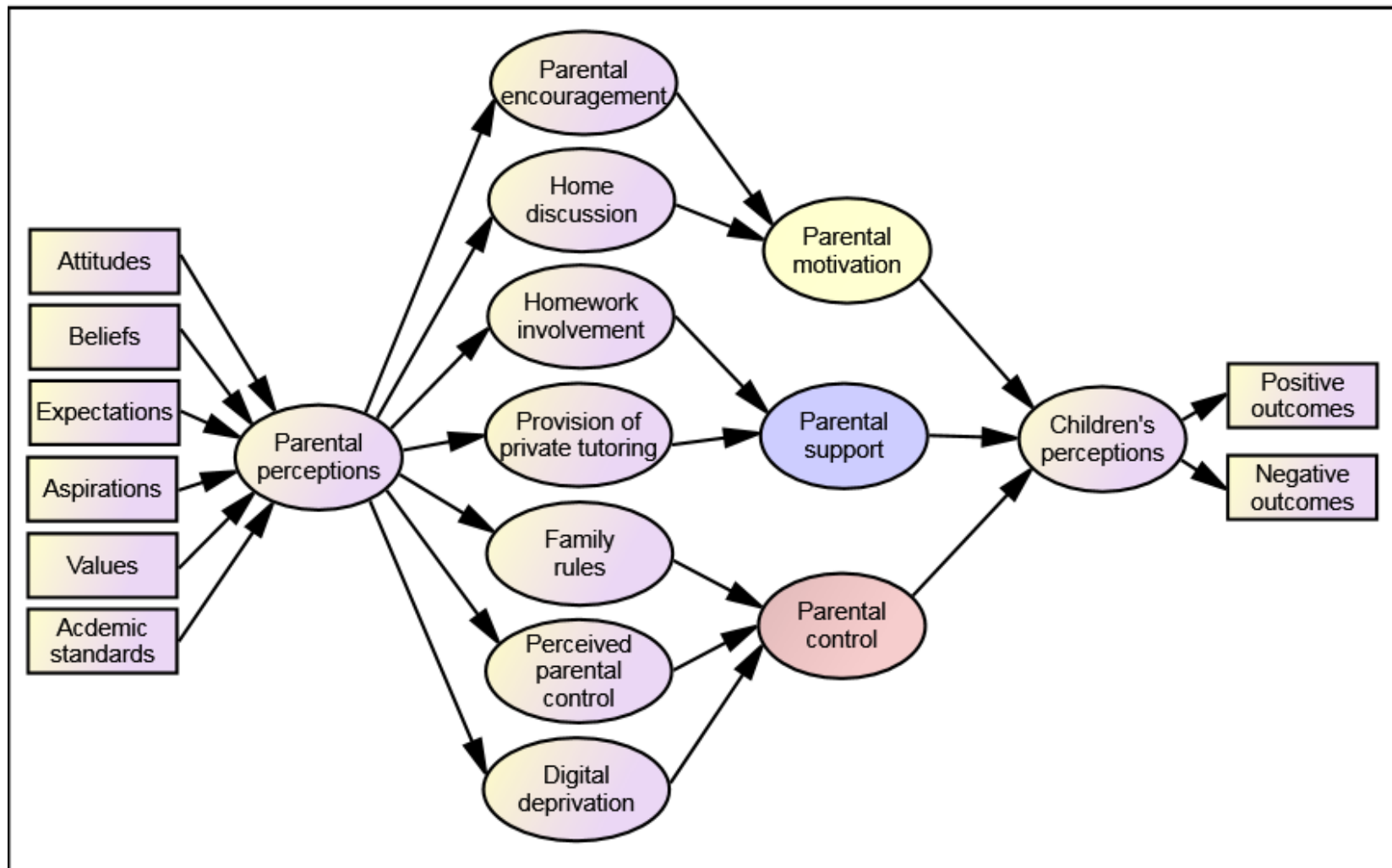


Figure 4.1. Improved conceptual framework enabling quantitative data analyses.

4.1 Steps involved in the analyses

With the aid of the modified conceptual framework in Figure 4.1 the analysis process involved the following steps:

- Step 1: All the items in instruments were grouped into relevant factors using information from previous studies in the literature and personal experiences. Some items were included in two or three factors when it was impossible to decide the best suited one as shown in Table 4.1. This was found to be a problem of design of the items, which was resolved in step 3.
- Step 2: Correlations were found among selected items to retain most related items within each factor.
- Step 3: Data were subjected to Structural Equation Modelling (SEM). Confirmatory Factor Analysis (CFA) was performed to recognise best factor loadings with selected items for parental motivation, support, and control. The problem of item repetition in Step1 was also dealt with by using the best factor loadings.
- Step 4: Independent-samples *t*-tests were used to compare the mean scores between ethnic backgrounds and genders of parents and children and to check for the significance of differences between variables. An effect size statistic for each relation was calculated too. The findings were used to answer research questions 2(a) and 2(b).
- Step 5: One-way between-groups ANOVA (Analysis of variance) with post-hoc tests were conducted to compare mean scores among year levels of students, to check for significance of differences, and to find where the differences occur. Also, an effect size statistic for each relation was calculated. The findings were used to provide answers to research question 2(c).

The next sections present the procedure and output of each of the above five steps for parents' and children's data with each of the seven parental involvement factors shown in Figure 4.1 in relation to parental perceptions and children's perceptions. Further, the following items from the parental questionnaire and similar items from the children's questionnaire were used in the analysis process and presented below for ease of reference. The complete questionnaires are included in Appendix A.

- A1. My child puts all his/her effort into school-related tasks.
 - A2. My child can get better marks if he/she tries harder.
 - A3. My child appreciates my feedback about his/her work.
 - A4. I care more about my child's learning skills than the marks for subjects.
 - A5. My child appreciates it when I get involved in his/her education.
 - A6. My child never copies answers from his/her friends.
 - A7. My child asks for help from the teacher whenever he/she requires.
 - A8. Mathematics is one of the favourite subjects of my child.
 - A9. For me, learning secondary mathematics is a waste of time.
 - A10. I make sure that my child spends enough time on studies after school.
 - A11. I assume my child is doing all right when I don't hear anything from the school.
 - A12. My child's learning is mainly up to the teacher and my child.
 - A13. I expect my child to spend more time on mathematics than other subjects.
 - A14. It's important that I let the teacher know about things that concern my child.
 - A15. Parent-teacher interviews are very important to get to know about my child's education.
 - A16. This school does a good job of letting me know about ways I can help out in school.
 - A17. I do not get involved in my child's school because my child does not like it.
 - A18. I check to ensure that my child's homework gets done.
 - A19. I talk to my child about what he/she is learning at school every day.
 - A20. I make my child do his/her homework again if I think it is not done well enough.
 - A21. My child never shows me his/her homework.
 - A22. I am too busy and I have no time to help my child with his/her homework.
 - A23. My child asks me for help with homework.
 - A24. I help my child with schoolwork if he/she asks.
 - A25. I spend time just talking to my child.
-
- B1. A student's motivation to do well in school depends on the parents.
 - B2. I am confident that I can motivate my child to try hard in school.
 - B3. I reward my child for good marks for end of semester reports.
 - B4. I usually keep the house quiet when my child is doing homework.
 - B5. I let my child engage in activities that are educational outside the home.
 - B6. I am primarily responsible for making sure that my child is supported to do his/her best in school.
 - B7. I want to employ a tutor to help my child in mathematics.
 - B8. My child asks to employ a tutor for him/her to help in mathematics.
 - B9. I prefer to have a tutor who can prepare my child for examinations.
 - B10. Learning from school is not enough to achieve outstanding results.
 - B11. I can help my child when he/she has difficulty understanding mathematics.
 - B12. I am confident about my ability to make choices regarding my child's schooling.
 - B13. I don't know how to help my child make good grades in school.
 - B14. I have enough income to support my child's education.
-
- C1. At home my child always listens to music while he/she is doing homework.
 - C2. I allow my child to use Internet or mobile phone only after finishing homework.
 - C3. My child is allowed to chat with his/her friends online anytime he/she wants.
 - C4. My child can use the Internet only with permission from a parent.
 - C5. My child has a timetable to do his/her homework every day.
 - C6. My child likes to do his/her homework while watching TV.
 - C7. My child usually watches television before doing his/her homework.
 - C8. I limit what my child watches on television.
 - C9. While my child is doing homework he/she often texts, tweets, chats on-line or talks to friends.
 - C10. My child can go to bed on school nights only after finishing homework.
 - C11. After finishing homework my child must study at least one more hour every day.
 - C12. My child has an email account or face book account.

- C13. I keep an eye on my child's progress with school work.
 C14. I allow my child to go out or sleep over with his/her friends.
 C15. My child must come home directly after school on any school day.
 C16. I do not allow my child to stay out with his/her friends till late.
 C17. I often listen to my child's side of an argument.
 C18. I allow my child to make decisions about his/her education.
 C19. In my house my child has a voice in making rules that concern him/her.
 C20. I have no influence on my child's high school plans.
 C21. I believe that parents should make the decisions in a family.
 C22. My child and I together make choices about my child's schooling.

After revising several times, the items which were grouped under each factor are shown in Table 4.1, which is the output of Step 1.

Table 4.1

Identified Factors and Related Items

Factor	Items
(a). Parental perceptions	A1, A4, A6, A13, A17, A19, A24, A25, B1, B12, B13, C11, C13, C18, C19, C22
(b). Parental encouragement	A3, A5, A17, A19, A24, A25, B2, B3, B4, B5, C17, C18, C19, C22
Set up family rules	A10, A18, A20, C2, C3, C4, C5, C10, C11, C14, C15, C16, C19, C22
Home discussion	A25, B2, B6, B11, C17, C18, C19, C21, C22
Homework involvement	A18, A19, A20, A21, A22, A23, A24, C1, C2, C5, C6, C7, C9, C10, C11, C22
Digital deprivation	C1, C2, C3, C4, C6, C7, C8, C9, C12
Perceived parental control	A10, C2, C3, C4, C8, C12, C13, C14, C15, C16, C17, C18, C21
Provision of private tutoring	B7, B8, B9, B10, B11, B13

(c). Children's perceptions	A1, A2, A3, A5, A7, A8, A14, A15, A16, A17, A21, A23, B2, B6, B11, B13, C13, C21, C22
-----------------------------	--

During the initial process of identifying items relevant to each factor, Step 1 was performed by categorising items manually. In order to identify the most related items to parental perceptions, step 2 was performed using IBM SPSS Statistics 20 and correlations found among items. Table 4.2 shows the output items and correlations related to parental perceptions. Step 2 was used to assist in making the decision of whether to retain items within each factor or not.

The term 'significant' is used throughout this chapter to describe a difference that meets the requirements of statistical significance in correlation (p) at the threshold level of 0.05. If $p > 0.05$, the evidence against the null hypothesis is not strong enough and it is impossible to reject the null hypothesis. If $p < 0.05$, the evidence against the null hypothesis is strong enough, so it is possible to reject the null hypothesis and accept the alternative hypothesis.

Firstly, correlation values in Table 4.2 were used to identify items related to parental perceptions. Values highlighted in yellow in the table are greater than 0.300, which is the cut-off level for items to be suitable to include in factor analysis (Pallant, 2013; Tabachnick & Fidell, 2013). Further, a few other values which are significant at the 0.05 level are highlighted in blue because those values are nearly equal to 0.300. The items belonging to highlighted correlation values were included in parental perceptions for further analysis. Negative values in correlation matrix represent negative relations between items, which means when one item increases the other one decreases.

Table 4.2

Correlations among Items Related to Parental Perceptions

	A1	A4	A6	A13	A17	A19	A24	A25	B1	B12	B13	C11	C13	C18	C19	C22
A1	-															
A4	.105	-														
A6	.288**	.006	-													
A13	-.049	-.181	-.133	-												
A17	-.062	-.091	-.280*	.059	-											
A19	.125	.225*	.067	-.142	-.202	-										
A24	.095	.223*	-.043	-.047	-.227*	.277*	-									
A25	.044	.303**	.083	-.187	-.183	.376**	.424**	-								
B1	.265*	.184	.243*	.212	-.109	.117	.214*	.023	-							
B12	.188	.155	.051	.019	-.305**	.218*	.441**	.346**	.297**	-						
B13	-.245*	-.241*	-.211	.143	.403**	-.467**	-.312**	-.261*	-.220*	-.474**	-					
C11	.089	-.235*	-.141	.369**	.227*	-.236*	-.170	-.277*	-.134	-.063	.143	-				
C13	.107	.080	.210	-.350**	-.388**	.510**	.277*	.315**	.061	.251*	-.342**	-.288**	-			
C18	.103	.203	.352**	-.165	.037	.031	.106	.195	.165	.026	-.180	-.122	.112	-		
C19	.056	.297**	.291**	-.169	-.145	.134	.209	.277*	.214*	.155	-.174	-.478**	.193	.634**	-	
C22	.169	.355**	.269*	-.298**	-.229*	.255*	.228*	.431**	.282**	.315**	-.275*	-.238*	.360**	.478**	.554**	-

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.3

Correlations among Items Related to Children's Perceptions

	A1	A2	A3	A5	A7	A8	A14	A15	A16	A17	A21	A23	B2	B6	B11	B13	C13	C21	C22
A1	-																		
A2	-.228*	-																	
A3	.520**	-.099	-																
A5	.316**	-.159	.606**	-															
A7	.578**	-.107	.366**	.311**	-														
A8	.134	.188	.283**	.200	.237*	-													
A14	-.042	.144	.029	.147	.049	.111	-												
A15	.100	.019	.053	.117	.223*	.048	.285**	-											
A16	.067	.228*	.109	.192	.107	.305**	.013	.342**	-										
A17	-.062	.007	-.363**	-.528**	-.189	-.281*	-.101	-.107	-.308**	-									
A21	-.263*	.328**	-.448**	-.426**	-.365**	-.191	-.125	-.175	-.064	.192	-								
A23	.012	.030	.186	.384**	.122	.127	.115	-.176	-.012	-.243*	-.428**	-							
B2	.358**	.012	.420**	.558**	.337**	.188	-.066	.176	.417**	-.347**	-.235*	.298**	-						
B6	.043	.127	.036	.314**	.022	.092	.085	.117	.206	-.161	-.003	.049	.273*	-					
B11	-.089	.065	.179	.276*	.055	.227*	-.128	.087	.364**	-.178	-.028	.165	.298**	.128	-				
B13	-.245*	.098	-.576**	-.544**	-.310**	-.184	-.036	-.112	-.142	.403**	.477**	-.390**	-.513**	-.170	-.299**	-			
C13	.107	.137	.309**	.404**	.276*	.089	.348**	.162	.239*	-.388**	-.366**	.161	.281**	.090	.052	-.342**	-		
C21	-.121	.138	-.109	-.001	.081	.077	.044	.019	.114	-.043	.222*	-.076	.150	-.031	.082	.060	-.050	-	
C22	.169	.021	.237*	.300**	.259*	.162	.086	.123	.155	-.229*	-.304**	.217*	.292**	.283**	.242*	-.275*	.360**	-.248*	-

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Secondly, applying a similar procedure with the other main factor, children's perceptions, the resulting correlations are shown in Table 4.3. All the items, except C21, were suitable for factor analysis as correlations between items were greater than required levels. Again, the items corresponding to highlighted correlations of children's perceptions were used in further analysis. It should be noted that the children's perceptions can be both positive and negative. Hence, items which have positive or negative effects on the education of children were included in this factor. In Table 4.3, B13 is strongly and negatively correlated with A3 and A5. The direction of negatively correlated items were not considered at this stage because such items needed reverse coding, in Step3.

Thirdly, correlations between items were found for each of the other identified factors, which are listed with related items in Table 4.1. Similar to the procedures used with correlations of previous factors, relevant items were selected for inclusion in factor analysis. The resulting correlation tables are provided in Appendix D.

Moving on to Step 3, the following describes how Confirmatory Factor Analysis (CFA) was performed among parental perceptions, children's perceptions, and each group of parental motivation, support, or control factors.

4.2 The use of CFA models

In CFA, a hypothesised model is tested for the best fit with the available items and factors of interest. Hence, an initial model was designed with parental perceptions, children's perceptions, and parental motivation factors with significantly correlated items. Missing values in the data were replaced with mean values (abbreviated as RMV) and the items with negative factor loadings were reverse coded (RC). The model was then evaluated by statistical means to determine the adequacy of its goodness-of-fit to the sample data

(Byrne, 2010). Then, factor loadings which are also known as standardised regression weights were examined for statistical significance. The models were assessed and refined several times, discarding items with lower factor loadings to achieve the best overall fit.

In the refining process, Chi-square value (χ^2 value), degrees of freedom (df), and probability level (p -value) were used to test and compare models. By definition, the number that shows degrees of freedom of a model is the difference between the number of observations and number of parameters. Roughly, a good fitting model may be indicated when the ratio of the χ^2 value to the df is less than two (Tabachnick & Fidell, 2013). It has also been suggested that the closer the Chi-square to the degrees of freedom, the better the fit is (Thacker, Fields, & Tetrick, 1989). Further, the higher the probability level associated with Chi-square, the better the fit is, and the p -value should be greater than 0.05 for good model fit. Decrease in both χ^2 value and df and increase in p -value resulted in a gradual approach of the best possible model.

In the process of fitting the best possible model, researchers have used absolute fit indices and incremental fit indices, which are now discussed. As explained by Hooper, Coughlan, and Mullen (2008), absolute fit indices determine how well a priori or a derived model fits the sample data, and incremental fit indices are based on the comparison of the fit of a substantive model to that of a null model. Absolute fit indices used in this study are Root Mean Square Error of Approximation (RMSEA), Goodness-of-Fit Index (GFI), and Root Mean squared Residual (RMR). The incremental fit index included in the study is Comparative Fit Index (CFI). In the CFA process, cut-off values for model fit indices ensuring a good model fit are as follows:

- $RMSEA \leq .06$ (Hu & Bentler, 1999),
- $GFI \geq .90$, and .95 for smaller samples (Miles & Shevlin, 1998),
- $RMR \leq .05$ (Byrne, 1998), or .08 acceptable (Hu & Bentler, 1999), and

- $CFI \geq .95$ (Hu & Bentler, 1999).

The total number of participants ($N = 213$) when divided into small sample sizes as parents ($n = 85$) and children ($n = 128$) may cause small deviations from the above cut-off values. Out of the above indices RMSEA and CFI are considered to be the least sensitive to the sample size (Fan, Thompson, & Wang, 1999; Hooper et al., 2008). Hence, those values were considered the most important indices during the model fit process. The following describes CFA models and composite factor scores which were involved in finding correlations between factors and in further analysis such as *t*-tests and ANOVA. Analyses were done separately by grouping the data as parental motivation, parental support, and parental control. The results for parents' data are reported in the following sections and the results for children's data are presented in Appendix E due to word length limitations. Even though separate CFA models were developed using parents' data to represent parental encouragement and home discussion, with children's data it was possible to construct a single model with parental encouragement and home discussion together in the same model representing parental motivation.

4.3 Parental motivation

Parental encouragement and home discussion, which are considered parental motivation factors, are discussed in this section with quantitative data and also in Chapter 6 with qualitative data. Firstly, a hypothesised structural equation model was initiated with the items related to parental perceptions, parental encouragement, and children's perceptions, and analysed using AMOS. The resulting CFA model ($n = 85$, χ^2 value = 36.91, $df = 31$, p -value = .21, $RMSEA = .05$, $GFI = .91$, $RMR = .03$, and $CFI = .98$), factor loadings, and covariance values are shown in Figure 4.2.

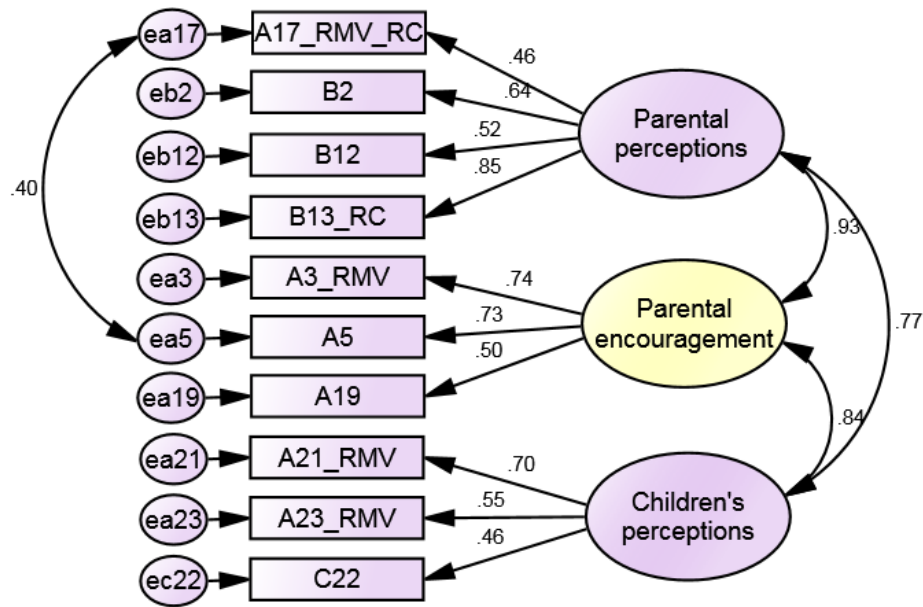


Figure 4.2. CFA model with parental encouragement.

Note: RMV – Replaced Missing Values, RC – Reverse Coded

Secondly, after refining several times, a CFA model was obtained for the items in parental perceptions, home discussion, and children's perceptions. The resulting model ($n = 85$, χ^2 value = 58.18, $df = 49$, p -value = .17, $RMSEA = .05$, $GFI = .90$, $RMR = .04$, and $CFI = .97$) satisfies the requirements of a good model fit. Factor loadings and covariance values are shown in the CFA model in Figure 4.3. With parents' data it was impossible to achieve the required model fit when the two factors were combined to obtain a single model. However, with children's data it was possible to construct a single model with parental encouragement and home discussion together as parental motivation.

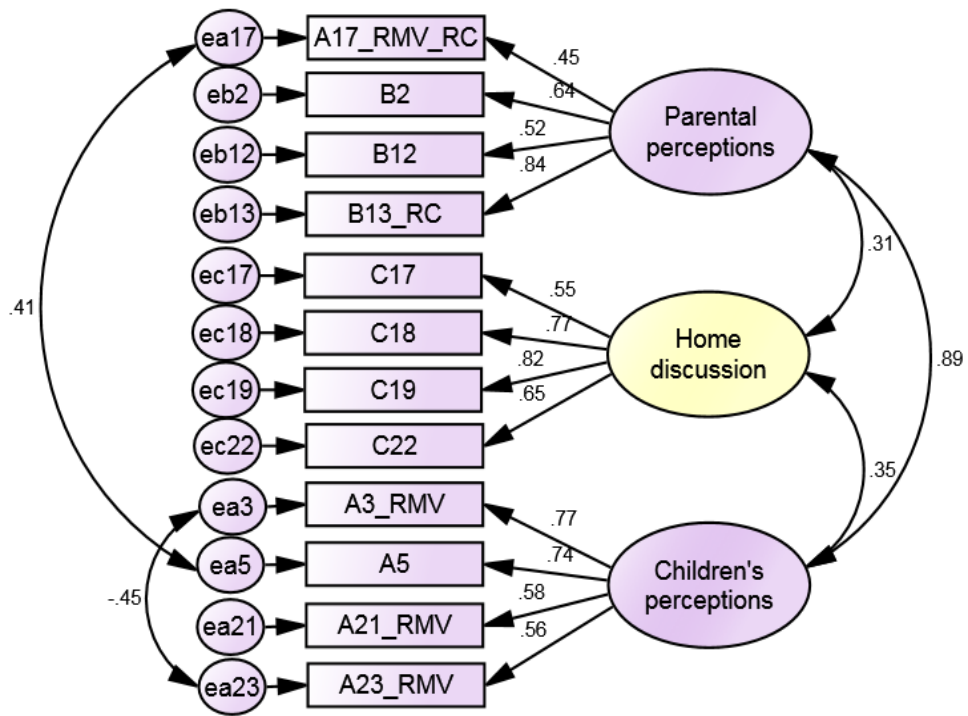


Figure 4.3. CFA model with home discussion.

Note: RMV – Replaced Missing Values, RC – Reverse Coded

Ensuring good fit, both of the above models satisfy the cut off limits described earlier in the description of the use of CFA in section 4.2. Composite factor scores found using those models were further involved in the next steps. To begin, factor scores for the CFA models were computed and involved in investigating correlations between factors. Later, those factor scores were further involved in comparisons between culture, gender, and the year levels of children. The results are shown in the following sections.

4.3.1 Correlations among factors

The procedure to find correlations among factors in the above two CFA models and the results are now presented.

Parental encouragement

In each CFA model, the items remaining with each factor were used to estimate composite Factor Scores (FS). As an example, the following formulae were involved with the model presented in Figure 4.2.

$$FS_Parental\ perceptions = (A17_RMV_RC + B2 + B12 + B13_RC) / 4$$

$$FS_Parental\ encouragement = (A3_RMV + A5 + A19) / 3$$

$$FS_Children's\ perceptions = (A21_RMV + A23_RMV + C22) / 3$$

Using the values obtained from above formulae, Table 4.4 provides the mean and standard deviation of each factor and correlations among factors. To interpret the strength of correlations, Cohen (1988, pp. 79-81) suggested the following as appropriate guidelines:

small ~ (.10 – .29)

medium ~ (.30 – .49) and

large ~ (.50 – 1.0).

Table 4.4

Correlations among Parental Perceptions, Parental Encouragement, and Children's Perceptions

	<i>M</i>	<i>SD</i>	Parental perceptions	Parental encouragement	Children's perceptions
Parental perceptions	1.912	.495	-		
Parental encouragement	1.928	.606	.686**	-	
Children's perceptions	2.033	.535	.499**	.565**	-

**. Correlation is significant at the 0.01 level (2-tailed).

The results show that there are large positive correlations between parental perceptions and parental encouragement ($r = .686$), parental perceptions and children's perceptions ($r = .499$), and parental encouragement and children's perceptions ($r = .565$). Hence, it can be interpreted that an increase in parental perceptions could have caused increases in both parental encouragement and children's perceptions. As parental encouragement increased, the way children thought about mathematics attainment – considered as children's perceptions in mathematics attainment – increased too.

Home discussion

Similar techniques were applied on items and factors in Figure 4.3 to find the strength of correlations. Composite factor scores were calculated using the formulae below.

$$FS_Parental\ perceptions = (A17_RMV_RC + B2 + B12 + B13_RC) / 4$$

$$FS_Home\ discussion = (C17 + C18 + C19 + C22) / 4$$

$$FS_Children's\ perceptions = (A3_RMV + A5 + A21_RMV + A23_RMV) / 4$$

Mean values and standard deviations of each factor and the resulting correlations between the factors are shown in the following Table 4.5.

Table 4.5

Correlations among Parental Perceptions, Home Discussion, and Children's Perceptions

	<i>M</i>	<i>SD</i>	Parental perceptions	Home discussion	Children's perceptions
Parental perceptions	1.912	.495	-		
Home discussion	1.821	.524	.281**	-	
Children's perceptions	2.035	.587	.654**	.320**	-

** . Correlation is significant at the 0.01 level (2-tailed).

Parental perceptions have a small positive correlation with home discussion ($r = .281$) and a large positive correlation with children's perceptions ($r = .654$) resulting in an increase in both home discussion and children's perceptions with the increase of parental perceptions. An increase in home discussion also shows an increase in children's perceptions as there is a medium positive correlation between those factors ($r = .320$).

Children's data analyses in Appendix E resulted in large correlations between parental perceptions and parental motivation ($r = .587$), parental perceptions and children's perceptions ($r = .730$), as well as parental motivation and children's perceptions ($r = .683$) as shown in Table E.1. Hence, both parents' and children's data provide positive correlations among the above three factors. The following section provides the results of

independent-samples *t*-tests that were conducted to compare factors between European–Australian ($n = 30$) and Asian–Australian ($n = 55$) parents.

4.3.2 Comparisons between ethnic groups

Continuing with the analyses and moving on to Step 4 in Section 4.1, independent-samples *t*-tests were carried out to compare means between ethnic background and the gender of children, and also to find out whether there were significant differences between ethnic and gender groups. For each of the above-mentioned groups there were only two different categories of participants (i.e., European–Australian and Asian–Australian for cultural background and Male and Female for gender). As independent-samples *t*-tests are restricted to only two groups, in the analysis of year level data from Year 7 to Year 12 one-way ANOVA was deemed more appropriate.

Parental encouragement

Firstly, parental perceptions, parental encouragement, and children’s perceptions were included in independent-samples *t*-tests to compare the group differences between factors. The output included mean and standard deviation of the three factors for each group. To find the significance of differences between groups, the other available outputs of an independent-samples *t*-test needed to be observed. One such output provided the results of Levene’s test for equality of variances. This test checks whether variance of the scores for the two groups (European-Australian and Asian–Australian) is the same. In the results if the significance value of Levene’s test is greater than .05 it is possible to assume that there are equal variances between groups and if the significance level is less than or equal to .05 it means that the variances for the two groups are not the same (Allen & Bennett, 2012; Pallant, 2013). To find out whether there is a significant difference between the two groups, the *p*-value was used, which is the value under the column labelled Sig.(2-tailed)

in the results table. If the value is less than or equal to .05, it is assumed that there is a significant difference in the mean scores for each of the two groups and if the value is more than .05, there is no significant difference between the groups (Pallant, 2013).

In addition to statistical significance, the effect size could also be used to find the strength of association between variables. An effect size statistic, which is also known as eta-squared (η^2), was calculated for each factor using output data from independent-samples *t*-test to provide an indication of the magnitude of the differences between the two ethnic groups. Effect size can range from 0 to 1 and it represents the variation in the dependent variable that can be explained by the variation in the independent variable (Pallant, 2013). In this case the dependent variable is the factor and the independent variable is the ethnic group.

The guidelines for effect size proposed by Cohen (1988) to interpret η^2 values obtained in independent-samples *t*-tests were as follows with no strict cut-off to delineate small, medium or large effects.

- 0.01 ~ Small effect
- 0.06 ~ Medium effect
- 0.14 ~ Large effect

The results of the above procedure comparing European–Australian and Asian–Australian ethnic groups with respect to each factor are presented in Table 4.6 below.

Table 4.6

Comparison of Ethnic Group Differences in Relation to Parental Encouragement

	European–Australian (<i>n</i> = 30)		Asian–Australian (<i>n</i> = 55)		<i>t</i> (83)	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Parental perceptions	1.892	.548	1.923	.469	-.275	.784	.001

Parental encouragement	1.798	.530	1.999	.637	-1.470	.145	.025
Children's perceptions	1.800	.537	2.160	.494	-3.110	.003	.104

The results shown in Table 4.6 indicate no significant difference in scores between European-Australian and Asian–Australian parents with regard to parental perceptions and parental encouragement of their children. The effect size statistic does not indicate any considerable difference in the mean responses of European–Australian and Asian–Australian parents with respect to parental perceptions ($p = .784$). Even though statistical significance shows that there is no difference in parental encouragement ($p = .145$) between the two cultures, the effect size statistic shows a small effect. However, there is a significant difference in children's perceptions between the two groups ($p = .003$), which is also confirmed by medium to large effect size statistic. Figure 4.4 shows a graphical representation of the above findings to compare magnitude of differences.

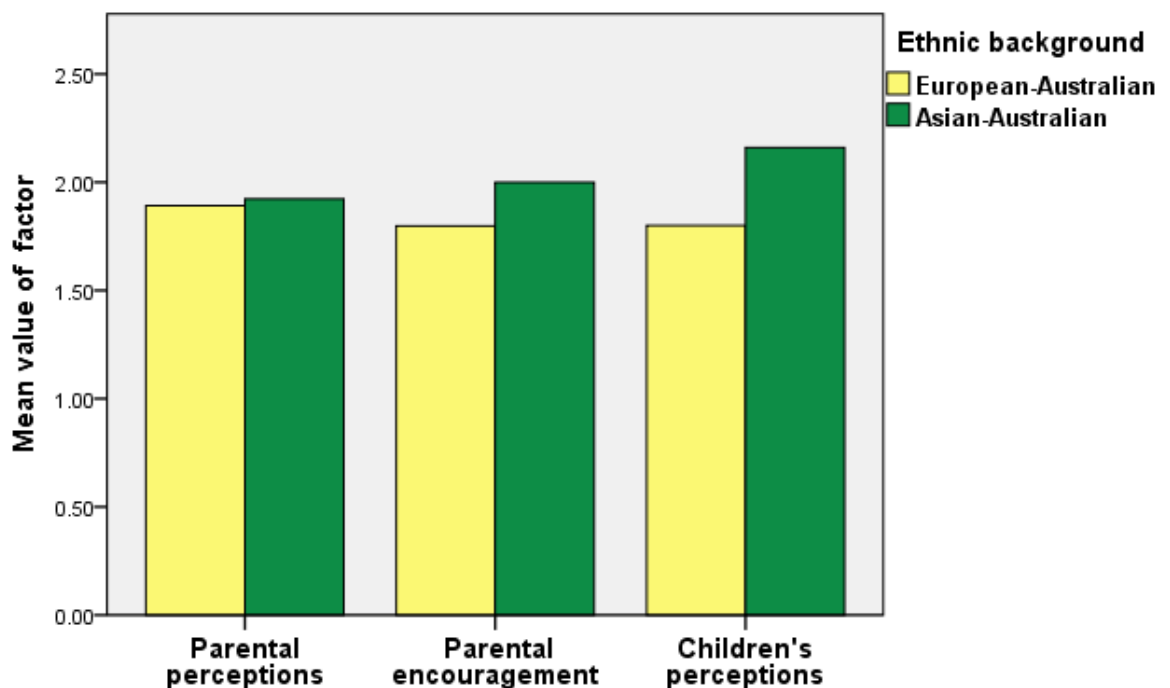


Figure 4.4. Graphical representation of parental perceptions, parental encouragement, and children's perceptions between the two ethnic groups.

The results imply cultural differences in the way parents thought about their children's perceptions in mathematics attainment. Lower mean value appears that the direction favours European-Australian parents. Hence, these parents appear more positive than Asian-Australian parents about their children's perceptions of mathematics.

Home discussion

Secondly, using similar procedures an independent-samples *t*-test was conducted between the two cultural groups with parental perceptions, home discussion, and children's perceptions. The results are shown in Table 4.7.

Table 4.7

Comparison of Ethnic Group Differences in Relation to Home Discussion

	European–Australian (<i>n</i> = 30)		Asian–Australian (<i>n</i> = 55)		<i>t</i> (83)	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Parental perceptions	1.892	.548	1.923	.469	-.275	.784	.001
Home discussion	1.550	.497	1.968	.481	-3.784	<.001	.147
Children's perceptions	1.832	.566	2.146	.573	-2.427	.017	.066

The resulting *p*-values indicate that there are no significant differences in parental perceptions (*p* = .784) and effect size statistic shows the same. There are significant differences in home discussion (*p* < .001) and children's perceptions (*p* = .017) between the two ethnic groups. While home discussion shows a large effect size, children's perceptions shows a medium effect size. The magnitude of these differences in the mean values are shown by the graph in Figure 4.5. The results imply cultural differences in home

discussion and children's perceptions. Lower mean values in the European–Australian group signify that they discuss more with their children than do the Asian–Australian group with their children.

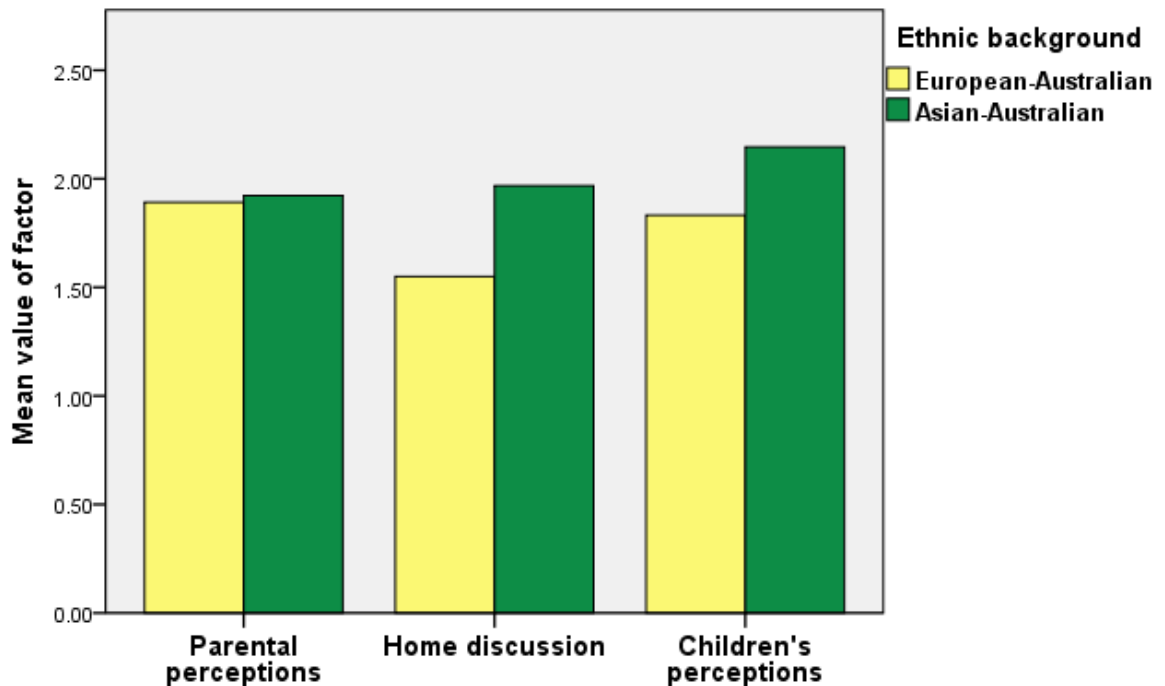


Figure 4.5. Graphical representation of parental perceptions, home discussion, and children's perceptions between the two ethnic groups.

Using children's data, neither parental perceptions nor parental motivation resulted in a significant difference between the two cultural groups as shown in Table E.2 in Appendix E. However, there appears to be a significant difference of medium effect size in children's perceptions between the two groups. Overall, both parents' and children's data show that there is no significant difference in culture in relation to parental perceptions about home discussion. However, children's perceptions about home discussion show a significant difference between cultures. It seems that parents and children held different perceptions about discussions at home.

In addition, as shown in Figure G.2 and cross-tabulation in Table G.6 in Appendix G, out of the 85 parents in this study about 8% of the parents wanted their child to be the best

student and about 55% of the parents expected their child to be one of the best students in class. All of these parents who had expectations to see their child to be the best student in class were from Asian–Australian background. The majority of European–Australian parents (about 37%) expected their child to be a good student and the majority of Asian–Australian parents (about 69%) expected their child to be one of the best students.

The next section provides comparisons between male and female students with regard to parental perceptions, parental motivation factors, and children’s perceptions to identify any similarities or differences according to gender.

4.3.3 Comparisons between male and female children and parents

Using the responses from parental questionnaire, another set of independent-samples *t*-tests were conducted to compare gender differences of parental perceptions, parental motivation, and children’s perceptions. These results were found using the data of 85 parents who provided responses with regard to their male ($n = 40$) and female ($n = 45$) children. The results are discussed below.

Parental encouragement

Again, parental perceptions of mathematics education, parental encouragement, and children’s perceptions of achievement were subjected to an independent samples *t*-test. The significance level of Levene’s test for equality of variances for each of the three factors was greater than 0.05. Hence, the assumption of homogeneity of variance, which means there are equal variances between groups, has not been violated, as described in Section 4.3.2. The relevant output values are shown in the following table.

Table 4.8

Comparison of Gender Differences in Parental Encouragement

	Male ($n = 40$)		Female ($n = 45$)		$t(83)$	p	η^2
	M	SD	M	SD			
Parental perceptions	1.988	.525	1.844	.462	1.336	.185	.021
Parental encouragement	2.017	.649	1.850	.560	1.274	.206	.019
Children's perceptions	2.070	.522	2.000	.550	.596	.553	.004

When the p -values are greater than 0.05, there is no significant difference in the mean scores of the two groups. According to the results shown in Table 4.8, there were no significant differences in any of parental perceptions, parental encouragement, and children's perceptions when comparing male and female students. To analyse this further, an effect size statistic for each factor was calculated. The values affirmed the findings of statistical significance as there was no considerable effect in the differences of magnitude of the mean values of male and female students. Figure 4.6 is the graphical representation, which does not display any significant difference between male and female comparisons.

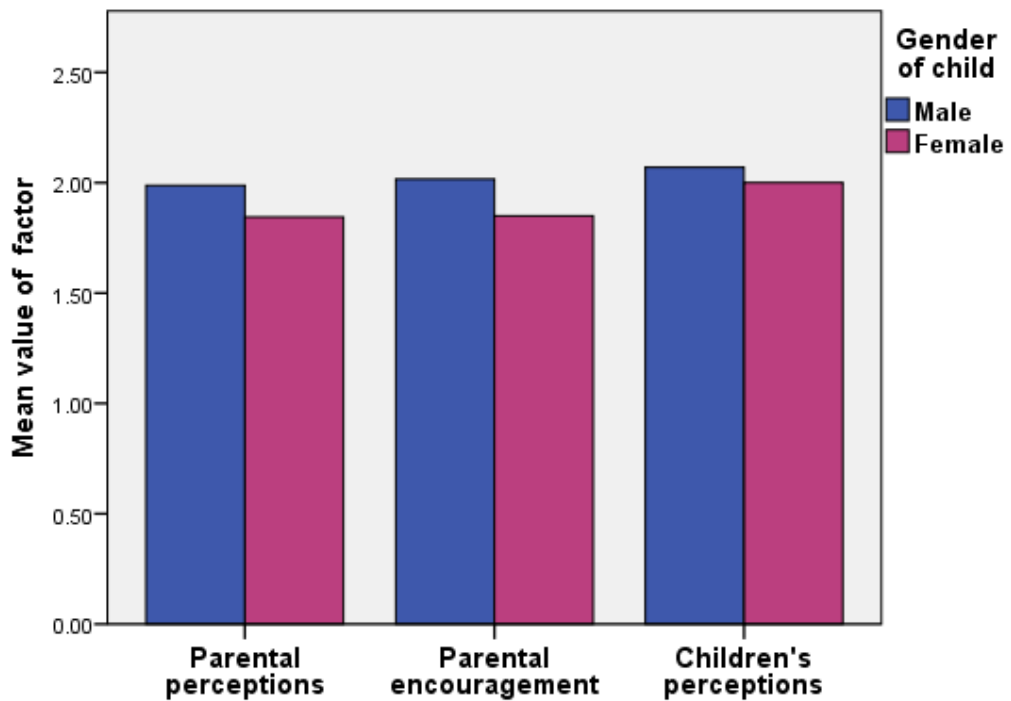


Figure 4.6. Graphical representation of parental perceptions, parental encouragement, and children's perceptions between the two genders.

Similarly, the gender of parents did not show significant differences in any of the above factors according to each p -value and effect size (η^2) statistic shown in Table F.1 in Appendix F. Hence, the results showed that the gender of parent or child did not affect parental perceptions, parental encouragement, or children's perceptions.

Home discussion

Following similar procedures to those described in the previous section, parental perceptions, home discussion, and children's perceptions were subjected to independent samples t -tests. The following table shows comparisons between male and female students for each of the three factors.

Table 4.9

Comparison of Gender Differences in Home Discussion

	Male ($n = 40$)		Female ($n = 45$)		$t(83)$	p	η^2
	M	SD	M	SD			
Parental perceptions	1.988	.525	1.844	.462	1.336	.185	.021
Home discussion	1.806	.520	1.833	.533	-.236	.814	.001
Children's perceptions	2.140	.599	1.943	.567	1.557	.123	.028

None of the p -values of the three factors shows a significant difference between the male and female groups. The effect size statistic for each factor confirms the results. Figure 4.7 shows the corresponding graph.

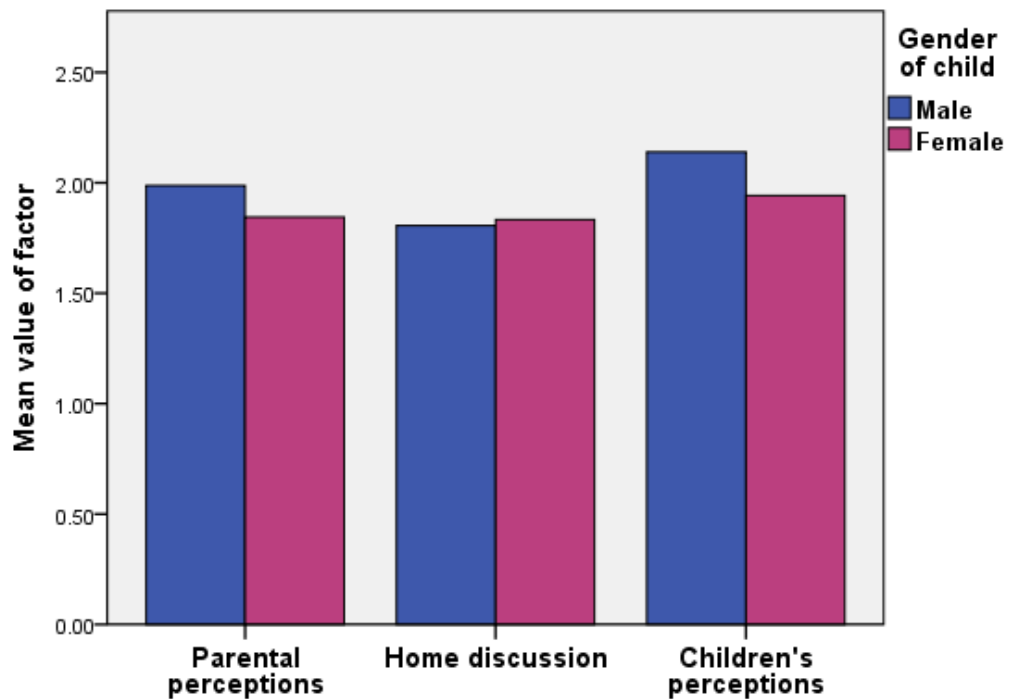


Figure 4.7. Graphical representation of parental perceptions, home discussion, and children's perceptions between the two genders.

As shown in Table F.2 in Appendix F, there were no significant differences in the above three factors due to the gender of parents. Similarly, there were no significant differences in male and female groups in parental perceptions, parental motivation, and children's perceptions according to children's data analysis in Appendix E (Table E.3). Hence, neither parents' nor children's data revealed gender differences that can affect children's achievement.

With regard to gender of children, even though there were no remarkable differences in parental expectations it was found that 5% of parents of male students and 11% of parents of female students expected their child to be the best student in class, as shown in Table G.9. This was an interesting finding that showed parents' higher expectations regarding their daughters' than their sons' academic achievement.

The next section describes how parental involvement factors vary with children from Year 7 to Year 12. In addition to statistical significance and effect size statistic, results are also included from post-hoc tests which identify where the differences lie.

4.3.4 Comparisons across year levels

In Step 5 in order to compare the mean scores of participants according to year level of their children, a series of analysis of variance (ANOVA) were conducted. In previous sections *t*-tests were used to compare the scores of two different variables because *t*-test can compare the means of two different groups only. The variable year level has six groups from Year 7 to Year 12 and the use of *t*-tests is therefore inapplicable. Hence, one-way between-groups ANOVA with post-hoc tests were considered an appropriate method.

While one-way ANOVA can find out whether there are significant differences in the mean scores of each factor across year levels, it cannot tell which groups differ. However, it is not likely that all groups differ when compared to each other. In this case, post-hoc

comparisons using Tukey's HSD (honest significant difference) test can clarify which specific groups among the sample have significant differences. Hence, the purpose of using Tukey's HSD test in this study was to determine which year levels in the sample differed from other levels in relation to each factor of parental involvement.

Parental encouragement

The following table represents output from one-way ANOVA across year levels ($n = 85$) with parental perceptions, parental encouragement, and children's perceptions.

Table 4.10

One-way ANOVA for Parental Encouragement among Year Levels

		<i>Sum of Squares</i>	<i>Mean Square</i>	<i>F(5, 79)*</i>	<i>p</i>	η^2
Parental perceptions	Between Groups	2.800	.560	2.487	.038	.136
	Within Groups	17.788	.225			
Parental encouragement	Between Groups	7.105	1.421	4.731	.001	.230
	Within Groups	23.726	.300			
Children's perceptions	Between Groups	2.151	.430	1.551	.184	.089
	Within Groups	21.915	.277			

*degree of freedom between groups and within groups

If the p -value is less than or equal to 0.05 there is a significant difference somewhere within the mean scores of the relevant factor and year levels. In accordance with these guidelines, children's perceptions do not show a significant difference across year levels. However, the results show a significant difference in both parental perceptions and parental encouragement across year levels. To find where these differences occurred, multiple comparisons in post-hoc tests were used.

Subsequently, post-hoc comparisons using the Tukey HSD test indicated that the mean score for parental perceptions showed significantly different results between Year 7 ($M = 1.60$, $SD = .52$) and Year 12 ($M = 2.20$, $SD = .51$) at the 0.05 level. Also, the mean score

for parental encouragement between Year 7 ($M = 1.47$, $SD = .66$) and Year 9 ($M = 2.22$, $SD = 0.36$) groups, Year 7 and Year 12 ($M = 2.35$, $SD = .59$) groups, and Year 10 ($M = 1.73$, $SD = 0.52$) and Year 12 groups were significantly different. Further, there was no significant difference between children's perceptions across year levels.

The effect size statistic, eta squared, was calculated using the ratio of sum of squares between groups and total sum of squares. According to Cohen's (1988) guidelines, the effect size statistics in Table 4.10 show a large difference in magnitude in parental perceptions and parental encouragement but a medium difference in children's perceptions among year levels. The composite bar graphs with mean values of each factor across year levels shown in Figure 4.8 provide a graphical representation which can also be used to compare output results.

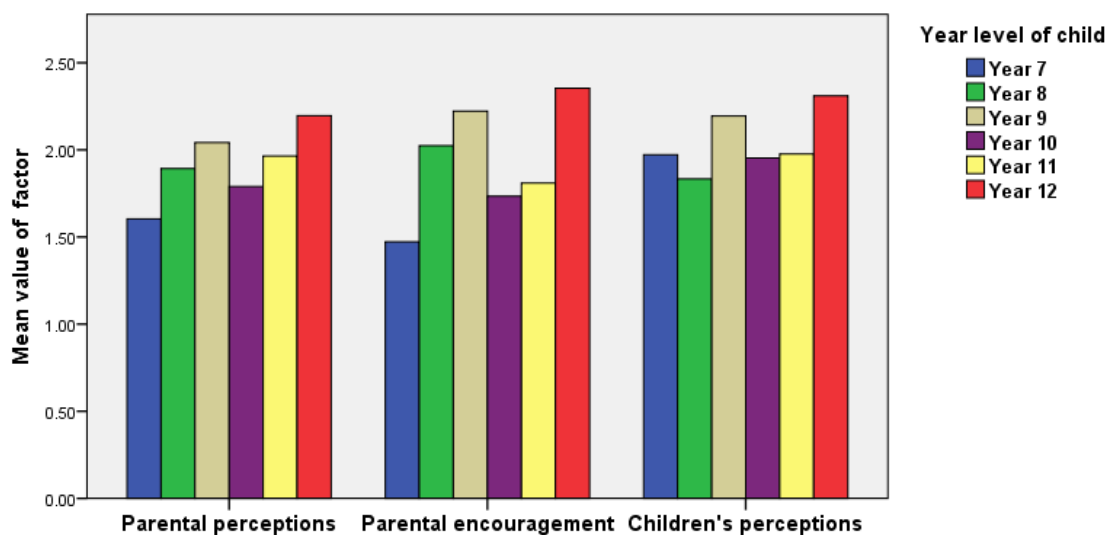


Figure 4.8. Graphical representation of parental perceptions, parental encouragement, and children's perceptions among year levels.

All three factors show an overall upward trend, rather a positive increase in mean values from Year 7 to Year 12, indicating a decrease in each factor considered. It should be noted that, in the Likert scale, higher mean values represented strong disagreement. However, it

can also be observed that there are some fluctuations in the mean values across year levels, which could be interesting to investigate further with a larger sample.

Next, the other parental motivation factor, home discussion together with parental perceptions and children's perceptions were subjected to similar procedures and the results are presented.

Home discussion

Outputs from one-way ANOVA across year levels ($n = 85$) with parental perceptions, home discussion, and children's perceptions are shown below.

Table 4.11

One-way ANOVA for Home Discussion among Year Levels

		<i>Sum of Squares</i>	<i>Mean Square</i>	<i>F</i> (5, 79)	<i>p</i>	η^2
Parental perceptions	Between Groups	2.800	.560	2.487	.038	.136
	Within Groups	17.788	.225			
Home discussion	Between Groups	3.109	.622	2.460	.040	.135
	Within Groups	19.967	.253			
Children's perceptions	Between Groups	4.735	.947	3.090	.013	.164
	Within Groups	24.216	.307			

All three factors show a significant difference across year levels according to p-value and a large difference in magnitude according to each effect size statistic. Post-hoc multiple comparisons show that parental perceptions were significantly different between Year 7 ($M = 1.60$, $SD = .52$) and Year 12 ($M = 2.20$, $SD = .51$) and children's perceptions were significantly different between Year 7 ($M = 1.75$, $SD = .63$) and Year 12 ($M = 2.46$, $SD = .63$) as well as Year 10 ($M = 1.84$, $SD = .46$) and Year 12. Interestingly, home discussion

between Year 7 ($M = 2.17$, $SD = .62$) and Year 12 ($M = 1.59$, $SD = .42$) shows a significant difference.

Even with some fluctuations the graphical representation in Figure 4.9 shows an overall upward trend for both parental and children's perceptions across Year 7 to Year 12.

However, there is a downward trend in home discussion from Year 7 through to Year 12.

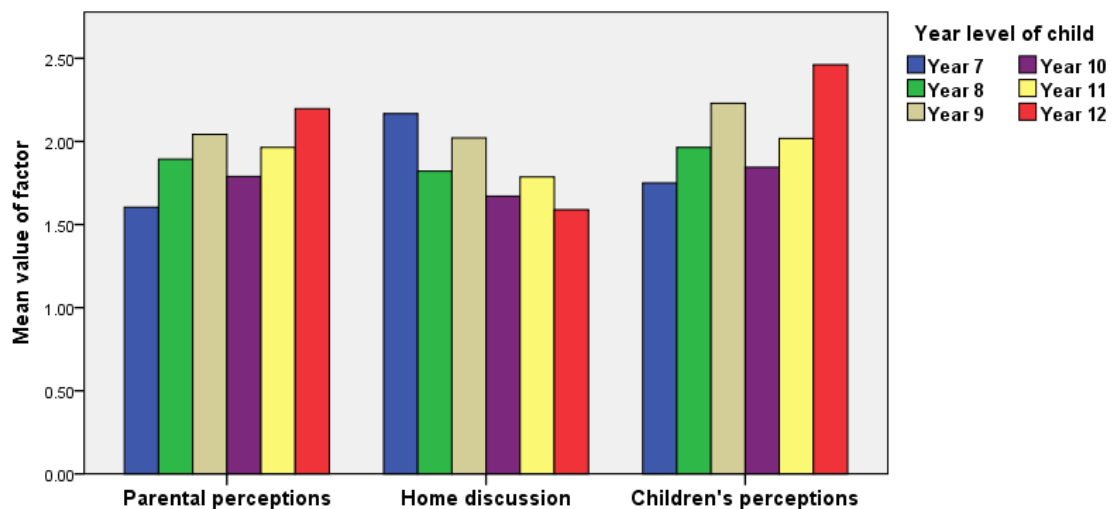


Figure 4.9. Graphical representation of parental perceptions, home discussion, and children's perceptions among year levels.

Similar to the results above, children's data indicated significant differences among year levels for each factor (Table E.4).

In addition to motivating their children, parents seemed to support and control their children in a number of different ways. Hence, factors related to parental support and parental control were subjected to similar analyses. The following section provides the results of quantitative data analyses and Chapter 7 presents qualitative data analyses related to parental support.

4.4 Parental support

In the following, homework involvement and provision of private tutoring were considered factors that constitute parental support. Firstly, the CFA model obtained for parental perceptions, homework involvement, and children's perceptions is provided in Figure 4.10. The fit indices of the model ($n = 85$, χ^2 value = 51.98, $df = 48$, p -value = .32, $RMSEA = .03$, $GFI = .91$, $RMR = .04$, and $CFI = .99$) satisfy the requirements of a good model fit. Both factor loadings and covariance values are shown in the model.

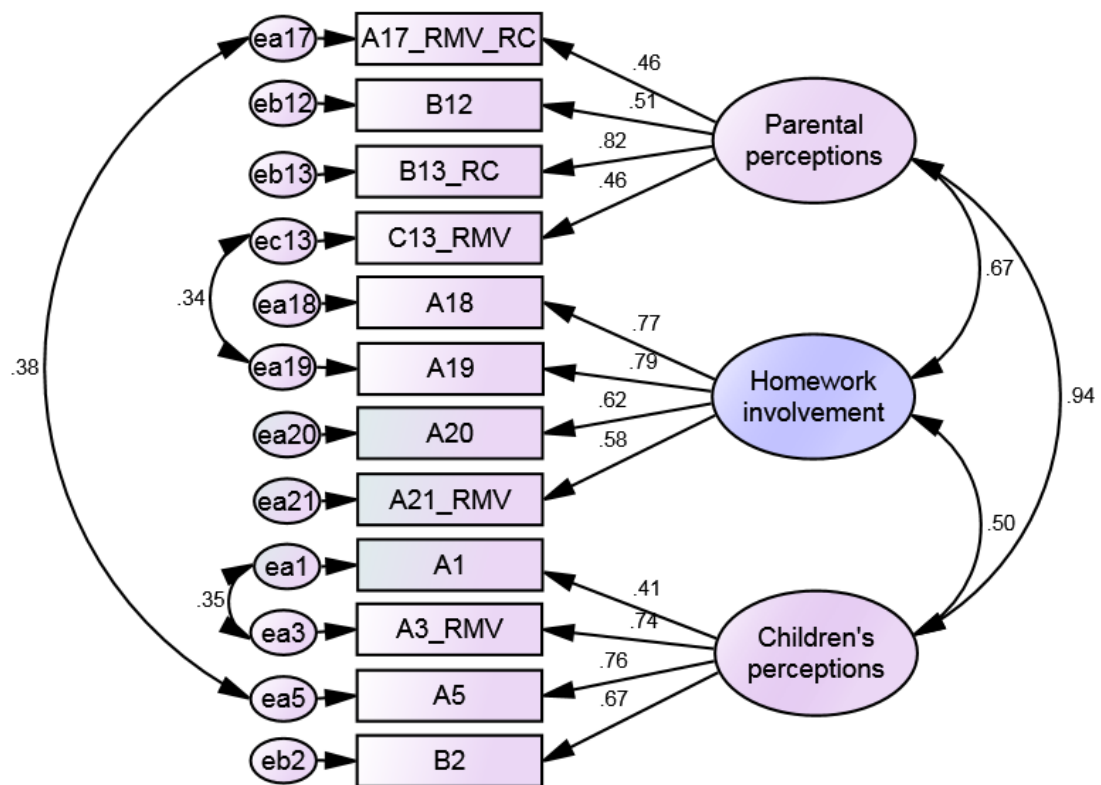


Figure 4.10. CFA model with homework involvement.
Note: RMV – Replaced Missing Values, RC – Reverse Coded

Secondly, the CFA model with parental perceptions, provision of private tutoring, and children's perceptions, is shown in Figure 4.11. Fit indices ($n = 85$, χ^2 value = 62.40, $df = 58$, p -value = .32, $RMSEA = .03$, $GFI = .90$, $RMR = .05$, and $CFI = .99$) satisfy the requirements of a good model fit. Factor loadings as well as covariance values are presented with the model.

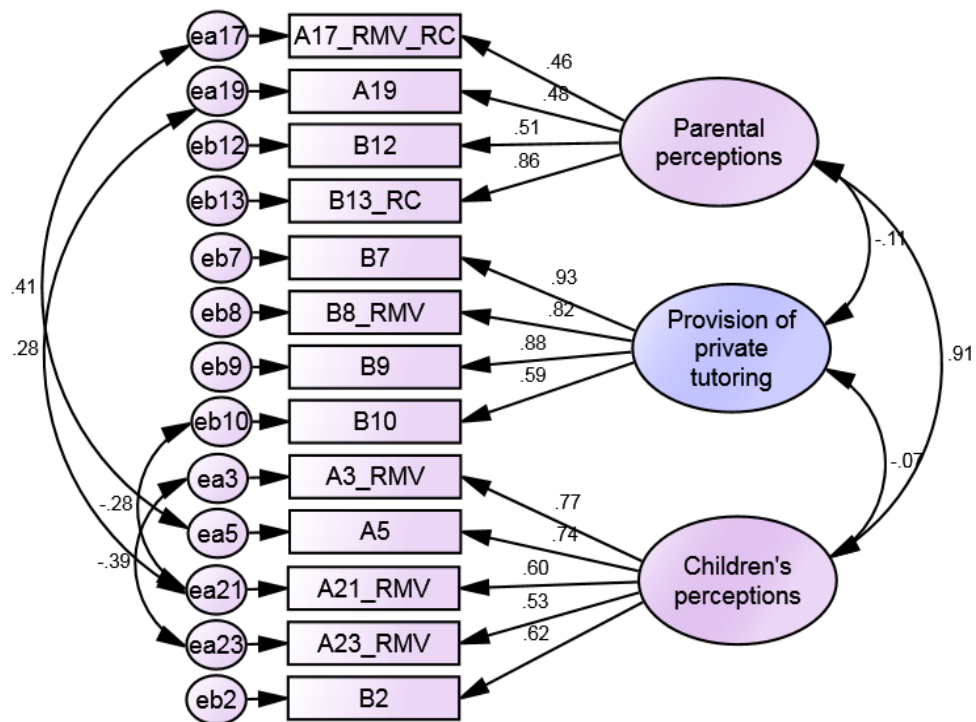


Figure 4.11. CFA model with provision of private tutoring.
 Note: RMV – Replaced Missing Values, RC – Reverse Coded

As the methods involved in finding correlations among factors and comparisons between groups are the same as in Section 4.3 the following sections provide only the results of these analyses.

4.4.1 Correlations among factors

For each CFA model above, the items remaining with each factor were used to estimate composite factor scores as described in Section 4.3.1. The following tables provide the resulting correlations between the factors analysed with homework involvement and the provision of private tutoring.

Homework involvement

Analysis regarding parental perceptions, homework involvement, and children's perceptions yielded the correlations shown in Table 4.12.

Table 4.12

Correlations among Parental Perceptions, Homework Involvement, and Children's Perceptions

	<i>M</i>	<i>SD</i>	Parental perceptions	Homework involvement	Children's perceptions
Parental perceptions	1.820	.459	-		
Homework involvement	2.229	.608	.426**	-	
Children's perceptions	1.920	.553	.640**	.332**	-

** . Correlation is significant at the 0.01 level (2-tailed).

According to Cohen's guidelines, the parental perceptions variable has a large positive correlation with children's perceptions. It can be deduced that an increase in parental perceptions is related to an increase in children's perceptions. There is a medium positive correlation between parental perceptions and homework involvement. Hence, it can be interpreted that an increase in parental perceptions could have caused an increase in homework involvement. The correlation between homework involvement and children's perceptions is medium and positive. This implies an increase in homework involvement by the parents is related to an increase in children's positive perceptions about mathematics learning. Further, parental perceptions and homework involvement, parental perceptions and children's perceptions, and homework involvement and children's perceptions are largely correlated according to children's data (Table E.5). Hence, both parents and children seemed to have similar perceptions about homework involvement.

Provision of private tutoring

Correlations among parental perceptions, provision of private tutoring, and children's perceptions are shown in the following table.

Table 4.13

Correlations among Parental Perceptions, Provision of Private Tutoring, and Children's Perceptions

	<i>M</i>	<i>SD</i>	Parental perceptions	Provision of private tutoring	Children's perceptions
Parental perceptions	1.924	.497	-		
Provision of private tutoring	2.351	.881	-.107	-	
Children's perceptions	2.028	.542	.740**	-.074	-

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

The results show small and negative correlation between parental perceptions and provision of private tutoring. Surprisingly, there is no correlation between provision of private tutoring and children's perceptions. However, there is a large positive correlation between parental perceptions and children's perceptions in relation to provision of private tutoring. Children's data show small, positive correlations between parental perceptions and provision of private tutoring, and provision of private tutoring and children's perceptions (Table E.6). There is a large correlation between parental perceptions and children's perceptions about private tutoring. Even though parents' and children's perceptions are largely and positively correlated in both sets of data, they had different perceptions on private tutoring.

Further, as indicated by the survey data, about 50% of the students in this study had private tutors for mathematics education. Some of the reasons were: attitude of parents that learning from school might not be enough to achieve good results, parents wanted their child to do well in class, parents could not remember their mathematics, and the difficulties in teaching one's own child (Tables G.1 and G.2 in Appendix G). The other 50% of the students have not had tutors because: their parents themselves were able to help without a

tutor, the children were doing well and did not require a tutor, their parents were unable to afford, and their parents thought learning from school was enough (Tables G.3 and G.4). As shown in Table G.5, 52% of the students who had tutors for mathematics achieved more than 80% marks on average whereas 64% of those who did not have tutors achieved the same. This implied that the higher achievers were not necessarily the students who had tutors.

4.4.2 Comparisons between ethnic groups

This section provides the results of independent-samples *t*-tests, effect size statistics and graphical comparisons among factors analysed with homework involvement and provision of private tutoring between European–Australian and Asian–Australian groups.

Homework involvement

The results from *t*-tests enable comparisons between the two cultural groups in relation to parental perceptions, homework involvement, and children’s perceptions as shown in the table below.

Table 4.14

Comparison of Ethnic Group Differences in Homework Involvement

	European–Australian (<i>n</i> = 30)		Asian–Australian (<i>n</i> = 55)		<i>t</i> (83)	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Parental perceptions	1.758	.489	1.853	.442	-.907	.367	.010
Homework involvement	2.117	.556	2.291	.631	1.268	.208	.019
Children’s perceptions	1.890	.568	1.936	.549	-.359	.720	.002

Out of the three factors above none of the factors show a significant difference between the two ethnic groups. Effect size statistics show that the magnitude of this difference is small in homework involvement between the two groups and there is a small difference in parental perceptions and almost no effect in children's perceptions. This can be observed by the composite bar graphs in Figure 4.12. Homework involvement indicates a lower mean value for the European–Australian group than Asian–Australian counterparts. Hence, it appears that European–Australian parents involved themselves more with their children's homework than Asian–Australian participants. However, it was impossible to make a conclusion because the difference was not significant.

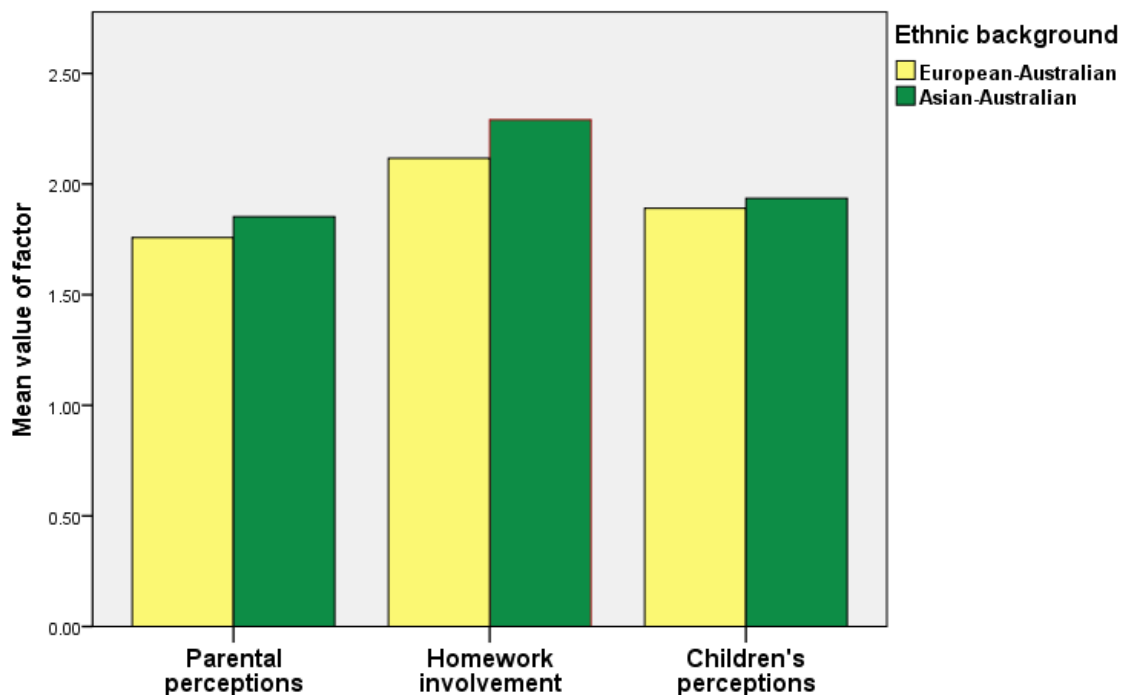


Figure 4.12. Graphical representation of parental perceptions, homework involvement, and children's perceptions between the two ethnic groups.

According to children's data both Asian–Australian and European–Australian parents seem to have similar perceptions about homework involvement in mathematics education as data comparisons show no significant difference in terms of their perceptions (Table E.7).

Further, the two sets of cultures do not appear to be significantly different in parental

involvement in homework. Children's perceptions in homework involvement between the two cultural groups are significantly different with a medium effect size in contrast to the results from parents' data.

As shown in Table G.7, Asian–Australian parents checked their children's mathematics work more often than European–Australian parents. About 64% of Asian–Australian parents and 37% of European–Australian parents reported that they checked mathematics work of their children at least once a week. About 15% of Asian–Australian and 20% of European–Australian parents never checked mathematics work of their children. Further, as shown in Table G.8, approximately 66% of Asian–Australian parents and 20% of European–Australian parents provided private tutors for their children.

The next section presents cultural differences in relation to private tutoring.

Provision of private tutoring

Independent-samples *t*-tests were conducted to identify any similarities or differences between the two ethnic groups in parental perceptions, provision of private tutoring, and children's perceptions. The results obtained are shown in the table below.

Table 4.15

Comparison of Ethnic Group Differences in the Provision of Private Tutoring

	European– Australian (<i>n</i> = 30)		Asian–Australian (<i>n</i> = 55)		<i>t</i> (83)	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Parental perceptions	1.833	.522	1.973	.480	-1.240	.219	.018
Provision of private tutoring	2.789	.919	2.112	.767	3.620	.001	.136
Children's perceptions	1.886	.558	2.106	.522	-1.818	.073	.038

There is a significant difference and a large effect size in the provision of private tutoring between the two cultural groups as shown in the above table. Even though parental perceptions and children's perceptions between the two groups are not significant, the effect size statistic for each of these factors shows a small difference. The magnitude of these differences can be observed in the composite bar graph in Figure 4.13. In the provision of private tutoring the higher bar for the European–Australian group than for the Asian–Australian group represents a higher mean value, which signifies less agreement with the factor. This implies more European–Australian parents did not agree with the provision of private tutoring when compared to Asian–Australian parents.

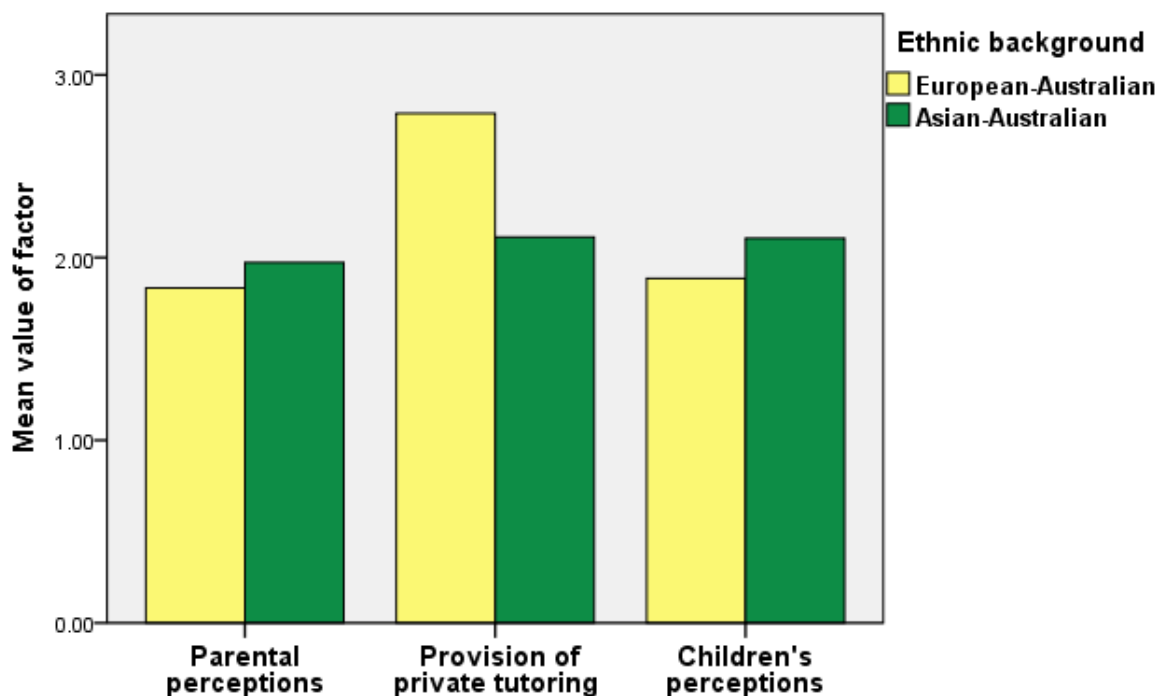


Figure 4.13 .Graphical representation of parental perceptions, provision of private tutoring, and children's perceptions between the two ethnic groups.

Between the two ethnic groups, children's data show no significant difference regarding their views of parents' perceptions on the provision of private tutoring (Table E.8).

However, there are significant differences between the groups in children's perceptions

about the provision of private tutoring. Hence, parents and children have reported different opinions about perceptions on private tutoring.

Next, another set of *t*-tests were conducted to find out whether there were any similarities or differences according to gender when parents became involved in homework of their children or provided private tutoring for them.

4.4.3 Comparisons between male and female children and parents

The results of independent-samples *t*-tests, effect size statistics and graphical comparisons among factors analysed with homework involvement and provision of private tutoring in relation to gender are presented in the following.

Homework involvement

Table below presents gender group comparisons in parental perceptions, homework involvement, and children's perceptions.

Table 4.16

Comparison of Gender Differences in Homework Involvement

	Male (<i>n</i> = 40)		Female (<i>n</i> = 45)		<i>t</i> (83)	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Parental perceptions	1.869	.463	1.776	.455	.932	.354	.010
Homework involvement	2.188	.563	2.267	.649	-.597	.552	.004
Children's perceptions	2.081	.581	1.776	.489	2.628	.010	.077

Even though parental perceptions and homework involvement showed no significant differences between male and female children, there was a significant difference between

children's perceptions. The effect size statistics show a small difference in parental perceptions, no difference in homework involvement and a medium difference in children's perceptions about homework involvement. Even though gender differences in parental perceptions are insignificant, the effect size shows a small difference. The following figure is a graphical representation of the information in Table 4.16.

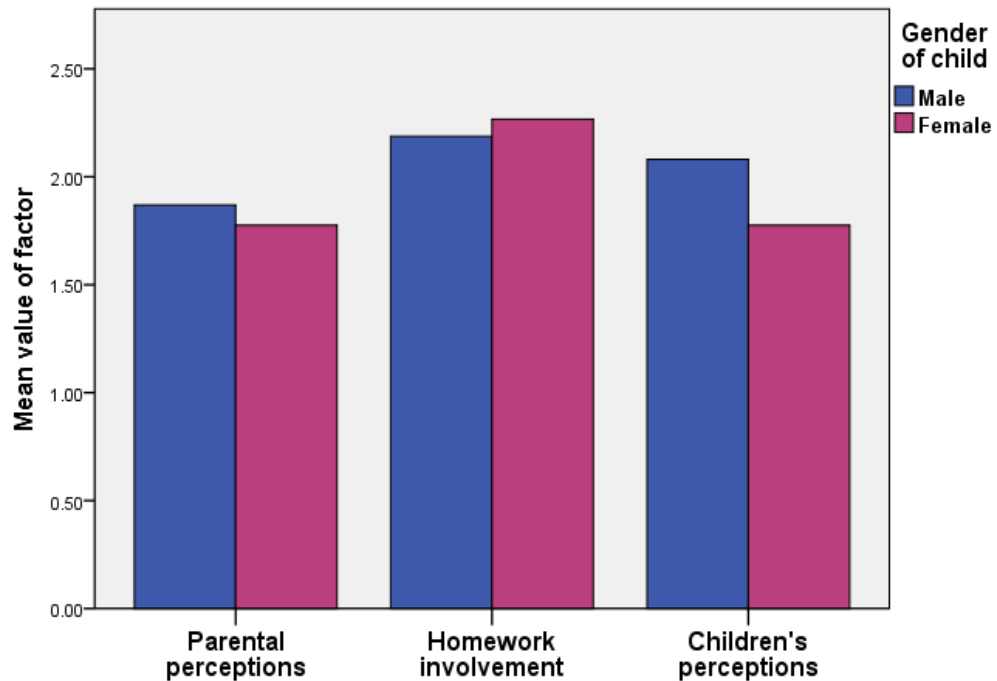


Figure 4.14. Graphical representation of parental perceptions, homework involvement, and children's perceptions between the two genders.

No significant differences were identified in the children's data between any of the above three factors in relation to the gender of children (Table E.9). Further, there were no significant differences with respect to the gender of parents as shown in Table F.3.

Provision of private tutoring

The following table presents the outcomes when parental perceptions, provision of private tutoring, and children's perceptions were subjected to a similar *t*-test to find out whether there were gender differences.

Table 4.17

Comparison of Gender Differences in the Provision of Private Tutoring

	Male (<i>n</i> = 40)		Female (<i>n</i> = 45)		<i>t</i> (83)	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Parental perceptions	1.969	.474	1.883	.518	.789	.432	.005
Provision of private tutoring	2.417	.873	2.292	.894	.646	.520	.005
Children's perceptions	2.127	.570	1.941	.506	1.594	.115	.032

For the above three factors there were no significant differences between male and female students. However, the effect size statistic for children's perceptions shows there was a small to medium difference between male and female students. The above results are shown graphically in the following figure.

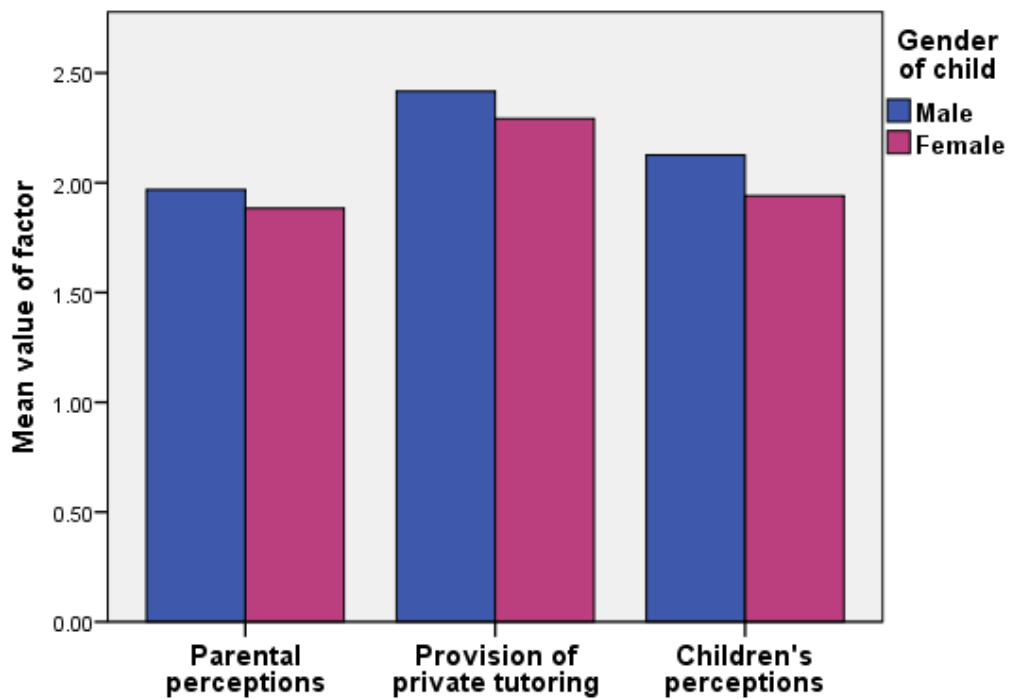


Figure 4.15. Graphical representation of parental perceptions, provision of private tutoring, and children's perceptions between the two genders.

The children's data show no significant difference between any of the above three factors with respect to the gender of children (Table E.10). Further analysis of parents' data presented in Table F.4 shows that there are no significant differences in any of the three factors due to the gender of parents. Hence, parental support did not vary according to the gender of children or parents. There were no gender differences found between parents in the frequency of checking children's mathematics work (Table G.10). Similarly, no gender differences were found in the provision of private tutors for children (Table G.11).

The next section analyses data about parental support across year levels of children. Similar to parental motivation, one-way ANOVA were conducted with post-hoc tests.

4.4.4 Comparisons across year levels

Data on the two parental support factors, homework involvement and provision of private tutoring, were subjected to two separate tests.

Homework involvement

Presented in the following table is a summary of results of one-way ANOVA across year levels ($n = 85$) among parental perceptions, homework involvement, and children's perceptions.

Table 4.18

One-way ANOVA for Homework Involvement among Year Levels

		<i>Sum of Squares</i>	<i>Mean Square</i>	<i>F</i> (5, 79)	<i>p</i>	η^2
Parental perceptions	Between Groups	2.514	.503	2.619	.030	.142
	Within Groups	15.163	.192			
Homework involvement	Between Groups	7.398	1.480	4.947	.001	.238
	Within Groups	21.896	.277			
Children's perceptions	Between Groups	4.649	.930	3.493	.007	.181
	Within Groups	21.032	.266			

All three factors were significantly different across year levels and the effect size statistic for each factor shows a large difference in magnitude. Multiple comparisons in post-hoc tests indicate a significant difference in parental perceptions between Year 7 ($M = 1.54$, $SD = .53$) and Year 12 ($M = 2.09$, $SD = .44$), homework involvement between Year 7 ($M = 1.85$, $SD = .68$) and Year 9 ($M = 2.52$, $SD = .53$), Year 7 and Year 12 ($M = 2.73$, $SD = .70$), Year 8 ($M = 1.98$, $SD = .42$) and Year 12, and Year 11 ($M = 2.09$, $SD = .46$) and Year 12, and children's perceptions between Year 7 ($M = 1.52$, $SD = .53$) and Year 12 ($M = 2.18$, $SD = .59$). Here is the graphical representation of the above results.

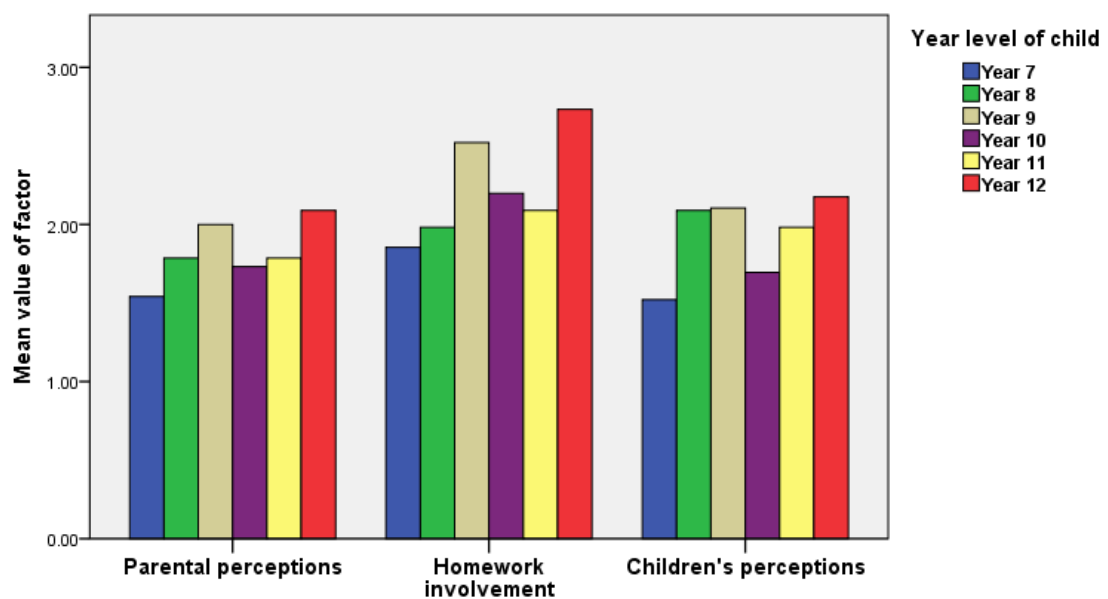


Figure 4.16. Graphical representation of parental perceptions, homework involvement, and children's perceptions among year levels.

The above graph shows an overall upward trend with some fluctuations in each of the three factors from Year 7 to Year 12. Even though the graphs for children's data appear to be similar (Figure E.11), the difference is not significant for children's perceptions while the other two factors show significant differences among year levels (Table E.11). Hence, parents and children did not have similar thoughts about homework involvement of parents.

Provision of private tutoring

The results for the provision of private tutoring together with parental and children's perceptions across year levels can be summarised as follows.

Table 4.19

One-way ANOVA for the Provision of Private Tutoring Among Year Levels

		<i>Sum of Squares</i>	<i>Mean Square</i>	<i>F</i> (5, 79)	<i>p</i>	η^2
Parental perceptions	Between Groups	3.228	.646	2.910	.018	.156
	Within Groups	17.525	.222			
Provision of private tutoring	Between Groups	1.816	.363	.453	.810	.028
	Within Groups	63.354	.802			
Children's perceptions	Between Groups	4.739	.948	3.759	.004	.192
	Within Groups	19.921	.252			

Provision of private tutoring does not show a significant difference between year levels even though both parental perceptions and children's perceptions show a significant difference. Even though it is not significant, the effect size statistic shows a small difference in the mean values related to provision of private tutoring across year levels.

Both parental perceptions and children's perceptions show a large difference between means. Multiple comparisons signal that the difference in parental perceptions is between Year 7 ($M = 1.60$, $SD = .60$) and Year 12 ($M = 2.23$, $SD = .56$). The differences in children's perceptions are found between Year 7 ($M = 1.72$, $SD = .53$) and Year 12 ($M = 2.44$, $SD = .59$) as well as Year 10 ($M = 1.83$, $SD = .43$) and Year 12. The results are shown in the graph below.

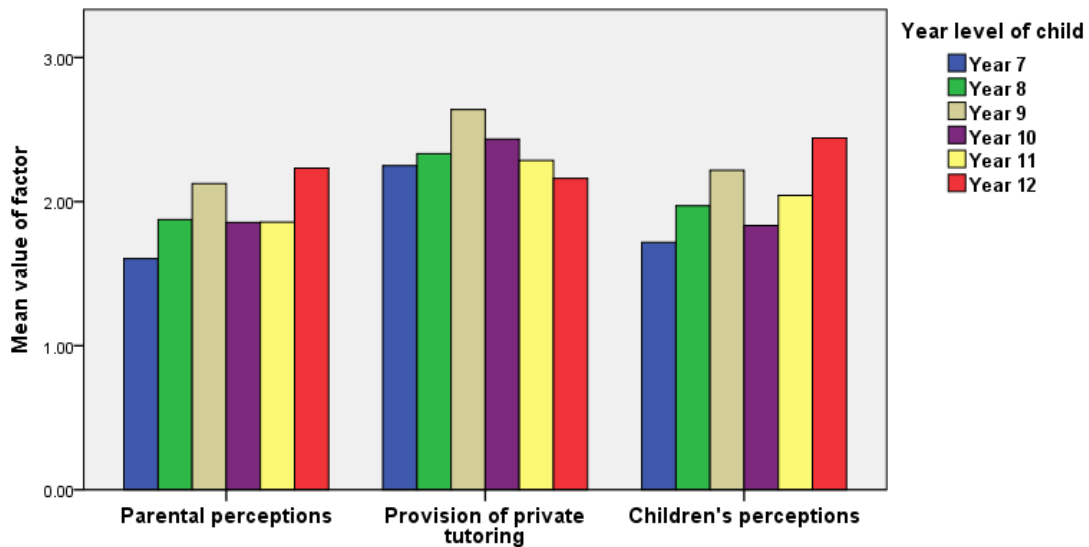


Figure 4.17. Graphical representation of parental perceptions, provision of private tutoring, and children's perceptions among year levels.

Both parents' and children's perceptions show an overall upward trend with fluctuations. In fact, this variation increases the disagreement with the factor under consideration. While provision of private tutoring shows an increasing trend from Year 7 to Year 9 it shows a decreasing trend from Year 10 to Year 12. This needs further investigation with a larger sample.

Similar to parents' data, children's data show significant differences between parental perceptions and children's perceptions but no significant difference in provision of private tutoring across year levels (Table E.12). The graphs indicate that both parents and children sought private tutoring for mathematics in lower and upper secondary levels, particularly in Year 7 and Year 12, but not in the middle years.

Since the processes are repetitive, the next section briefly describes and displays the results of quantitative data analyses and Chapter 8 provides qualitative data analyses related to parental control.

4.5 Parental control

The factors included in parental control were: setting up family rules, perceived parental control, and digital deprivation. In the CFA it was possible to combine all three factors together and the resulting single factor represented parental control. The final CFA model fit representing parental perceptions, parental control, and children's perceptions is shown in Figure 4.18. Fit indices ($n = 85$, χ^2 value = 78.66, $df = 67$, p -value = .16, $RMSEA = .05$, $GFI = .90$, $RMR = .04$, and $CFI = .97$) have satisfied the requirements of an appropriate model. The following is the best model achieved and the resulting factor loadings and covariance values are presented.

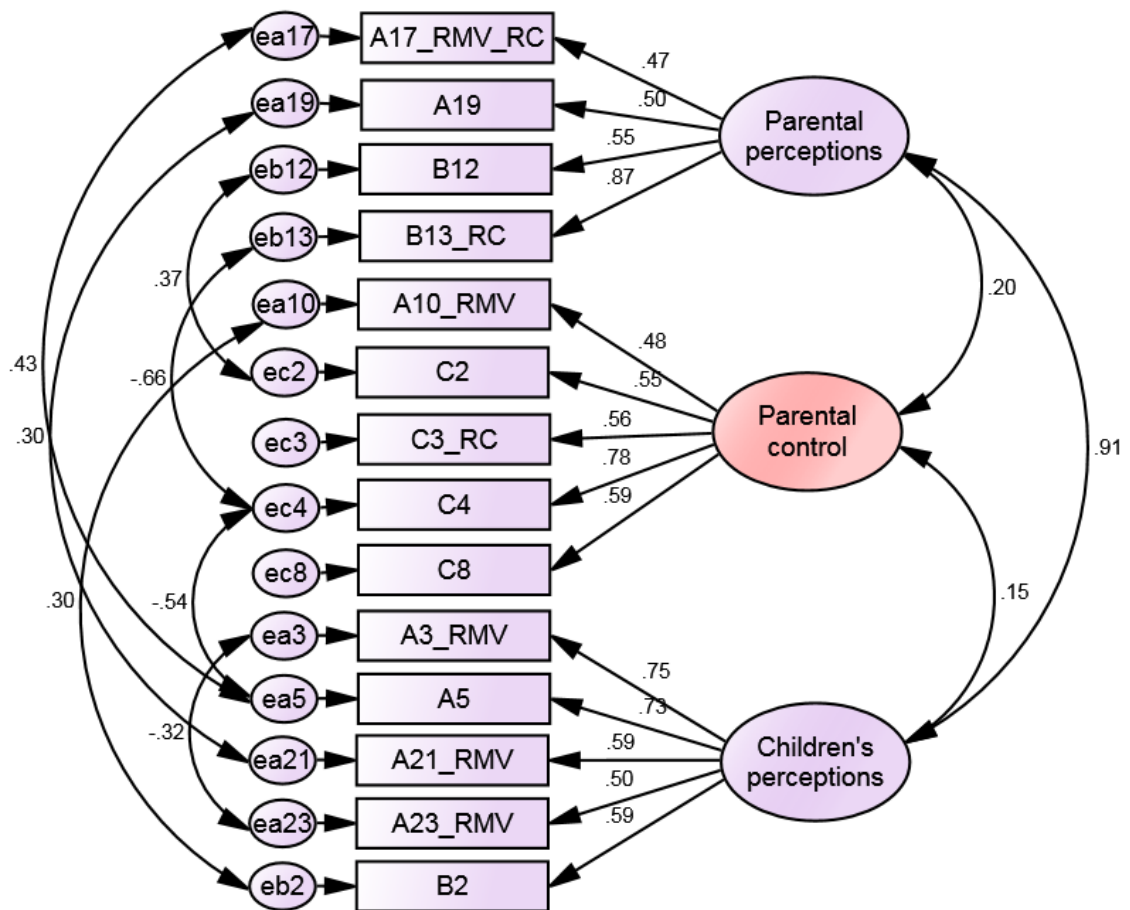


Figure 4.18. CFA model with parental control.
Note: RMV – Replaced Missing Values, RC – Reverse Coded

Using the above model, composite factor scores were calculated. The following sections provide summaries of results for correlations and the other comparisons involving the same methods as in Sections 4.3 and 4.4.

4.5.1 Correlations among factors

The following table shows correlations among the three factors of interest, namely parental perceptions, parental control, and children's perceptions.

Table 4.20

Correlations among Parental Perceptions, Parental Control, and Children's Perceptions

	<i>M</i>	<i>SD</i>	Parental perceptions	Parental control	Children's perceptions
Parental perceptions	1.924	.497	-		
Parental control	2.332	.555	.236*	-	
Children's perceptions	2.028	.542	.740**	.108	-

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

There is a small positive correlation between parental perceptions and parental control and a large positive correlation between parental perceptions and children's perceptions.

Hence, an increase in parental perceptions results in an increase in parental control and an increase in children's perceptions. There is no significant relation between parental control and children's perceptions at the 0.05 level. However, this can be considered as a small correlation according to Cohen's guidelines. This means that there may be an increase in children's perceptions with the increase of parental control.

Children's data (Table E.13) show large, positive correlations between parental perceptions and children's perceptions, parental perceptions and parental control, and parental control

and children's perceptions. This implies that children felt that they were controlled by their parents more than parents thought they controlled their children.

4.5.2 Comparisons between ethnic groups

The following output table obtained from *t*-tests was used to compare differences between the two ethnic groups in relation to parental perceptions, parental control, and children's perceptions.

Table 4.21

Comparison of Ethnic Group Differences in Parental Control

	European–Australian (<i>n</i> = 30)		Asian–Australian (<i>n</i> = 55)		<i>t</i> (83)	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Parental perceptions	1.833	.522	1.973	.480	-1.240	.219	.018
Parental control	2.560	.537	2.207	.529	2.918	.005	.093
Children's perceptions	1.886	.558	2.106	.522	-1.818	.073	.038

Out of the three *p* - values obtained in the above table, only parental control showed a significant difference between European–Australian and Asian–Australian participants at the 0.05 level. Hence, there was no significant difference between parental perceptions or children's perceptions in the two groups. However, the effect size statistic showed a small difference in parental perceptions, a medium to large difference in parental control, and a small to medium difference in children's perceptions between the two groups. Figure 4.19 shows the above comparisons graphically.

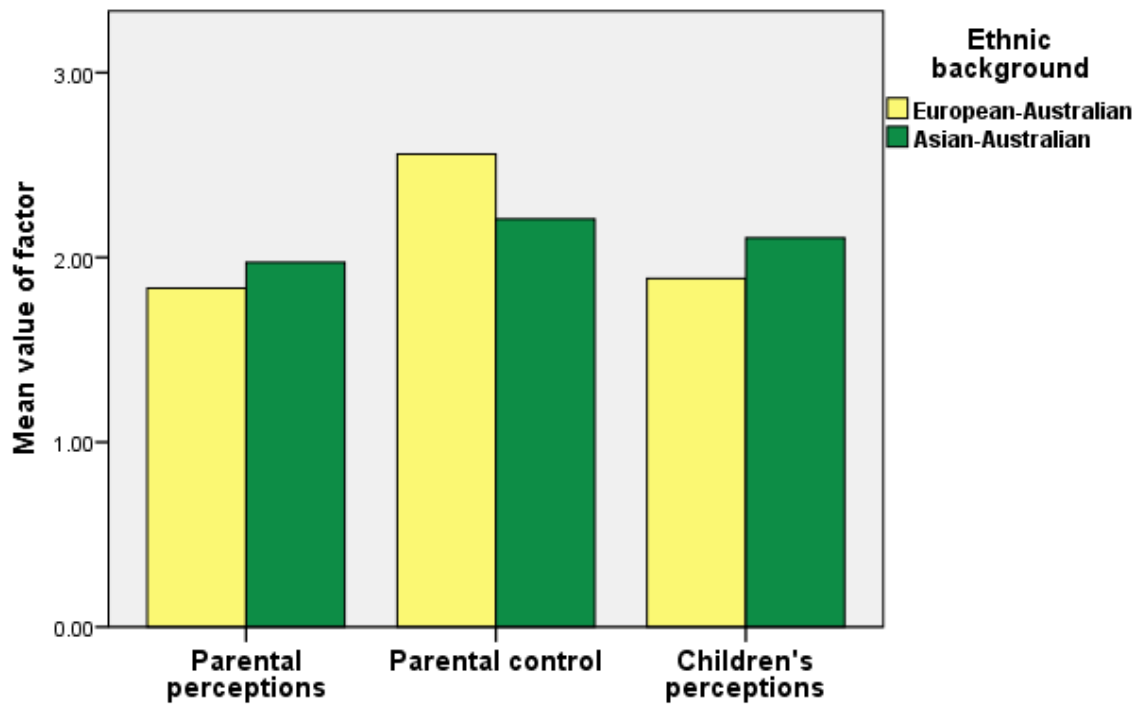


Figure 4.19. Graphical representation of parental perceptions, parental control, and children's perceptions between the two ethnic groups.

As shown in Table E.14, while parental perceptions were not significantly different between the two ethnic groups, parental control and related children's perceptions showed significant differences in the children's data. According to both parents' and children's data, Asian–Australian parents exert more control on their children than European–Australian parents. However, the children's perceptions on parental control, as seen in Figure 4.19 using parents' data has a higher mean value for Asian–Australians and Figure E.14 using children's data has a higher mean value for European–Australians. The higher the mean value is, the lesser the children's perceptions in parental control.

The next section presents results of gender comparisons for both children and parents.

4.5.3 Comparisons between male and female children and parents

Table 4.22 shows the comparison between gender group differences for parental perceptions, parental control, and children's perceptions.

Table 4.22

Comparison of Gender Differences in Parental Control

	Male ($n = 40$)		Female ($n = 45$)		$t(83)$	p	η^2
	M	SD	M	SD			
Parental perceptions	1.969	.474	1.883	.518	.789	.432	.007
Parental control	2.345	.545	2.320	.570	.208	.836	.001
Children's perceptions	2.127	.570	1.941	.506	1.594	.115	.030

The p - values obtained in the above table show that the scores of all of the three factors are not significantly different between male and female students. Effect size statistics show no effect on parental perceptions or parental control but a small to medium difference in children's perceptions between the two groups. The results are visually displayed below.

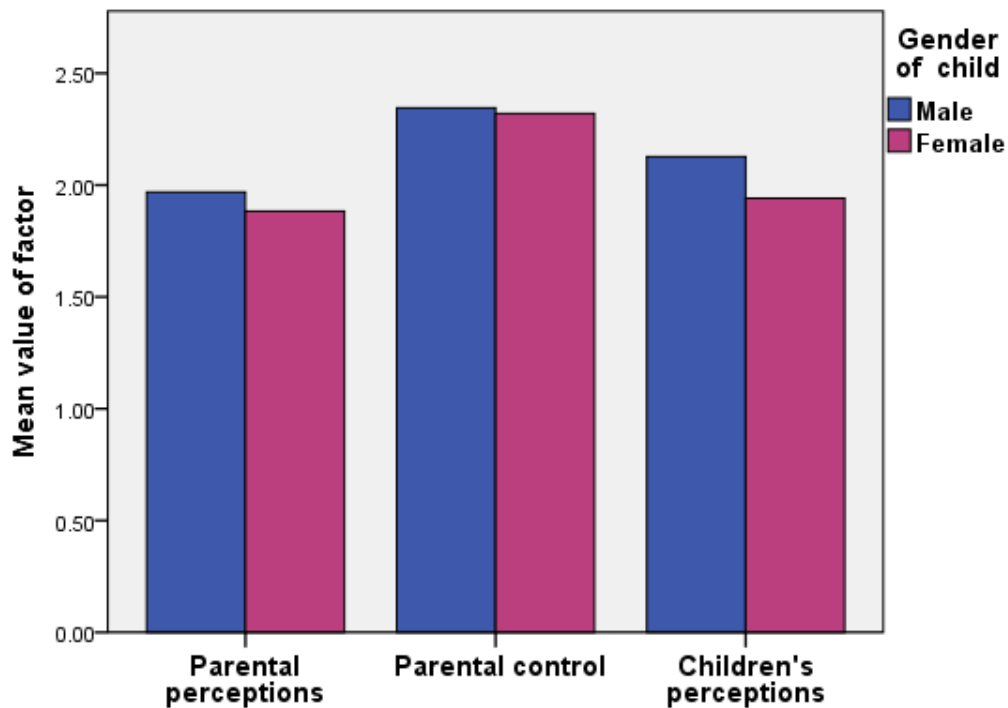


Figure 4.20. Graphical representation of parental perceptions, parental control, and children's perceptions between the two genders.

Children's data indicate a significant difference in parental control between the two gender groups but related parental perceptions and children's perceptions do not show a significant difference (Table E.15). Further, parents' data do not show a significant difference in any of the three factors as shown in Table F.5. Hence, there seem to have been no distinctions between genders of parents on any of the parental involvement factors in this study.

The next section analyses data to investigate parental control across year levels of children.

4.5.4 Comparisons across year levels

The output from one-way ANOVA across year levels ($n = 85$) with parental perceptions, parental control, and children's perceptions is as follows.

Table 4.23

One-way ANOVA for Parental Control among Year Levels

		<i>Sum of Squares</i>	<i>Mean Square</i>	<i>F</i> (5, 79)	<i>p</i>	η^2
Parental perceptions	Between Groups	3.228	.646	2.910	.018	.156
	Within Groups	17.525	.222			
Parental control	Between Groups	4.367	.873	3.205	.011	.169
	Within Groups	21.530	.273			
Children's perceptions	Between Groups	4.739	.948	3.759	.004	.192
	Within Groups	19.921	.252			

Scores for all three factors show a statistically significant difference among six groups at the $p < 0.05$ level. Post-hoc multiple comparisons indicate a significant difference in parental perceptions and that difference occurs between mean scores for Year 7 ($M = 1.60$, $SD = .60$) and Year 12 ($M = 2.23$, $SD = .42$). Parental control shows significant differences between Year 7 ($M = 1.82$, $SD = .48$) and Year 9 ($M = 2.47$, $SD = .50$), Year 7 and Year 11 ($M = 2.49$, $SD = .56$), and Year 7 and Year 12 ($M = 2.54$, $SD = .57$). Children's perceptions

are significantly different between Year 7 ($M = 1.72$, $SD = .53$) and Year 12 ($M = 2.44$, $SD = .59$) and Year 10 ($M = 1.83$, $SD = .43$) and Year 12. The effect size statistics show a large effect for each factor across year levels. The following graph displays the results.

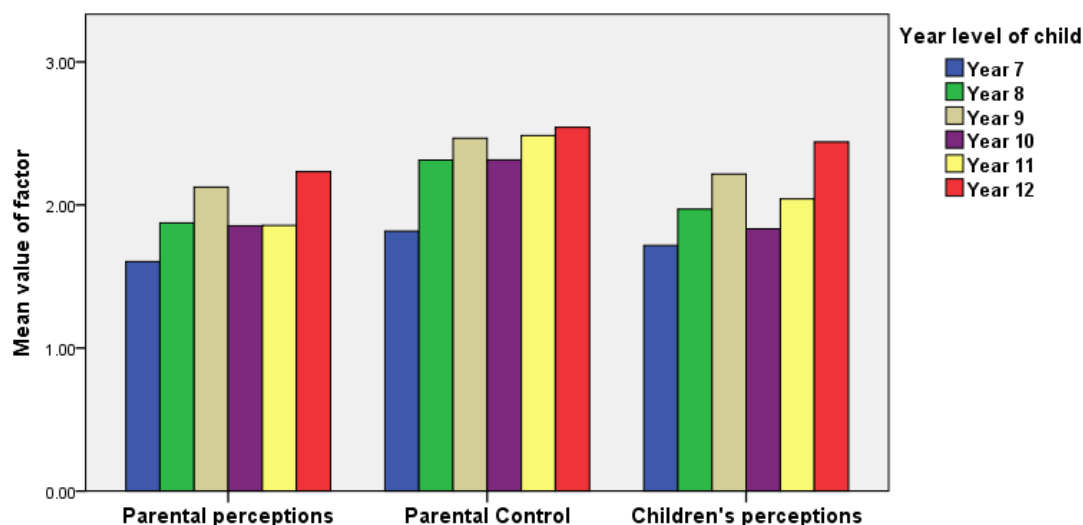


Figure 4.21. Graphical representation of parental perceptions, parental control, and children's perceptions among year levels.

Although there are some fluctuations, the above graph shows an overall upward trend or an increase in each of the three factors from Year 7 to Year 12. Likewise, children's data show an upward trend and significant differences in all three factors across year levels as shown in Figure E.16 and Table E.16. This implies that parental control as well as parents' and children's perceptions of control decreased with the increase in year level because higher mean values represent less agreement with the questions asked.

Using cross-tabulations and percentage bar graphs, other items in parental questionnaire were analysed. These results are presented in Appendix G, which are included in the discussion in Chapter 9. The following chapters describe the approach to qualitative data analyses and report the results by synthesising the data from parents' and children's interviews and the notes from survey participants.

4.6 Summary

The quantitative data were analysed using appropriate techniques such as bivariate correlations, confirmatory factor analysis, independent samples *t*-tests, and one-way ANOVA. The steps, processes, and results have been presented in this chapter and in Appendices D, E, F, and G. In the analyses, parental perceptions, their involvement, and children's perceptions on parental involvement were taken into account. Use of both parents' and children's data enabled examination of the extent to which parental involvement was affecting children's perceptions of academic achievement from both parents' and children's perspectives. Correlations, significance, and effect size among the factors of interest were computed and comparisons between culture, gender, and the year level of students were presented in this chapter.

The results showed that parental perceptions and children's perceptions of parental involvement are largely and positively correlated. Also, parental perceptions had large and positive correlation with parental encouragement, medium and positive correlation with homework involvement, small and positive correlation with home discussion and parental control, and small and negative correlation with the provision of private tutoring. Further, correlations of children's perceptions were large and positive with parental encouragement, moderate and positive with home discussion and homework involvement, and small and positive with parental control. There was no correlation between children's perceptions and the provision of private tutoring. Children's data provided different levels of correlations with some factors, which are described in the analyses.

There were no significant differences between Asian–Australian and European–Australian cultural groups in parental perceptions of their involvement with children's education. While there were no significant differences in parental encouragement and homework

involvement between the cultures, the differences were significant in home discussion, provision of private tutoring, and parental control. According to mean values, European–Australian parents discussed with their children more than Asian–Australian parents did. However, Asian–Australian parents provided tutors and controlled their children more than European–Australian parents did. Children’s perceptions on parental encouragement and home discussions were significantly different between the two cultures, while homework involvement, provision of private tutoring, and parental control were not significantly different. According to this finding European–Australian children preferred parental encouragement and home discussion more than Asian–Australian children did. Parents’ and children’s data showed similar results in most of the factors but there were differences. Children’s data showed no significant differences between cultures on home discussion. In addition, there were significant differences in children’s perceptions of homework involvement, private tutoring, and parental control between cultures as indicated by the children’s data.

In parents’ data the only significant difference in the gender of children was found in homework involvement and in children’s data parental control was significantly different. In further analysis, it was found that there were no significant differences in the gender of parents when they were involved with children’s mathematics education.

Parental perceptions on their involvement in the education of their children, parental encouragement, home discussion, homework involvement, and parental control were significantly different across year levels. Even though provision of private tutoring did not show a significant difference, it seemed that both parents and children were interested in tutoring for mathematics in Year 7 and Year 12, when compared to other year levels. While children’s perceptions regarding parental encouragement did not show a significant

difference across year levels, children's perceptions on home discussion, homework involvement, private tutoring, and parental control were significantly different from their parents' notions according to parents' data. Conversely, children's data showed that their perceptions on parental encouragement and home discussion were significantly different between Year 7 and Year 12 as well as Year 10 and Year 12, and in homework involvement they were not significantly different. The implications of these results are elaborated in Chapter 9.

Chapter 5: Qualitative data analyses

This chapter introduces each of the eight parents and eight of their senior secondary level children from Asian–Australian and European–Australian backgrounds and provides the structure of the qualitative data analyses. While preparing for the qualitative data collection, I purposively recruited parent and child participants to ensure variety in ethnic background, gender and year level of students, using information provided in the questionnaires. Asian–Australian participants were selected from recent migrants while European–Australian participants were from those who were more established in the country. This enabled the study to investigate more on migrant status and acculturation. Berry, Phinney, Sam, and Vedder (2006) noted acculturation as “the process of cultural and psychological change that follows intercultural contact” (p. 305).

All interviews were carried out at participants’ residences as they requested, assuring their comfort and convenience. Even though each parent–child dyad was from the same family I decided to interview them separately. On average, the duration of an interview was about forty minutes.

Eight parent–child dyads from participating families consented to contribute to the data. There were four Asian background parents from India, Malaysia, Bangladesh, and Vietnam, and four European background parents from England, Greece, Italy, and Turkey. All four Asian parents and children and two European parents were born overseas while two European parents and all four children were born in Australia. Both parent and child questionnaires and interview questions are presented in Appendices A and B respectively. Qualitative data in the transcribed scripts were re-coded several times using NVivo program to ensure that the data were grouped into relevant themes for analysis purposes.

Starting with an introduction of each parent and child, in the chapter I then look at the key areas informing the answers to research question 1, which are reported in Chapters 6, 7 and 8. In particular, the emerging themes from the qualitative data are discussed in these chapters to identify possible answers to research question 1.

Using the data from both European–Australian and Asian–Australian parents and children simultaneously, all of the seven factors in the study were further investigated with evidence from interviews with the participants. Quantitative results in Chapter 4 and qualitative results in Chapters 6, 7, and 8 are combined and discussed in Chapter 9.

5.1 European–Australian participants

This section provides an introduction to the four European background parent-child dyads involved in this study. Pseudonyms were given to the participants, allocating the same first letter according to their country of origin. Noting that all of the four European–Australian children were born in Australia, the following names were used:

- Eric and Emma were a father–daughter dyad whose ethnic background was English.
- Greg and Gresha were also a father–daughter dyad whose ethnic background was Greek.
- Irene and Ian were a mother–son dyad from Italian background.
- Tania and Tina were a mother–daughter dyad having a Turkish background.

For the ease of identifying each person in the analysis, profiles of these four pairs are provided below. Kingswood Secondary College, Prince Hill Secondary College, and Majestic High School were pseudonyms given to the schools in this study.

5.1.1 Eric and Emma

When Eric was three years old his family migrated from England to Australia. He grew up and studied in South Australia. After graduating with a Bachelor of Economics he has been working in the financial sector for over twenty years. At the time of the interview, Eric lived in Victoria with his wife and two daughters. His younger daughter was Emma. Eric believed that every child should be numerate. Further, he stated that mathematics includes useful life skills which are important for everyone in the society.

At the time of the interview, Emma was fifteen years old and studying in Year 10 at Kingswood Secondary College. Emma said that she always liked mathematics. She added “I think mathematics is pretty important because it is not just about being able to do questions, it is kind of understanding processes and solving problems”. According to Emma’s responses, it seemed that her favourite subjects alternated among mathematics, science, film studies, and English, although she liked all her subjects in school. Outside the classroom, Emma was involved in various activities including playing netball and performing in the Australian Girls’ Choir.

5.1.2 Greg and Gresha

Greg’s family was originally from Greece and migrated to Australia when he was five years old. He said that they struggled with poverty and also with English language when they arrived. However, Greg had been able to become a secondary school teacher. He had been teaching mathematics and science for over thirty years at the same secondary school and he was the mathematics leader at the time of the interview. In his opinion “mathematics is nearly everything” and he emphasised its necessity in everyday life. Greg lived in Melbourne with his family. They had two daughters and Gresha was the younger one.

At the time of the interview, Gresha was sixteen years old and in Year 11 at Majestic High School. She saw herself as a maths/science type of a student who enjoyed these subjects. She felt that she was quite good at English. Gresha believed that people were using mathematics all the time in the real world and it seemed to be something everyone needed to know. Gresha claimed that she was good at neither creative work nor arts subjects. Instead, she did some extracurricular activities such as sports outside of school to keep everything balanced.

5.1.3 Irene and Ian

Australian-born Irene's father's and mother's parents were from Italy and England respectively. She grew up in country Australia and studied in country schools. She worked for the Victoria Police Force for fifteen years and chose to change her career. After finishing her teaching degree she worked as a primary school teacher and moved into the early childhood area under the Department of Education. Irene considered mathematics an important subject because it was not just learning about numbers but also about the ability of problem solving, which could be applied in real life situations. She believed that mathematics was a good way of training the human brain. Irene lived in Melbourne and Ian was the only child in Irene's family.

Ian was eighteen years old and studying in Year 12 at Prince Hill Secondary College. He studied a diverse range of subjects at school including English, Further Maths, Philosophy, History: Revolutions, and Visual Communication and Design. Even though Ian found Further Maths easier when compared to other subjects, he was getting help from a tutor. Ian believed that mathematics could be helpful in daily life. Surprisingly, he reported that he did not get any homework in mathematics from school even though he was studying in Year 12.

5.1.4 Tania and Tina

Tania was born in Melbourne but her husband was born in Turkey. After finishing school she studied primary teaching at university and moved to Turkey to teach at an international school. Tania met her husband in Turkey and they moved back to Melbourne to start a new episode of their lives. Tania was working at a manufacturing company and her husband was an engineer. They have two daughters born in Australia of whom Tina is the elder. In her interview Tania said “It is important to learn mathematics to a certain level because mathematics is all around us in life after school and university”. Further, she affirmed the need to have some knowledge in mathematics in the lives of everyone. She added, “Not everybody finds mathematics easy”.

Tina was fifteen years old and she studied in Year 10 at Kingswood Secondary College. She was doing well at school and she studied Year 11 Maths Methods as one of her accelerated learning subjects. She also participated in sports and playing piano. Her favourite subjects were mathematics, science, and English. Tina had already looked into university courses which had made it easier for her in subject selection at school.

5.2 Asian–Australian participants

This section introduces four Asian background parent–child dyads in this study whose pseudonyms are given following the same method as for the European–Australian participants. Hence, the names start with the first letter of the country of origin. All four of Asian–Australian parents and their four children were born overseas and they were recent migrants.

- Indra and Indi were a mother–daughter dyad who inherited Indian background.
- Melani and Maya were also a mother–daughter dyad from Malaysian background.

- Bing and Ben were a father–son dyad from Bangladeshi background.
- Vinh and Van were a mother–son dyad whose background was Vietnamese.

More details of each of the above pairs are provided in the following introductions.

5.2.1 Indra and Indi

Indra and her family lived in India before migrating to Australia five years before the study. At the time of the interview her husband was working as an IT professional while Indra was self-employed and worked as an interpreter. They had a son who was a university student and their daughter was Indi. Both of their children were born in India. Talking about her children, Indra said that involvement in their children’s education was more important than earning money. She expected her child to have a good knowledge in mathematics, and other subjects as well.

Indi studied in Year 11 at Majestic High School in Melbourne. Her hobbies were playing piano and dancing. Indi liked mathematics and she had selected Further Maths, Maths Methods, and Specialist Maths as three of her VCE subjects. In addition, she studied Accounting which was also mathematics based. Often Indi’s brother helped her with studies. She affirmed “I think mathematics is very important because it is used in learning other sciences [subjects] and also in real life”.

5.2.2 Melani and Maya

Melani has a Chinese background and lived most of her life in Malaysia. Three years ago she migrated to Australia with her two children, a son and a daughter. Her husband was still working in Malaysia. Melani was an administrative officer at a university in Melbourne. Her daughter was Maya, who was the younger child in their family. Melani was involved in her children’s education thinking it was part of bringing up a family. She believed, “Education is a ticket in terms of social mobility”. Even though she considered

that mathematics was important, she said higher level mathematics was not useful in day-to-day life.

Maya was in Year 11 at Kingswood Secondary College. Mathematics was the hardest subject for her. She said that she did not understand the explanations of her mathematics teacher at school and she was dependent on her tutor for her learning. Maya performed well in all other subjects she studied. She did not see any importance in mathematics learning but she studied the subject because it was a pre-requisite for some of the university courses she was interested in.

5.2.3 Bing and Ben

Two years before the interview, Bing had migrated from Bangladesh to Australia with his family. In Australia, Bing started working as a lecturer at a university in Melbourne. His wife had completed Master of Business Management in Bangladesh and was looking for work. They had two sons and Ben was the elder. Bing believed that parents and the school should collaborate with each other and he went to Ben's school to talk to his teachers often. He stated, "Children should have a very strong background in mathematics because it is embedded to many other subjects".

Ben was studying in Year 10 at Prince Hill Secondary College. He found his transition from his Bangladeshi school to Australian school difficult because of the language. Ben said that his parents were helping him with his studies but their capabilities were limited in teaching mathematics. He wanted to do well in mathematics and he was interested in becoming an aeronautical engineer.

5.2.4 Vinh and Van

Vinh was a teacher of English language at an Adult Learning Centre in Melbourne. She migrated from Vietnam to Australia three years earlier. Vinh lived with Van, who was her

only son, while her husband kept working as an engineer in Vietnam. Vinh argued that education was an important part of children's life and if parents got involved they could help children to overcome difficulties and to develop their strengths. Her opinion was that mathematics helps children improve their logical thinking which can be useful in other subjects as well.

Van was fifteen years old and studied in Year 10 at Prince Hill Secondary College. He performed well in all subjects. He thought that his mother Vinh did not know her mathematics and he asked for help from his father in Vietnam over the telephone whenever he had a difficulty in his mathematics homework. Van was good at mathematics but he did not like studying mathematics as much as he liked other subjects. Nevertheless, he said he was trying his best in mathematics. He wanted to become an astronomer. Even though Van believed that his mother was putting pressure on him to do more and more studying, Vinh interpreted the situation differently. She said that her son was not ambitious and not competitive.

5.3 Structure of the qualitative analyses

In the previous chapter, parental perceptions such as attitudes, beliefs, expectations, aspirations, standards, and values and seven categories of parental involvement namely, parental encouragement, setting up family rules, home discussion, homework involvement, digital deprivation, perceived parental control, provision of private tutoring, together with children's perceptions, were used in analysing the quantitative data. The next three chapters describe these parental practices using qualitative data from both parents' and children's interviews and descriptive written answers provided by the participants in the two questionnaires. The analyses include data from both European–Australian and Asian–Australian parents and children, male and female children, and Year

10 to 12 children. The findings provide further insights into the research questions, particularly for question 1 which is:

How do parents' perceptions about and parental involvement in mathematics education affect the way children think about mathematics achievement?

Qualitative data were used mainly to find answers to the above question. In the interview transcripts it was found that some parents and children had not talked about some of the sub-themes that emerged. Therefore, the extracts quoted under each sub-topic may not include every participant.

As for the quantitative analyses, parental practices in qualitative analyses were divided into the same three areas, namely parental motivation, support, and control. The three parenting roles can be interdisciplinary phenomena, which seem to be interconnected and overlapping as shown in Figure 5.1.

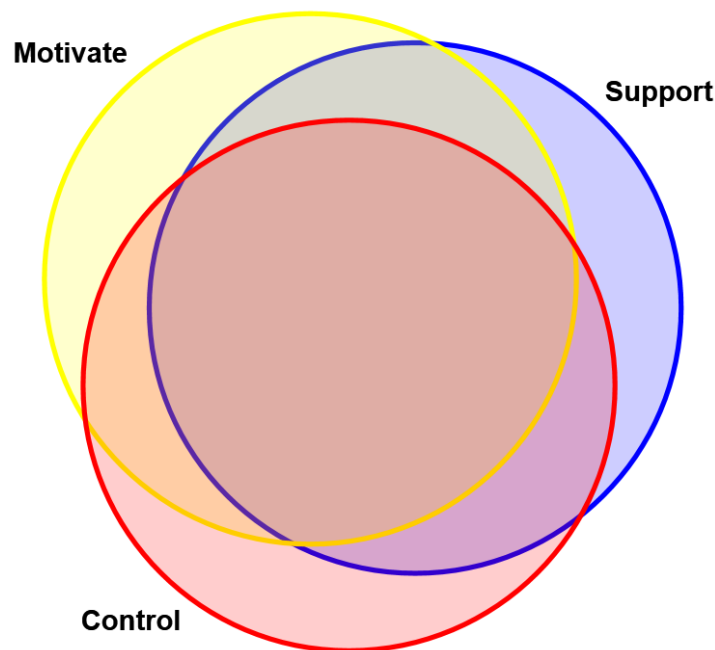


Figure 5.1. Three main areas of parental involvement.

The intersection of all three parental actions in the Venn diagram is shown as the largest area because it seems that most of the parents act as motivators, supporters, and controllers when involved in their children's education. For the purposes of the analysis, these three parental actions were structured separately as shown in the mapping diagram in Figure 5.2.

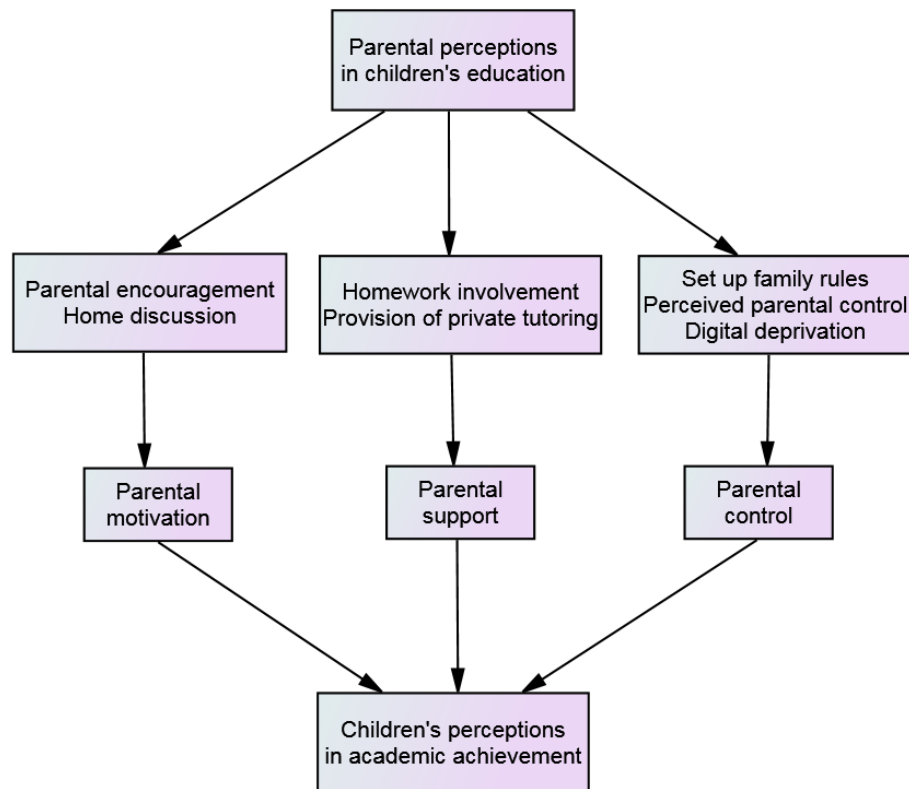


Figure 5.2. Mapping structure used to implement the qualitative analysis process.

The next three chapters describe the analysis of these parental practices with supporting evidence from the data available. First, the analysis of parental motivation is provided in Chapter 6, which concerns parental encouragement and home discussion. Second, parental support, which includes homework involvement and provision of private tutoring, are analysed in Chapter 7. Third, Chapter 8 presents the analysis of parental control, which includes setting up family rules, perceived parental control, and digital deprivation.

It should be noted that some of the participants' quotes were slightly edited without changing the meaning to make it readable and easily understood.

5.4 Summary

The collection of interview data and the use of thematic analyses have been elaborated in this chapter. Purposive and volunteer sampling were used as the methods for gaining access to a group of participants. These participants from both cultural groups were introduced with their background. The plan for the qualitative data analyses was outlined and the analyses focussing on parental motivation, support, and control are reported in three separate chapters that follow.

Chapter 6: Parental Motivation

Out of the seven parental practices in the study, in this chapter I analyse and report on findings related to parental encouragement and home discussion, which are factors that can motivate children. The parental actions that motivate children in education, identified from the qualitative data analyses, are presented in the following sections beginning with the most common parental involvement factor, parental encouragement.

6.1 Parental encouragement

The different practices of parental encouragement identified in this study can be categorised as giving advice, providing moral support, offering rewards, and caring about health and well-being. Each of these categories is elaborated in the following sections.

6.1.1 Giving advice

It can be assumed that parents advise their children with the aspiration of them succeeding. Sometimes, parents may not be able to help their secondary school children with particular subjects but may be able to guide, encourage, and support children's efforts. No doubt, parents advise their children in various situations and in different ways. The following are some examples from the data collected.

In relation to involvement in mathematics education, Eric reported that his daughter Emma was able to manage her studies and he was of little assistance to her. Even though Eric could not help with the content in the curriculum, he expressed the view that he still was able to guide, encourage, and support Emma. His minimum expectation for Emma was to achieve an undergraduate degree in a field she liked. Eric advised her in selecting subjects, courses, and careers. He appeared to be supportive of Emma and he believed that his

support was intended to encourage his daughter in education. From his own experience as a university student, Eric recalled how he used to think about the importance of mathematics. He believed that mathematics would be helpful in Emma's future careers too. Eric recognised the importance of mathematics in his life and he wanted to communicate the same to Emma. He was confident that he could advise Emma to achieve her goals:

I think Emma wants to be very successful and she wants to make a lot of money, she has told me that. I can give her tips there. I can see where maths in my own life has helped me. (Eric)

Eric was one of the parents who seemed to be conscientious in advising his daughter. His experiences had helped him and he would wait for a suitable time to catch her in a good mood to talk. The following is an example of him seeking to let Emma know what was available in the workforce through a conversation and the outcome seemed to be positive.

There is just a whole lot of opportunities out there. So I have tried to let Emma know a bit about financial markets, stock broking, and economics. When you can build that into the conversation and stuff because you know what kids are like, sometimes they want to listen to that stuff so you just pick your moments and just try and explain things to them. (Eric)

Tania was involved in Tina's education in a similar manner. Tania's assistance was mostly not on the subject matter but advice on how she could schedule her work and meet deadlines. As with Eric, it seemed that Tania waited for a suitable time to offer advice. For example, Tania was aware of the amount of work Tina got from school and sometimes she found that Tina was panicked with upcoming deadlines. Tania wanted to advise her daughter even though she was not comfortable with the specific subject matter. With her life experiences, Tania believed that she could help Tina to at least prioritise her work. Tania explained her willingness to advise her child:

I still have an idea of what, how much work she has ... sometimes they have a lot of work all at once. And if she is getting panicky about trying to get all the things done by a certain deadline, I try to find ways to talk to her, to find out what it is she has, to see if I can help her prioritise it. (Tania)

Tina appeared to know her mother's intentions and that she was always willing to help. For this reason, as Tania commented Tina had been responding to her mother in a positive manner. Another example of Tania's involvement was about Tina's Year 10 work experience. Tania encouraged her daughter to do her work experience at Tania's work place which was a laboratory in a manufacturing company. With the experience Tina had at her mother's work place she then thought about studying pharmaceutical science, which she may not have considered otherwise. This kind of guidance seemed helpful for children to open up their minds to possibilities.

Both Tina and Emma showed that they listened to advice of their parents. Even so, Emma said that she found it unnecessary that parents wanted to guide children all the time. Emma shared her ideas and decisions with her parents but she preferred to do things with less guidance or advice.

I do think it's important that you talk to your parents about your decisions and where you want to be in your future ... goals and things like that, but I don't agree that they should entirely pick everything about your life, because it's your life and you need to live it eventually ... one day by yourself, without your parents. (Emma)

It does not seem to be fair to consider Emma's attitude as a quality of an average teenager because she was intelligent, well-mannered, and well-connected to her family. What she meant was that she wanted to grow independently to get ready for her future with less support or interference from her parents. Some parents had similar ideas to what Emma had. As a parent Greg thought that parents should advise and support their children but he said, "At the end of the day, the child has to make the bed and lie in it". Further he added:

Parents have more experience and their role is to advise. They expect their children to listen to them but the decision is up to the child. It is the child who has to study, do the homework, sit for the exams, find a job, and build up the future. (Greg)

Even though parents have their own role to play, the child's role seems to be the most important with regard to education. Hence, guiding all the time and making decisions on behalf of senior secondary school children may not be helpful and may result in a negative outcome of parental involvement.

Further, Greg was a mathematics teacher and he was capable of helping and advising his daughter Gresha in her education. However, Greg explained the difficulties he faced when helping his daughter in mathematics because of the differences in his teaching methods and those of her teachers at school. "When the methods are different, children do not like to listen to their parents and they walk away", Greg said. Earlier, Gresha had done so, despite her father Greg being a mathematics teacher but he was able to change his daughter's attitude after some time. This explains how contentious it is to teach one's own child. It may be worse when the parent has little idea about the content of the subject.

Indi was an Asian–Australian student who thought her parents had no idea about the education system in Victorian schools because her family had migrated to Australia only four or five years earlier. Indi saw parental advice in a different way. She was thinking that her parents did not know about the course she was following, the Victorian Certificate of Education (VCE). When asked whether her parents encouraged her in her studies she replied:

No. I guess it's because my parents don't even know the structure over here. Because they didn't study here, they didn't do any studying here, they don't really know much about VCE or school. So I don't think they can help me with advice but yeah, they just tell me that I should try harder. (Indi)

This statement made by Indi, which was an assumption, seemed to be a misunderstanding, because her parents were skilled migrants and they were well-educated people. In fact, Indi's mother Indra had a different opinion. She expressed the importance of mathematics

learning for future careers. It seemed that she had some idea about education in general and she was capable of advising her children. She said:

Mathematics is very important. And if you do like engineering, you need to have good [knowledge in] mathematics... my daughter... if she wants to go for this medical line, or engineering line or even finance ...any line, she needs to have a good knowledge of mathematics. (Indra)

While she was in Year 10, once Indi had told her parents that she wanted to earn money. In reply, Indra had told her daughter, “We are here to support you, you are not required to do any job. Put all your efforts into studies because this time will never come again”. Indra affirmed her practice of advising her children.

We always give some suggestions... because sometimes they do some silly mistakes [in mathematics], which they can avoid and we always tell them that you do more and more practice so that you will not repeat the same mistakes again. (Indra)

Even though Indra was aware that her daughter was working hard, she kept advising her as a mother. In addition, Indra said that she consulted her brother who was an engineer in order to give advice to her children. She said that she used to give the “same advice to her elder son”, which showed that she treated both children similarly.

Melani was another parent who was able to give advice but not competent enough to help her daughter Maya with mathematics. She stated that she would do anything at any cost to help Maya in her mathematics education. Melani was looking for the ways to find a solution and she found services of a tutor. She believed that she had employed a very capable and highly professional tutor and that relieved her. According to her daughter Melani had not given up advising her but Maya did not complain about it. She willingly accepted the positives of her mother’s advice.

From her own experiences, Vinh also considered parental advice as important to keep children on track. She believed that the parents with their experiences can navigate, guide,

and advise their children but the child should make his or her own decisions about the future. Vinh remembered how her father had advised her when she was young.

I am very grateful to my father who decided to put me into a college [to learn English]. Well, of course he didn't say that I had to but he gave me advice. He just explained things to me at the time when I was about the age of my son now...about fourteen...He said, "I can see that you are a very good teacher because you care for other people and you are good at language. Why don't you become an English teacher?" (Vinh)

Vinh became an English teacher and she was happy that she was guided by her father and she followed his instructions. On the one hand, she believed it was good advice and she was able to fulfil her father's aspirations. On the other hand, from then onwards she believed that she was not good at mathematics and natural sciences. At present she seemed to be regretting not learning mathematics in her higher education. Vinh's father's advice affected her both positively and negatively in her life. From that, Vinh had learnt a lesson and she only gave factual advice to her son Van, so that he could make his own decisions.

The above scenarios showed that parents advise children in their own different ways. Even though children may listen to advice of their parents, children do not expect ongoing advice. This implies that parents should know their limits in advising children, so that they may maintain a good relation with them and encourage them effectively. If the outcome seems negative parents, need to step back and consider different approaches to be involved with their adolescent children.

6.1.2 Providing moral support

Not every parent may be able to help his or her children with their school work, especially for senior secondary school children. Some children put a lot of effort into their study but they do not achieve good results. In such circumstances parents can encourage their

children by providing moral support. The following are some examples from interviews and questionnaires in which parents tried to encourage their children.

While Emma was doing well in subjects such as mathematics and science, her older sister was good at drama and music when she was at school. Eric stated, “If they are doing drama or music you can go and watch a performance. Unfortunately when you do maths you can do really great at it and you don’t get much recognition for it compared to other arts subjects because it is a different sort of subject”. Knowing such differences in recognition, Eric encouraged Emma to study mathematics and tried to keep up her morale.

That’s one of the things you need to do with the difference between [maths/science and] arts children, like one that is involved in the arts, if they perform ... the enjoyment in that is just immediate and they can see how successful a pop star or whoever might be. But for someone that’s more academically gifted, you have got to let them know how big the rewards are if you are successful in that field. (Eric)

However, these differences in recognition of different subjects may affect the interest in learning any particular subject. This is where parents can be involved and convince their children about the importance of learning such subjects and the opportunities that may arise in the future. Hence, in this case, parental aspirations and expectations and their involvement in education may be morally supportive for children, although sometimes children feel this kind of support as pressure.

In addition to being supportive of education, migrant parents, especially recent migrants, usually provide moral support for their children with the transition from one country to another. With her Asian background, Melani explained:

Coming from an Asian background we always believe that education plays a very big part into the future of children. Therefore, you know, education is a ticket in terms of social mobility, we would say. You can be what you want to be with education. (Melani)

Melani and her husband prepared their children for the challenges in moving to another country before they migrated to Australia three years ago. They had been planning and implementing everything possible for a smooth transition for their children without culture shock. This kind of support can be helpful to building confidence in children's minds. Melani's daughter Maya experienced no issues in moving and fitting into a new school in Australia.

As a recent migrant Melani had very high expectations for her daughter and she advised Maya to do her best in mathematics so that when she looked back she would not regret missed opportunities. Maya had a positive attitude towards parental support. It did not seem that she experienced pressure from her parents, but it was apparent that she put her own pressure on herself because she was a bit emotional with her answers. Describing her parents Maya said, "They don't put their expectations as a pressure on me [sighs]. They pretty much support me". She thought that the feeling of "knowing that parents were willing to help" was encouraging. Maya added that her parents would congratulate her for doing well or getting high marks. In fact, rewards are sometimes intangible but they can be encouraging words or statements only. Likewise, moral support can be verbal too.

If parents wanted to offer their support, Indi said it is great to have that kind of resource on tap and children should make use of those offers. However, from Indra's interview it was found that in practice, Indi did not like her parents' offers to help her as she found it was time consuming. Indi was a high achiever and she learnt everything fast. Hence, she wanted her parents to help her quickly, which was a challenge for them. Even though parental support was appreciated by Indi, it did not work well with her pace of learning and cognitive skills.

A mother who responded to the parents' questionnaire had written that she believed her daughter's passion for mathematics would help her to achieve good results. Indeed she encouraged her daughter to strengthen her abilities. Then again parents sometimes felt sorry for their children when they studied hard but were unable to achieve good results. Tania said that she would ask Tina "in a very gentle way" how she could help her to overcome the difficulties and get better. However, she affirmed that she would not be angry about it as long as the child tried her best and she would encourage and support her child to do better next time.

As seen above, senior secondary school students may place pressure on themselves because they want to be successful in their future. Further, they may want their parents to be happy about their performance and to be proud of them. Thus arises the necessity for parents to understand their children and not to put extra pressure on them. Rather, parents can provide moral support for children to direct them towards success in education.

6.1.3 Offering rewards

It seems that some parents encourage their children by offering rewards for hard work. In particular, when children are young parents sometimes give rewards to them when they get good marks or achieve something remarkable. However, as children grow, the type of rewards also seems to be different, sometimes intangible. As mentioned by Eric, trust was an example.

We reward her [Emma's] hard work by basically trusting her but we will say when we think there is just a bit too much on the social agenda. But she is very good at self-regulating that. (Eric)

Greg's attitude and the way of offering rewards were the same as Eric's. He encouraged his daughter Gresha to do well in her education by letting her go out with her friends.

If they are getting their work done, they are doing all the right things, I think the parent should reward their kids with letting them go out with their friends and so forth to entice them to do more. (Greg)

Greg thought that children deserve a break when they were doing well at school. One of the key points was that, by giving her a break, he expected Gresha to work even harder.

Vinh expected the same from her son Van. He said that his parents forced him to do more and more even when he had finished all the work and was up-to-date with his studies. He saw his parents' encouragement negatively because he preferred his freedom. Thus it can be seen that at times freedom given to a child could be a reward for effort in study. Melani encouraged her daughter Maya by giving more freedom as a reward for good results. Maya enjoyed her freedom, thinking that it was a well-deserved reward for all her hard work.

Comparatively, Indi did not get any rewards for doing well in school but her parents encouraged her by saying, "Good job. Keep up the good work". Indi thought that her parents were happy for her achievements and she felt happy too. So, she did not expect any reward. She also commented:

I have been doing well in maths since like, I was a little girl so it is not like it is a surprise for them that I am doing well. So yeah, that is why. They are certainly used so it is not like rewards, they would be upset if I didn't, if I started doing badly but, yeah, it is like you know expectations, yeah. (Indi)

Some parents encouraged their children by giving rewards for good work. However, these rewards did not always come inside a wrapping. The students who were interviewed in this study were senior secondary students. The rewards they received then were different from what they used to get when they were smaller children. Sometimes, some rewards were just the encouraging words of parents, and sometimes freedom, which could still provide happiness in these children's minds.

6.1.4 Caring for health and well-being

Health is important for the learning process, which requires thinking and grasping the ideas being taught. It may not be advisable to spend long hours studying at night. Emma preferred to finish all her mathematics homework and other studies before she went to school the next day. Eric was worried about Emma who sometimes studied late. When asked about Emma's study habits Eric pointed out:

If anything, she puts almost too much in, you have got to sometimes pull her back a bit and just make sure she is not doing it again, you need your sleep. (Eric)

There were students who were self-disciplined about maintaining their health. Indi had a long distance to travel to her school and after coming home she usually spent an hour just relaxing before having dinner. After studying for some time she then used to go on Facebook for a change. During weekends she had private tuition for mathematics. Then again she would make sure that she had enough hours of relaxation before getting back to studies at home. Likewise, Maya stated the importance of relaxing, as school work sometimes was quite stressful when required to meet deadlines. She also said that weekends were not holidays for her but merely continuous studies. However, she would try and relax between her study sessions because she was concerned about health issues.

Similarly, Bing believed that his children needed some sort of recreation and to get them out of studies he used to take them somewhere with the family on weekends. He encouraged Ben to play with his brother while they were away. Bing wanted to achieve a balance between studies and sports for his children. In like manner, Vinh encouraged Van to attend all extracurricular activities at school. Van enjoyed these activities and Vinh did not hesitate to give her consent or to pay any amount of fees in order to make Van feel happy.

Even though Van was a gifted student he had a habit of playing online games after finishing school work. That was a concern for Vinh, as she wanted her son to socialise more because she felt that he did not have enough friends. She thought, “Socialising make him understand real life”. While Vinh wanted her son to have friends she also wanted to know everything about each friend and the family. Van found it annoying and he thought it was too much parental involvement. However, it seemed that Vinh was unsuccessful in that exercise, because Van was not interested in making new friends. Further, it was noted that Vinh’s interference was felt by her son as an obstacle to enjoy a positive experience in socialising.

Most parents considered healthy food and eating habits as essential requirements in student learning. Bing and his wife wanted to make sure that Ben had eaten enough while at school and home. As Bing explained, Ben sometimes forgot to have lunch because he used to play during lunch time. Knowing the importance of nutrition, Bing kept on reminding his son to have food while at school and after coming home.

Noises due to television and other electronic devices seemed to be a problem for some children when studying at home. One child might prefer to study while another child sought entertainment. It may be a responsibility of parents to be involved in such situations to encourage the child who wanted to study and also not to disappoint the other child. Hence, providing a quiet and comfortable place to study could be a way of encouraging children in their studies. Some parents reported that they provided children with their own spaces, chairs, tables, computers, and other materials to motivate children in their studies. Tania mentioned the importance of ergonomics.

Definitely we set up a place in their bedroom where they can go and work quietly and we encourage them. (Tania)

Particularly, a quiet working environment seemed to be preferred to support study at home.

A child who responded to the questionnaire stated:

They [parents] always help me with my homework and they have created a home environment that encourages learning. Therefore I like their involvement in my education. (a respondent to children's survey)

Parents were happy for their children to use technology as long as the children used the equipment wisely. Some parents did encourage their children to use technology because it not only helped in education but also was useful in daily life. Tania encouraged her daughter Tina to carry a mobile phone and to keep it near her so that they could contact her at any time. Then she emphasised:

We do trust her ... we don't keep tabs on her all the time. (Tania)

Irene had seen her son Ian working with technology most of the time, even though he was not studying much. Irene did not complain about it because Ian stayed home without hanging out with his friends. When Irene was asked how her son spent his after school hours and week-ends she said:

Usually in his room playing games. Internet gaming or listening to music. He skypes to some friends and people that he games online with and he does a bit of homework [laughs], but he spends most of his after school and weekends in his room doing those things. (Irene)

Van was another child who spent most of his after school hours with technology. Vinh was not happy about it because she thought that it might affect Van's communication with other people. Vinh explained her concern:

About two hours after school ... he plays interactive games online. He reads [some online stories]. Usually there are two or three characters of his age, teenagers, and this is about their daily life. But what I don't like is that their conversations are very short and never in full sentences. And, that affects my son when he answers somebody. (Vinh)

Along with parental encouragement of their children, another factor that was involved in parental motivation was home discussion. The following section describes how home discussion can be a help in motivating children.

6.2 Home discussion

Data in this study indicated some areas in which parents generally involve themselves in discussions with their children in relation to mathematics education. Mathematics performance at school, subject selection, higher education, and career pathways were often discussed. In addition, some parents showed their interest in having family time with their children.

6.2.1 Discussing performance in mathematics at school

Irene and Indra had different attitudes about the performance of their children in their examinations. One expectation of Irene for her son Ian was to “get the best marks he possibly could” but she would not exert any pressure on the child. In contrast, if Indi had achieved low marks in mathematics at school she said that her mother Indra would not be happy and would put a lot of pressure on her. Indi added that her mother might say, “You should have done better. You should have tried more...”.

Gresha’s father Greg, a mathematics teacher, explained that the relationships between students and parents, teachers, or tutors could be difficult as each group had different expectations. Surprisingly, Greg reported that he and his daughter Gresha had no such issues. He mentioned:

I help her and she wants to be helped and we work pretty well together, which is unusual. (Greg)

When Gresha was not able to achieve good marks she believed that her parents would be a little disappointed but they would not make her feel bad about herself. Instead, Gresha's parents would try to get her spirits up by saying "Look, It's just one thing. Just next time you can do better. It's alright". It was Gresha who put pressure on herself but not her parents. She admired her parents' attitudes and she said:

I put a lot of stress on myself, and if they put more stress on me the next time I'd probably do worse, so I do think it's the right way to go. (Gresha)

Further, the data showed that there were some parents who gave priority to mathematics over other subjects. Maya said that her mother talked to her about mathematics after school every day. The first question Melani would ask from Maya was: "How was your mathematics today?" As reported by Maya:

Since my mum knows I'm quite weak at it [mathematics], she constantly asks me and reminds me of that subject, I guess, and also inquires my progress in that subject. (Maya)

In this case, Indra was different to Melani and she gave no priority to any one of the subjects her daughter studied. Indi said that her mother used to ask about her studies in general but not any subject in particular.

Talking about senior mathematics subjects, Greg described the importance of understanding and accepting the level of mathematics ability of their children. Greg has many years of experience teaching mathematics and advising senior students at school. He explained appropriate choices among the three senior mathematics subjects, Specialist Maths, Maths Methods, and Further Maths, which are in ordered here from hardest to easiest. For lower ability groups of students, Greg's advice was to drop down to Further Maths without putting a lot of pressure on themselves. Melani had the same vision towards those students who struggle in mathematics. She said if the child could not show

acceptable results then that could imply that particular level of mathematics was not suitable for the child. She added that the child and parents should look for alternatives.

With regard to schoolwork or homework, parents appeared to engage in different interactions with their children. For example, Vinh was able to understand the procrastination of her son, Van. She admitted that children need a mood or some sort of enthusiasm, at least, to start studying at home. She added that she would prefer to encourage her son rather than demand that he did schoolwork.

In Tania's case she seemed to have no issues with her daughter's schoolwork as she was capable of managing her academic and social life. Tania said:

She [Tina] is very good at her schoolwork, she can apply herself very well. And she knows what she needs to do, so we don't have that problem. She is also social and she has a pretty good balance between spending time with friends. She plays a lot of sport, and she does manage to do her schoolwork. (Tania)

However, it was not the same with some of the other parents and children in the study. Bing voiced deep concern for his son who was sometimes behind the expected level in mathematics. Whenever Ben was found to be not up to date with his schoolwork, Bing used to consult his teacher to get opinions on how to help his son improve. Bing said that he and his wife wanted to ensure that Ben was at the required level in his class. In particular, Bing wanted Ben to submit his homework on time. If there was a notification from the school teacher with regard to failure to submit any work, Bing said he would definitely talk to his son and find out the reasons. He also asserted that he would not let Ben ignore his homework. Further, Bing suggested that "Homework is an extension of work for the school and if you [the students] do it you [they] will understand the concepts better". He also mentioned that it would not only be parents but also teachers who would not be happy when the students failed to do their homework.

Vinh also added that it would be a good idea to look at what their children were doing and how well they were doing at school. She wanted to help Van but she did not want to do the work for him. Her intention was to give feedback, raise questions, or at least to make sure that he finished all his homework. One time there had been a situation where Van's work was overdue according to the school online information system. Vinh was not happy about it because she was assured by Van that he had already submitted the work. Hence, the parent and the child were in a situation where it was uncomfortable for both of them. Later, they came to know that it was the teacher who had not updated the system.

The teacher's role in education and parent-child discussions about the teachers seem to be vital. From the descriptive answers provided in the questionnaires, it was found that the students' mathematics performance at school was influenced by the teachers. Some parents were disappointed that the teachers were not supportive enough of their children and there was not enough one-on-one time with the teachers. Some students did not understand their schoolwork or homework and they were struggling with the subject. Such situations may have occurred due to lack of English language knowledge of some mathematics teachers from non-English speaking backgrounds. Also, sometimes it seemed that some teachers did not appear to be competent enough to teach or cater for each and every child in class. Particularly, in response to questionnaires a group of parents noted that their children were not interested in mathematics as they were not able to understand the explanations of the teacher or what was written on the board. Another group stated that their children performed better in groups as their discussions enabled them to understand the concepts easily. Hence, it seems that parent-child discussions about performance at school are crucial for both parties to achieve academic success.

The next section describes another area parents and children discuss. It involves selecting appropriate mathematics subjects and other subjects to the satisfaction of both parents and children.

6.2.2 Collaborating with children in subject selection

Apparently parents play an important role in educational decision-making for their children. As three different mathematics subjects, Further Maths, Maths Methods, and Specialist Maths, are offered to senior secondary students, especially, subject selection in mathematics seemed to be crucial. Greg highlighted the point that the subject selection must be done according to the capabilities of children. He also added that “mathematics is in nearly everything” and it is a pre-requisite for a number of university courses. Moreover, Eric pointed out that mathematics is different when compared to other subjects. He said that a student could be excellent in mathematics but would not be able to get much recognition compared to performing arts students. Hence, parents and children were involved in discussions, arguments, agreements, and disagreements as described below.

Whenever there were information nights at Emma’s school, Eric and his wife attended those sessions. He believed that the information could be helpful to understand teaching and learning activities at school and to motivate his child. Eric also commented on the importance of guidelines provided in information nights when selecting Emma’s Year 11 subjects. He considered subject selection as a joint project between parents and children.

We have talked about it between us. Emma is still a little bit undecided about what she wants to do later. She has got five or six different things she is interested in. ... I think it is very much a two way blend between what the child is interested in and also making them fully aware of the practical realities of some of those career choices.
(Eric)

Emma was very happy with the way that her parents were involved in her choices but she said if the involvement was forceful it could be stressful for a child. Even though Tania did

not force Tina to follow any particular subject, she did not let her daughter decide everything by herself. If Tania was not happy with a decision made by Tina she would definitely discuss it with her daughter to let her know the consequences. Tina confirmed that mother–daughter interaction and added:

When I was choosing Year 11 subjects in the end I was the one that made the decision, but my parents gave me a lot of advice on what they thought was good and I took that into consideration when I made my choices, but they didn't force me into anything. (Tina)

In Melani's family most of the discussions took place at the dinner table. She believed that such discussions over the years had indirectly influenced Maya's decision making with regard to her subject selections. Melani said:

She decides. She discusses with us. We give her our thoughts but the end decision is still up to her. So, in a way she's given a free hand to plan ... and work accordingly in terms of the subjects she needs to pick up in school. (Melani)

Having no restrictions from parents, Maya selected all her subjects for Year 11. As she said, children have to choose what they want to do, and parents have to help them in making the right decision. When describing her subject selection she confirmed the ideas Melani had already described:

They [parents] don't force me on what subjects I take, so it's mainly I really have the choice of it, but I do keep a consideration of what my parents say about those subjects, since it'll lead to university and everything. (Maya)

Indi and Indra experienced the same as Maya and Melani in the process of subject selection. As Indi explained:

They gave me the suggestions, but they didn't say that you have to do this or that. It was up to me. They said do whatever you're good at and we picked my subjects pretty broadly because I didn't know which career I wanted to go. (Indi)

Similar to parents Eric, Tania, Melani, and Indra, Greg also preferred to give advice to his daughter Gresha to steer her in the right direction. He also believed that the parent's role is

to advise and the children then have to make the ultimate decision. He emphasised that it would not work well if parents selected the subjects and the children were not prepared to do the study required.

Gresha's attitudes were in line with her father's and she wanted to make her own decisions. She said:

It is important that they [parents] do help you and discuss choices together and things like that, but not make them for you. (Gresha)

Describing parental involvement, Gresha added that it would be quite annoying if parents were always looking over your shoulder, monitoring everything you do, and making the choices of subjects for you. Further, she described an experience of one of her friends and the parents. When the friend had selected a particular subject her parents did not agree with her. As Gresha reported the parents responded "No, you can't do that subject. We do not want you to do that at all". However, that was a subject her friend really wanted to do. Gresha believed that it impacted on the child and she considered the situation as representing too much involvement of parents.

With my personal experiences, I have observed that parental involvement within some Asian cultures is considerably higher than that of other cultural backgrounds. Describing his experiences in Bangladesh, Bing pointed out that the students did not have much freedom to choose their own subjects. Being aspirational, their parents wanted them to be engineers and doctors and the children tended to accept what parents had decided for them. After studying and living in Australia for several years, Bing did not want to follow his parents in this regard. He said if someone had to study something he or she did not like, it could be difficult. He did not want his children to face that situation. Instead he would talk to teachers and friends to get their ideas so that Ben could benefit in his future. Bing also

affirmed the importance of having a discussion with Ben to understand his preferences to guide the child towards the best possible direction in his studies.

Interestingly, Vinh played the role of a typical Asian mother, or rather a “tiger mom”. She did not allow negotiations with Van. She said her son must have an undergraduate degree as the minimum qualification and she would encourage him to step into post graduate studies. Vinh believed that she was coming from a family mathematics background as her father and elder sisters were mathematics teachers. Hence, she wanted her son to do something related to mathematics in future. The following shows Vinh’s influence on Van’s subject selection.

Of course he has to choose Maths and English, no other way. ... He really likes history, he’s good at history in general. So I pointed that out to him as well. ... I said “You have to consider really well what you like the best. ... If your choice does not have any point, we have to consider everything again”. (Vinh)

Having understood his parents’ expectations Van had selected the subjects they wanted him to do. Vinh was happy about the choices and she said “Luckily what he chose kind of matched with what my husband and I expected”. As Eric once said, it is a joint project between parents and children in which each party has to negotiate, sacrifice, or agree with the other party. Hence, this kind of collaboration between parents and children seems essential for children who in most instances are less experienced than their parents.

After subject selection, another series of discussions can take place about careers and tertiary education. The next section describes parental influence on the career pathways and higher education of adolescents.

6.2.3 Suggesting options in career pathways and higher education

Most of the parents who participated in the study expected their children to go to university. For them, a basic degree was the minimum qualification and they would be happier if their children could continue with post-graduate studies. Out of the eight parents, Irene was the only one who did not seek to influence her child to go to university even though both Irene and her husband were university graduates. She did not expect Ian to enter university straight after finishing school. Irene thought he could always get there when he was ready but it was up to him to find out what could make him happier, a break from studies or a job. Talking about careers she added:

I think children should make their own decisions about what they're going to do as a career. It's a decision that affects the majority of their life because they're only a child for such a short period of time, and I think it's a difficult decision and many children even when they leave secondary school still don't know what they want to do. Even myself I've had three very separate careers in my time, and I think it's not for me to choose what my child does. (Irene)

Irene had frequently asked Ian to be a positive member of the community and to make a contribution to community. She expected him to either study full time or work full time. At the same time, Irene did not influence Ian's choices:

I don't really care what he does, so long as he enjoys what he does and that he's happy about his life and about whatever employment he chooses. (Irene)

By the time of the interview Ian was in year 12 and he did not know what career he would have or wanted to have. Irene said that Ian was sick of studying and would prefer next year off from studies. Also, she did not put any pressure on Ian to enter a university. She said that there are other pathways into many professions through Technical and Further Education (TAFE) institutions, which Ian might be interested in.

Greg recalled his mother's response when he asked permission to become a policeman. She had replied, "Over my dead body." Greg had given up his dream of becoming a policeman. For his daughter Greg was mostly focused on a job that Gresha could be happy with, whether it meant earning a lot of money or little money was not that important to him. Eric, Tania, Indra, and Melani wanted their children to have a degree to earn good wages and to be successful and happy in life. Bing and Vinh talked more about the higher education of their children rather than earning money.

As had been noted, Melani had even higher expectations and wanted to give her daughter Maya the freedom to travel globally if required. She expected her daughter to become at least a graduate because everybody would have a degree by the time she could finish university education. Hence, she might not be any better than others. Melani explained what she said to her daughter:

I've told her, "If you can't get a job in Australia, go wherever your job brings you. Be a global citizen. Do not confine or restrict yourself. Once you get a degree you have the wings, fly wherever you need to. I'm not clipping or tying you down to any country." (Melani)

Maya was interested in Business and Commerce, thinking that it might improve her chances of employability. Melani thought that her daughter's decision was due to parental influence and she explained:

Because both my husband and I are from the business line, it could be an indirect influence as she was growing up. Our discussions might have intrigued her. So it could have an indirect impact. So I think that family influence does play a significant role in a child's interest. (Melani)

Tania was happy to discuss options and give ideas but she wanted Tina to choose careers and courses for herself. Discussing more about careers, she added:

Often kids don't have any idea, but I don't think it was that different for us either when we were at school, but somehow we all choose something. And you might look

back and think if you had your time again you might choose something different, but that's life. (Tania)

Interestingly, Indra recalled that her parents decided the field she should go into. At that time she was living in India and it was normal for parents to make decisions for their children. However, Indra was happy to let her daughter Indi decide herself what she wanted to do in the future. She would also provide some guidance for Indi to think more about her decision. Further, she would encourage her daughter to do the best in the course which she was interested in, to achieve success.

Ben advocated parental involvement in his career selection because he believed that parents have more experience and they can see the future better than children. However, Bing's intention was to consider the ideas and interests of his child and to support him. He also wanted to explain the outcomes or consequences of Ben's choices. Bing also said that his wife wanted their son to be a doctor. However, he did not agree with the idea, saying that it should be the son's decision and interests and not the parents' aspiration.

Each of the above parental views influenced the children in the study differently. For example, Emma said that her father, Eric, would encourage her to go to university even if she might not have been too keen. She added that he would not force her but he believed in higher education because of the competitiveness of the workplace. Van thought his parents would force him to do university education. In due time he expected that he could do whatever he wanted with his degree without parental influence.

Some children thought parental influence was helpful, while others saw it as a burden if it was too much. Emma considered parental influence as a support in making decisions about her future. She commented:

It's great that they're interested. It does make such a difference because at school a lot of the time you're the only one. But having that extra support from home can be really helpful. So I think if parents want to get involved, that's awesome. (Emma)

Further, Emma emphasised the importance of talking to parents about their decisions and future goals but she did not agree with the fact that parents pick absolutely everything for their children. Indi thought her parents wanted to see her doing well in spite of the course in which she enrolled. In talking about her parents she said, "They just want me to get a good job and settle down." For both Emma and Indi, parental influence had not been a pressure on them.

In contrast, Van was against the parental influence and argued that it is unfair to force a child to do something in which he or she has no interest or capability. He believed that it could be disadvantageous and an unnecessary pressure for a child. Van said he would definitely discuss the situation with his parents:

If they don't agree with me I will ask them to give me an explanation why I have to do this or that. I just can't do whatever they ask me to do. (Van)

Some families considered information nights at schools and open days at universities important as these were helpful in course selection and deciding career pathways. Emma, Maya, and their parents had robust support and information with regard to course selection by going to open days at universities. Melani said that they had been involved in open days for the previous two years and they were hoping to go there again to clarify final questions about prerequisites for and the content of subjects in the courses of interest. Hence, those parents were looking for expert advice rather than influencing their children.

6.2.4 Having quality family time

Discussions between parents and children at home seemed to happen randomly at any time of the day. However, there were parents who purposively arranged a time to talk to their

children every day. One such parent, Tania, has two daughters and she mentioned that she was not aware of any differences in discussions with sons and daughters. Nevertheless she tried to make herself available for her daughters to talk with her if they needed to. Tania said:

Yeah, we try and sit down for dinner, at least at the table at night, and they can talk about school. And also, just as a mum, and I have two girls, just spending time talking one-on-one with them, I don't know what it would be like with sons, but just in their rooms, often when you just go and sit there they'll start to talk about things that they might not otherwise. I find that's good. (Tania)

Tania wanted there to be a balance in her daughter's social life too. If Tina had been busy or socialising too much, Tania might place some restrictions on her. Even though Tania was talking about the importance of family time she seemed to be flexible with her decisions. When Tina asked for permission to go out after she had been studying hard and she was tired, Tania found it difficult to make a decision. While she did not want to hurt her daughter's feelings, she did not want to lose family time with her daughter. She was not sure what to say:

We might put some restrictions on her. We might say no. [Laughs]. But she usually has a pretty good argument persuading us too. [Laughs]. (Tania)

Discussing the parental involvement with her children, Tania explained the importance of talking and listening to children:

Even watching them play sport, or just listening to them talk about what they've done at school that day. I find my kids like to talk about that, and it's important to not be too busy, and find even if you have come home from work and you've got to cook dinner, it's important to try and find that time I believe, to talk about school with them. (Tania)

Although Maya would not be allowed to go out with her friends, Melani said frequently they did everything together as a family. As a result they often had their family time without specifically organising or requiring any effort. In contrast, Indra was not happy

because she felt that they did not have enough family time as her daughter used to go out and spend time with her friends during weekends.

On week days Bing allowed Ben and his brother to go for a walk or play outside if the weather was good. During the weekend at least once they would go out together as a family and enjoy the excursion. Bing considered that to be recreation for everyone in the family. He also said that teenagers could be easily distracted and it is the responsibility of parents to get them onto the right track. In addition to family time, he enjoyed watching his children growing up:

I think that as parents, it's not an easy job but it's interesting and, you know, I do enjoy every day, every moment while I have some conversation with my kids. They try to help me ... I become surprised sometimes, some of their ideas are so innovative, so helpful, it gives us a really huge pleasure as parents. (Bing)

The above analysis emphasises the importance of family time to strengthen the parent–child relationship, which appears to be another foundation for children's academic achievement. The next chapter analyses and reports qualitative data on parental support.

6.3 Summary

The different practices of parental encouragement identified in this study can be categorised as giving advice, providing moral support, offering rewards, and caring about health and well-being. Sometimes, parents seemed unable to help their secondary school children with particular subjects but were able to guide, encourage, and support children's efforts. No doubt, parents advise their children in various situations and in many different ways with the expectation of them succeeding. Even though children might listen to the advice of their parents, children did not expect ongoing advice constantly from parents. Some parents encouraged their children by offering rewards for hard work. However, when children grew older the type of these rewards became different and sometimes they were

intangible offerings, ones that were not always inside a wrapping. Health is another aspect which the participants felt was important for a good education. Providing children with their own spaces, chairs, tables, computers, and other study materials was considered to be a way of encouraging children. In particular, a quiet working environment might be an essential requirement to study at home. Further, parents were happy for their children to use technology as long as the children used the equipment wisely. Some parents did encourage their children to use technology because it not only helped in education but was also useful in daily life.

Parent–child discussions seemed based on performance at school, subject selection, higher education and career pathways, and sometimes just to have family time. With regard to performance in mathematics, parents discussed test marks, homework, the clarity of the teacher, and teacher support. Discussions on subject selection were seen as vital for senior secondary students, as the selected subjects can affect courses in higher education and future careers. Some parents purposefully arranged family time every day to discuss their children’s educational matters.

Chapter 7: Parental Support

The data about parental motivation were analysed and reported in the previous chapter. In this chapter I analyse data related to parental support as explained by the participants in the study. Involvement with homework and providing a tutor of mathematics were identified as different ways parents can support their children. As described by both parents and children homework involvement and provision of private tutoring can be divided into sub categories, which are parental activities that can support children's academic achievement.

7.1 Homework involvement

When parents were involved they sometimes helped with homework, perhaps checking the workbook, or monitoring children from a distance while children were engaging in homework. Although some parents saw the importance of homework, others thought homework was work to be done by the child. Parental involvement in homework seemed to decline with the advancement of the year level of students.

The following sections describe parents who helped with or checked homework, monitored their children's engagement from a distance, and had an opinion about homework.

7.1.1 Helping with homework

While the majority of parents showed interest in helping their children with homework, there were others who were not able to help because they had forgotten their high school mathematics or did not have enough knowledge in mathematics to help their children. There were parents who were willing to support their children with homework and there were children who were willing to be supported by parents.

Emma said that parental involvement in homework was important to parents because they could find out what their children were learning at school and whether they were up-to-date with the assigned tasks. Even though Emma received a lot of support from her father while she was in lower secondary levels, she did not require his support in her upper secondary levels. At the time of the interview she was able to do mathematics faster than her father. Emma was confident about her abilities but she added that she was not aware whether the other students in her class needed support from their parents. As she explained:

I think, like, once you're in high school and stuff you should be pretty independent with it [homework], so yeah, it kind of depends. (Emma)

Eric elaborated on Emma's development as follows:

We support Emma in terms of helping her with any sort of study that we can. Like maths that I can help her with, there used to be a lot in Years 7, 8 and 9 that I would help her. It's getting less so now as she gets more advanced in maths and she probably just finds it's quicker to do it herself. (Eric)

Even though Eric found it difficult to help his daughter with senior mathematics, he described parental assistance as a great resource. Even then, occasionally Eric and Emma worked in collaboration to solve worded questions which was an example of a parent's willingness to help and the child's willingness to be helped. If their joint effort was not successful, the next resource for them was the school teacher. Emma commented that she would seek assistance from her mathematics teacher the next day in such cases.

Likewise, Tina preferred working independently without support from her parents. Her mother Tania said that she monitored and supported Tina with homework when she was in primary school. Commenting further about support in homework Tania added:

I believe that you can assist them, but as long as they're understanding what it is, so they can later use that knowledge, and not just to write what the parent is saying, and not retain that information later. (Tania)

Further, Tania wanted to get the children to think for themselves, and to do the homework so that it was their own work. Comparing her two daughters she said:

In secondary school, at the moment my youngest daughter [Tina's sister] is in year seven, and I have helped her a little bit this year to develop summarising habits, and study habits. But my older daughter [Tina] has always been very independent, so it depends on the child as well. (Tania)

However, Tina commented that she sometimes needed assistance with her homework. The person she would look for in such situations was her father. Tania believed that her husband was good at mathematics and said "If a parent in the family is capable and able to help, then that's probably the first place to go, if you think that they [children] respond well when listening to a parent".

Expressing her ideas about homework, Gresha said, "If parents help all the time then you're not really being independent, you're not trying to solve problem by yourself". She added that she would first try the question a few ways herself, and if she was not sure at all how to continue she would ask for help. Moreover, she said, "Obviously it is good to ask for help when you are really stuck with something and have no idea how to continue with it". When Gresha needed help with homework she would ask her father who was a secondary school mathematics teacher. Greg was willing to help his daughter and commented:

It is very important that the parents obviously support the children in their homework and help them as much as they can because this also ensures that the students realise the importance of completing the homework. So I think it's very important that they support and help their students in their quest for success. (Greg)

Greg also added, "I help her [Gresha] and she wants to be helped and we work pretty well together, which is unusual because a lot of students say to me that it is very hard to learn

from parents”. According to Greg, relationships between parents and their children and teachers and their students are different because they have different expectations. He emphasised the importance of discussions between parents and children to find out the difficulties faced by children in their studies or in daily life as senior secondary students.

Interestingly, Greg pointed out a problem that might arise when parents try to help their children with homework. If the method the student learnt at school and the method the parent tried to teach were different, there could be arguments between parent and child and this could cause problems. Hence, the child might refuse help from the parent and both of them could be disappointed. A parent’s response to the survey implied the same idea.

Some mathematical teaching methods are different from the days we learnt mathematics. So the child gets mixed up and they do not want us to help. (a survey participant - parent)

Some other survey responses from parents commented that they found mathematics at school challenging and hard to decipher, being different from what they had learnt a long time ago or different from what they had learnt overseas. Another parent mentioned that parents' educational levels could be different and not all parents could be involved with their children's mathematics education at home. Those parents believed that teachers should be more responsible to develop students' mathematical knowledge, skills, and techniques at school than are the parents.

A child participant in the survey mentioned, “Parents become annoying when trying to explain maths problems that I don't understand”. It appeared that Irene had not faced the above situation as she had decided that she was not capable to help Ian with his homework. She used to help him while he was in primary school but not anymore. Irene said, “I know a lot of parents say they can't help their children with mathematics because they don't remember those particular concepts from their own schooling”. She thought it was normal

for parents not to get involved in the mathematics education of their children due to lack of capabilities. Even though Ian did not get help with homework from his mother he was able to see the positive side of such an opportunity:

I think it's good if the parents are able to help if they [children] are struggling with it [homework]. But like, typically parents may not have the time to do it, because you know, they're working and they may have other stuff to do, so if they have the time to like, help the children if the child needs it, then it's good. Yeah. (Ian)

Ian and Indi both claimed their parents were not helpful with their homework. Indi believed that children would not listen to their parents and she added that she would not get much help from her parents even if she asked them. Indi admitted that her father had helped her more than her mother when she was in lower secondary year levels. Later, she realised that she could get more help from her elder brother than her father because her brother was able to answer questions and explain faster than her father. Hence, she continued to ask her brother for help when she needed it. In her interview, Indra mentioned that Indi's reluctance to get help from her father seemed to be a matter of the time taken when explaining a particular question. Further, Indra added that her husband kept trying to teach Indi but she refused to have his support.

Similar to Indi, Maya also did not see her parents as a resource to get help with her mathematics homework. About the time when she started her senior secondary education she stopped seeking her parents' support. As she recalled:

I can't exactly remember, but... it started... between Year 10 and Year 11, then I stopped asking, because the first person I ask to is my mum. She didn't know, so I ask my dad. He didn't know, so [laughs] can't really do much other than that. (Maya)

In contrast to Ian, Indi, and Maya, Ben had faith in his father's competence in mathematics and said he could ask him for help when required. Conversely, Bing had a different thought about his knowledge of mathematics. He said that he would not be capable of

helping Ben with his senior secondary mathematics. Ben was just starting his senior secondary education and it seemed that he had not realised his father's concerns about helping with senior mathematics.

One of the survey responses from a parent claimed that their child did not want or seek help because the child felt that it was enough to learn from school only. Similarly, Van showed self-confidence in his performance in mathematics and said that he did not require help from parents. When asked about a person who could help him if necessary, he said he would prefer to ask his father. Van added that he preferred parental advice but not their involvement in his work. His mother's attitude was not exactly the same as Van's because she expected to be more than an advisor.

It would be a good idea if parents have a look at what their children are doing at school and how well they are doing. And help them. But by helping I mean not doing the homework for them, but maybe give feedback or raise questions or at least making sure that they finish all their homework. (Vinh)

However, in practice, she did not involve herself in helping or checking Van's mathematics homework for three reasons. First, Van appeared not to need or ask for help for his mathematics homework. Second, Vinh found it difficult to teach or work with her own son. Third, Van's father could help him better than she could, if required. Even so, Vinh pointed out some ideas about parental support.

Education is part of your children's life. An important part of the children's life. And if we get involved, we can help them overcome difficulties. We can encourage them to develop their strengths. We can help them build confidence. And it is the most important thing in a child's life. (Vinh)

A survey response from a child implied a similar idea about parental support. The child mentioned:

I believe parents' involvement in my mathematics education is very helpful and motivating. They always help me with my homework and they have created a home

environment that encourages learning. Therefore, I like their involvement in my education. (a survey respondent – child)

Based on the above results, there are four types of relations existing in parent–child homework help in mathematics.

- Parent wants to help and child wants to be helped.
- Parent wants to help and child does not want to be helped.
- Parent cannot help and child wants to be helped.
- Parent cannot help and child does not want to be helped.

In addition to helping or assisting, some parents used to check their children's homework, especially when they were young. Wanting to make their parents happy, the children seemed to do their work. That might be a method parents adhered to in order to involve children in educational activities while at home. The next sub-section discusses parents checking of the mathematics homework of secondary school students as described by the participants.

7.1.2 Checking homework

While Greg, Bing and Vinh were interested in checking their children's homework, Eric, Irene, Tania, Indra, and Melani said that they would not check homework because they were not able to help with secondary school mathematics. Regardless, they would remind their children about homework or they would ask whether the children were up-to-date.

In Greg's case, he would check Gresha's mathematics homework every now and then. By doing so, he tended to find that Gresha was self-driven and up-to-date with her work as he expected. Even though it was usually not an issue, Greg said that he would not be happy if Gresha did not finish her work. In that situation Greg said he would ask Gresha to catch

up, and if she did not do that there might be a penalty such as not allowing her to watch television until she finished her homework.

Bing believed mathematics was an important subject and he wanted to ensure that Ben was doing his work. Thus, Bing and his wife would find time to sit with Ben and check his homework once or twice a week and would help him if necessary but they would not allow Ben to ignore homework. Ben said that his parents would ask him to redo homework if he got the questions wrong and wanted him to be at the level he should be as a Year 10 student.

When asked about mathematics homework Van said “I feel confident in maths and I just can do it myself. I do all my homework”. A few years earlier Van had allowed his parents to check his homework but he did not like it later. Though Van was not happy to show his homework to parents, Vinh wanted to check her son’s work. However, she found it impossible to check his homework because she was not able to access his electronic textbook. She remarked:

He uses eBook to which I have no access. eBook means the textbook is electronic and he put it in his iPad with a password. So I have no way to get access to it. I demanded him to show it to me once and he said “Mum, if there’s no complaint from the teacher, then trust me.” Yeah. (Vinh)

While some parents were keen to check their children’s homework, others had given up on checking with the growth of children. Emma said that her parents would not check her homework but they would expect her to get her work done. However, if they came to know that she was behind, her parents would encourage her to catch up as they knew the importance of mathematics for her future career plans. Eric said that Emma was so self-motivated and diligent that he did not want to check her work in her senior secondary levels. Furthermore, he emphasised:

She [Emma] is too self-disciplined, she seriously is. That would be detrimental and negative to be looking over her shoulder. We don't need to. (Eric)

Ian commented that the person who checked or helped with his mathematics homework was his tutor. The tutor would advise Ian about what needed to be done, after checking his homework. His parents did not check but they asked about his homework every once in a while. Irene described why she did not want to be involved in Ian's homework.

I don't check his maths at all... his work or his homework. I wouldn't be able to understand it [laughs]. I used to like algebra. So I sort of just as a fun thing have had a look at some algebra that he did, but I don't check it. (Irene)

There was a similar response but different reasons from Tania about checking her daughter's homework.

I don't check Tina's homework at all anymore, because she's at a stage where she probably remembers maths better than what I do [laughs]. She's capable, so we don't need to worry about that. (Tania)

It was observed that both parents and children found it unusual when they were talking about checking homework. When asked how often parents check her homework Tina said:

Like never [laughs]. Because I show them my tests and I do well on my tests, so they don't really see much reason to check my maths. So as long as I'm getting good results, they assume that I am doing my homework. So yeah, they don't really check it. They did when I was younger but not anymore. (Tina)

Maya's response to the same question was:

No, my parents [laughs] trust me on finishing my work. I... pretty much finish all my work. (Maya)

Indi gave a similar response, saying:

Never [laughs]. (Indi)

Hence, it appeared that some parents were not comfortable or did not want to check the homework of their senior secondary school children. Checking also seemed not to be

common between those parents and children. They did not seem serious when answering the question about checking homework, probably because it was not a common practice.

Continuing her ideas about checking homework Tina said, “I don’t mind if my parents have a look if they want to... at some homework I’d done”. Further, when Tina had done a test and if her parents knew about it, they would ask about her performance. Tina did not mind it and did talk about the test and her marks with parents. However, she did not want her parents to be involved too much.

I guess if they were always on my back about everything I was doing, it would probably stress me out even more. That would probably make it a lot harder for me to do well at school if my parents were always really hard and wanted me to do really well... It would stress me out a lot more than just knowing that I can do it at my own pace. It’d be a lot easier, I think. (Tina)

At the time of the interview, Indi was self-motivated and did her homework without supervision even though her parents checked and helped with her work when she was in primary school. Her parents did not want to check Indi’s homework at senior secondary level, but would ask for marks she was getting. In addition, Indra said that her husband would go to parent–teacher interviews at school to find out how well Indi was doing in her class.

Similarly, Melani checked Maya’s homework when she was in primary school but not anymore. According to Melani, learning should be a child’s responsibility and the child should be accountable for it. She said, “If my daughter short-changes herself with her studies the repercussion will be her own fault”. Therefore, Melani let her daughter do the work but she said that she would intervene if she ever received a call from school or if she observed Maya’s grades were not progressing well.

Likewise, a parent who responded to the questionnaire noted:

As for checking homework, I make sure it is done but I do not check the content. Maths not being a forte of mine I would not know if it was correct or not. (a survey participant - parent)

One of the child participants of the survey mentioned that parental aspirations had put pressure on him/her because his/her parents would not be able to understand his/her thoughts. Discussing the checking of homework the participant added:

My parents do not check my homework because I always do it to the best of my ability. So there is no need. I sometimes feel pressure from my parents to do well, especially from my dad, but they don't realise that they are. They just want the best for me and have the best intentions. (a survey participant - child)

As has been noted, most of the parents checked their children's homework and helped them when the children were at primary school. Eventually, parents found it unnecessary to check their children's homework as they grew up. As can be seen from the above analysis, checking the mathematics homework of children showed a decreasing trend with the increase of age of children due to following reasons. Firstly, many parents could not remember high school mathematics. Secondly, many parents thought the curriculum and teaching methods were different from what they had experienced. Thirdly, when parents helped children, either parents or children could be annoyed and disrupt the partnership. Finally, children find it easier to do homework by themselves or to get help from a friend, sibling, tutor, or their teacher than to work with parents. At the same time, there are exceptional parent-child relationships such as Gresha's and Greg's in which the child is happy to show and the parent wants to check the work.

The following reports how parents monitor their children's work from a distance.

7.1.3 Monitoring from a distance

Although some parents did not involve themselves in checking senior secondary students' school work it seemed that they were monitoring what their children were doing, from a

distance. Despite the children being engaging in their homework independently, parents did have concerns about their children.

Emma said that her parents would not be happy if she was staying up late at night doing homework. She thought that they would say, “Hey, you should have done this earlier.” or “You should be going to bed earlier.” Therefore, she always tried to finish her homework before everything else.

If Tina’s parents realised that she was behind or not up-to-date they would have a chat with her to find out what was happening. If Tina was behind and her parents knew that she had been going out with friends or wasting her time on the computer they indicated that they would be angry. Tina thought that her parents’ anger was reasonable and did not want to disappoint them. Hence, she always tried to be up-to-date.

Gresha agreed that parents should know what was happening with children’s education and their homework and should keep up to date to a certain extent. However, she said if the parents wanted to “look over your shoulder” and monitor everything you do every five minutes, it would be annoying.

Whenever Indi’s parents saw her sitting around and doing nothing they would remind her to do homework. Although her parents wanted Indi to finish her work, they would never come to her room and sit with her to ensure she did it.

With her parenting, Melani believed that she had brought up her daughter in such a way that she was responsible for her own learning. As seen in their house, a computer was set up in the living room. Melani had done this on purpose because it enabled her to check what Maya was doing with the computer. She also added:

She [Maya] has over the years proven that she can be left alone to do her work and so far it has not sort of shown anything negative, so I think that method is right for her. As a parent I will sit on the sideline to just monitor from afar. (Melani)

After she came to know that her son did not like to talk about his schoolwork with her, Vinh decided to check Van's records online from the school website. Then she was able to find out whether Van had submitted all his work in time or not. She found it easier than asking him. Only when she found something unusual did she inquire about it from Van.

Bing considered home as an extended school. He said, "If parents can't help their children with the content still they can ensure whether they are doing right things such as homework or not". Especially, Bing mentioned about distractions from or addictions to digital equipment. He also urged parents to keep their eyes on what children might be doing, otherwise, parents would not be aware whether they were engaged with books or they were just chatting on Facebook.

The scenarios above suggest that children sometimes do not like it when their parents monitor or check them all the time. Nevertheless, some parents do monitor their children at least from a distance. Some parents seemed to have an opinion about homework as discussed in the following.

7.1.4 Having an opinion about homework

Originally from Greek background, Greg remembered that he had experienced a hard time when he was growing up. As a result of dedication and hard work he became a mathematics teacher. Like any other parent, Greg too wanted the best for his children. He believed that education could be a way to get there. As explained by Greg, homework could be an important way of building on skills and engaging with the content learned

during the day. He also said that he would not be able to imagine doing well in maths without actually doing homework.

Conversely, Irene had the following opinion:

I'm not a big believer in homework for children until they reach about year 10 unless it's something authentic type learning. Real life learning. I don't believe in photocopied work sheets that teachers give children to do as homework. I've always had the attitude that it's not my homework, and I have never helped my son with his homework. (Irene)

If Ian was not able to do his homework on his own, Irene did not help him. She would write a note to the teacher saying that he had attempted to do this work but was unable to do it. Likewise, Melani did not intervene with Maya's homework as she believed that homework should be a child's responsibility and the child should be accountable for it. Interestingly, both Irene and Melani had provided tutors for their children and those children had the opportunity to get help from the tutor.

Bing's attitudes were different. Both Bing and his wife wanted their children to do their homework and they asked Ben to talk to them or his teacher if he found it difficult to complete. Bing considered homework as an extension to school work which could help children reflect on what they learned in class. If Ben did not attempt his homework Bing believed that he would be missing out on the opportunity to enhance his skills. Therefore, Bing was not happy about it. However, if Ben was not able to understand the homework, Bing said the teacher should be partially responsible for it because he/she must not have explained adequately. Bing was not happy about that situation either. Hence, parents have different attitudes about homework and they act differently with children.

The information in above sections shows that some students have tutors and they play an important role in supporting secondary school children to improve in mathematics. Out of

the four European–Australian students in this study, Emma, Gresha, and Tina did not have a tutor of mathematics while Ian did. In the Asian–Australian group of students, Ben and Van did not have the services of a tutor at the time of interviews. Although Ben and his parents wanted to have a tutor of mathematics they were unable to afford the service. Indi and Maya were provided with private tutoring, which they thought was important for achieving good results.

The next section considers parental involvement in providing the services of a private tutor for their children.

7.2 Provision of private tutoring

From the surveys in this study it seemed that the idea of having a tutor was not only a decision made by parents. It could also be a choice of the child. In some cases it seemed to be a decision made by parent and child together. The following sections discuss the necessity and affordability of a tutor, expectations from a tutor, how to find one, and priority issues with tutoring and school work, which are some of the issues raised by the participants. As a tutor I personally have experienced the conflicts in families and arguments between parents and children in such situations.

7.2.1 Need of a tutor

As a student who was interested in mathematics, Emma believed that it would be helpful to have a tutor because she could get extra help outside of school. If Emma requested to have a tutor, her parents would opt for it because they knew her interest in mathematics. Her father explained about the peer support group Emma had. Eric said that Emma was good at talking to a network of two or three friends where they jointly solve problems in mathematics, communicating from their homes via social media with the use of

technology. He commented, “Whether it is chatting on Facebook or on a phone with the speakers on, it enables them to do their work easier”. If Emma did not have peer support, parental support, or support from siblings, Eric said that he would find a tutor for her. However, he believed that they might not need one. As has been noted, his inclination would be to try other options before a tutor. At the time of interviews Emma had not had a tutor because she did not need help.

Tina was happy about the marks she was getting and her parents were happy too. She was doing well at school without a tutor. She said that she could get help from her teachers, parents, and friends if needed. Also, it might be just a little thing that she could not understand. So, she said that it would not be a good enough reason to have a tutor. Later, in Year 12 she supposed she might need one because she wanted to do well in her examinations and she said that she would look into getting a tutor then. Tania was happy to provide the extra assistance of one-on-one or small group tutoring if that was what Tina wanted. As the names imply, in one-on-one tutoring a tutor has one student at a time, while group tutoring includes a group of students working together with the tutor.

Having a parent who was a mathematics teacher, Gresha did not require the services of a tutor. However, she said that she would look for a tutor if she could not work with her father anymore for some reason. She was aware that parents and children may not be able to keep working together according to the stories she had heard from her friends at school. There were a few of the survey respondents whose parents were engineers, teachers, and tutors. They had no tutors because their parents helped when required.

When asked whether he was getting enough support for mathematics from school, Ian replied positively but he had a tutor for Further Mathematics. Irene wanted him to do well

in mathematics because she thought it a good way of training the brain of a child. As she was not able to help Ian with mathematics, she decided to employ a tutor so that he could help Ian regularly. Similarly, Indi was getting enough support from her school but she had a tutor for Specialist Mathematics because she wanted to do better. Indi found it better when she could get the content clarified by someone else but she never underestimated her school teachers. She said:

I reckon it's better to learn from a [school] teacher than having a tutor because they actually know you, they know the content, and they know what they're teaching you.
(Indi)

Indi's school teachers offered after school support for those who required it but Indi as well as other children did not make use of such facilities. Her parents were happy to provide the services of tutors if Indi needed them for any of her subjects. Indra said that it was essential to have tutors because she believed that learning from school was not sufficient to achieve excellent results. Further, she was not able to help her daughter because she did not know the content and her husband had no time to help even though he was capable of doing the mathematics. She also added that children would prefer a tutor to a parent because tutors might be easier to follow, faster in finding solutions to a question, and better in explaining than parents. Hence, tutors were the option they chose.

Maya was getting low marks for her Maths Methods tests but she was complaining about her teacher. As she explained:

It's just the way my teacher teaches ... I'm not very used to ... once she starts teaching she doesn't really stop. She doesn't slowly explain us what's happening. She just goes from one point to another without fully and in detail explaining. She always uses shortcuts, so she misses out certain steps. Because I'm the type who doesn't exactly pick up maths very fast, like I understand one point but I won't understand what she's saying for the rest. (Maya)

Hence Melani decided to engage a tutor to impart the required mathematics knowledge to her daughter. They asked Maya to have private tutoring and they said that they would help her out at any cost to ensure that she could progress and pass mathematics, enabling her to

get into the course that she wanted. At the beginning Maya was reluctant to have tutoring because it would increase her workload and would take more time, resulting in having less time to do her other subjects. Later, she agreed to get the support of a tutor and she said that her grades were getting better. In addition, her school offered after school support but those classes were not taken by their regular teachers, but undergraduate students, although Maya enjoyed learning from them too.

According to Bing, parents should see the teacher and discuss alternatives when a child was unable to show improvement in mathematics. He also argued that parents should also look for all the possible avenues to provide extra support for their children. Further, Bing said that the homework club at Ben's school, which was supporting students to catch up their work, was not enough for him as it was once a week only. Also, not many parents were able to help their children with senior mathematics. If the school or the parents were not able to provide the required support, the next option for Bing was a tutor. Bing mentioned, though, that he would not look for a tutor to help his son with homework. Instead, he needed the tutor to help Ben understand the concepts. He wanted the tutor to be an additional supporter and not to be a substitute for a teacher.

Van did not need a tutor for mathematics because he was able to do his work without extra support. Even if he needed it, he had his father and an aunt who were capable of helping him. Vinh also agreed that her son did not require a tutor of mathematics because he was doing well at school. She said that tutoring had become a fashion in Asian communities. While students were performing well at school some Asian parents unnecessarily provided tutors or sent them to group classes in private institutions. Vinh added that she had come to know about children who had more than one tutor for some subjects, for example,

mathematics and English. Having one or more tutors may not always result in high academic achievement of children as described in the following.

An Asian–Australian student who responded to the survey was in accelerated classes and was doing well in mathematics up to Year 10. Even though the subject was never a natural talent, the student succeeded through consistent hard work. Then the student failed miserably in Maths Methods in Year 11 and dropped mathematics in Year 12. The following is an excerpt from the student:

In my opinion, the schools in Australia do not prepare us well in math at all. Throughout my life I have had around 5 different private tutors to help me with my math homework and I've been to about 3 different centres to help me with math. And it's ironic how I didn't even pursue it in my final year of high school and to think about all the money my parents invested in me makes me despondent. (a survey respondent – child)

While some respondents said that it would be helpful to have a tutor, others did not agree with the idea. The following are some of the snippets from the survey responses that argued for using a tutor.

I believe that having a tutor in mathematics is not an essential part of my learning, but it is highly advised to have one as it makes learning a lot more easier and fun and without one, I would not have been motivated in class nor have the grades I have now. (a survey respondent – child)

I don't have a tutor because this year maths is not hard, but I'm gonna have a tutor next year. I believe I need tutor after Year 9. I enjoy learning more and being ahead of the class. (a survey respondent – child)

I believe private tuition and help received outside the school is the major contributing factor for academic success, particularly in competitive exams. This fact is very often neglected. The credit of the child's success is always attributed to school and teachers. Teachers pleased to get credit but often discourage tuition. I strongly believe private tuition should be regulated and it should be recognised as a value added service in education. Teachers' attitude should be changed, private tutor should be recognised as a contributor not as a competitor. Tutors are the best in their field. That is the only reason parents seek their help. By the way I am not a tutor. This is purely my observation. (a survey respondent – parent)

Seems like tutoring is crucial in student's understanding of the various concepts. School teaching of Math seems to sweep through without taking into consideration student's learning and understanding. (a survey respondent – parent)

My daughter had a tutor in primary school which really helped as her primary school was unable to provide the level of support she needed. At her secondary school there are opportunities for her to seek extra assistance if needed but if she was finding this not enough I would re-consider a tutor. (a survey respondent – parent)

On the other hand, some parents and children did not agree with the idea of engaging tutors.

Teachers provide sufficient after class support, reducing if not eliminating the need for a tutor in most circumstances. (a survey respondent – child)

There are many sources for mathematics help both on the school intranet and the wider internet. (a survey respondent – child)

Waste of money and time. (a survey respondent – child)

Tutoring takes away my parents money. I wish I didn't have to have tutors. I wish the time I learnt at school was adequate so I wouldn't have to go tutors after school. Wasting time and money when going to school should do the job. (a survey respondent – child)

I believe too many students at my daughter's secondary school have tutors for the wrong reason and that many of these students do not get any leisure time. This is supported by what I have personally seen in primary schools and by the anecdotes my daughter tells me about her fellow students. (a survey respondent – parent)

The above statements imply that if school teachers are providing enough support to learn mathematics at school there is no need for a tutor. However, some parents provided the services of a tutor because there was no other option when the schools had difficulties in securing good mathematics teachers. As parents stated:

[There is] not enough one on one time with the teacher, trying to get assistance in class is near to impossible. Hence we have gone down the path of a private tutor. Extremely disappointed with my child's maths teacher this year. (a survey respondent – parent)

It is sad that there is a national shortage of good maths teachers, and as a result smaller and less financial public schools are really struggling to get quality teachers. As a result students are under-performing and parents are being forced to pay for extra tutoring. (a survey respondent – parent)

I am annoyed that I have to go to the expense of a private tutor because my child cannot get assistance with maths when he asks for it. My child is so lacking in confidence in maths now, that it is my belief that he will drop the subject next year. (a survey respondent – parent)

The snippets from surveys lined up above provide evidence why a tutor may or may not be an option in support of mathematics learning. On the other hand, a student responded that he or she wanted to have a tutor but the parents were not happy to provide one. The student wrote:

My parents believe that I don't have the basic understanding of certain mathematics concepts thus will refuse to get me a tutor because they think that I will not understand the concepts but rather just learn by rote. I disagree with this because I only need a tutor for extra material related to the VCE curriculum and tests and perhaps some guidance if I am having trouble. (a survey respondent – child)

However, some students had tutors despite having enough support from school. This is elaborated in the following.

7.2.2 Expectations from a tutor

Parents and children seemed to have different expectations from a tutor depending on their need to have one. The analysis in this section shows a variety of expectations of the participants.

By having a tutor Emma would not expect more work. She expressed that she would prefer if the tutor was helping her through the work she was doing in school at that moment and also helping her to understand it more. Eric wanted the tutor to be totally covering the course work and to provide a few extra tips from personal experience so that Emma would find it helpful.

If Gresha decided to have tutoring she stated that she would probably expect the tutor to be sympathetic and not put pressure on her. Further, she wanted the tutor to explain examples step by step, enabling her to apply the same process and her knowledge to the rest of the questions. Also, she expected the tutor to elaborate what she learned at school, providing other techniques that she might find easier. Greg had concerns about how his daughter

might work with a tutor because if the tutor did do the work for her she would not do the learning. He said “He who does the work does the learning.” Therefore, Greg would be stringent and he needed to be comfortable about it, if Gresha decided to have a tutor.

Ian seemed to be happy as long as he would be able to learn something from his tutor. It could be either practising questions or revising for a test. He preferred his tutor to his school teacher because of the direct nature of instructing. Irene wanted him to get everything clarified by the tutor if he was struggling with mathematics. She described her expectations from the tutor. First, he should teach Ian some skills to show the workings of a problem. Second, he should show him how to get through as much of the exam paper as possible so that he would be able to get the most marks he could. Third, he should have enough experience and skills needed to teach students to get a good result.

Tina had never had a tutor before. If she was to have one she wanted her tutor to just sit with her and get to know her, then go through what she was learning in class and to make sure that she understood it all. If she was able to understand the topic, then she would probably want the tutor to challenge her a bit more to make sure that she could do even harder questions. Tina also wanted the tutor to know about her level of abilities because she believed that trying to teach something she could not do, would not help her at all. Her mother said that she would check with Tina whether she found tutoring helpful or not. Tania would also monitor the grades of her child to see if there was any improvement by having a tutor.

As the content learnt at school or learnt from a tutor might be the same, Indi said that she would prefer if the tutor were able to teach it differently. In addition to help with homework she expected the tutor to teach more of the content so that she would be able to

be ahead in her class. She said that the tutor should teach how to do homework but not to sit there and help. Also, tutors should help more with preparing for examinations by explaining the content clearly so that students could be able to practice and apply their knowledge at the exams. Indra expected the tutors to give more and more practice work to enable students to remember what they learnt.

Similar to Emma, Maya did not expect more work from a tutor. As stated by Maya, a tutor could help students understand better. Her expectations from a tutor were almost the same as Indi's. Furthermore, Maya preferred an experienced tutor with effective teaching strategies. She wanted to have knowledge from which she would be able to do all the questions in hand without sticking to one question for a long time. Melani's expectations would be for the tutor to be able to fill in the gaps of her daughter's learning in mathematics and also to be a person who would be patient enough to provide her with the required confidence. In addition, Melani wanted the tutor to help Maya to overcome the fear of learning mathematics and to enjoy the subject. She wanted him or her to help Maya with homework but she did not want him/her to do it for her. According to her, a tutor's main role would be to ensure that the child could understand the concepts in an effective manner.

Ben wanted to be up-to-date with his work with the help of a tutor but claimed he would not need help for each and every question. Hence, the requirement of a tutor for Ben was to help understand. Bing said that he would not be happy if Ben wanted to do his everyday homework with the support of a tutor.

By having a tutor Van would expect everything to be explained in simple terms without making it more complicated. If they decided to hire a tutor, Vinh expected the tutor to have

the expertise and experience to diagnose her son's weaknesses. This person should be trained as a teacher and he/she should have a method to deal with learning difficulties in mathematics. Further, Vinh described the tutor as someone who could help to develop her son's interest in mathematics. She also stated:

The fact that a person is good at something doesn't mean that he's a good teacher. Because I'm a teacher myself, I understand that really well. Some teachers are really good but just for themselves and not for the students, yeah. So I would choose, consult, and ask for a tutor who can inspire my son to work, a person who can help my son to see his strengths and weaknesses, and who has a good method to deal with that. Yeah. (Vinh)

Even though some parents were happy to provide the services of a tutor to support their children and they had various expectations from a tutor, in some cases, cost seemed to be a problem.

7.2.3 Affordability

A survey respondent stated, "Many parents prefer to have a tutor but they are unable to afford". Out of the eight students and eight parents in the study Emma, Tina, Ben and Eric, Tania, Indra, Bing, and Vinh were all mindful of the cost of a tutor. They mentioned that the tutors could be expensive and proposed that they would find university students as tutors because it might be a cheaper option. Indra had issues with affordability and she had to reduce the amount of tutoring Indi would like to have. In fact, Indi had already used tutors for Specialist Mathematics, Accounting, and English and she said that the money spent on tutors had been worth it as she was able to benefit from that additional support. Maya had a tutor for Mathematical Methods and she was improving according to her test results. She also considered payment for tutoring as well spent money. Her mother was not reluctant to pay for a tutor if it would help Maya to pass the subject:

Being a parent and having a child who's needing help for this specific type of mathematics, I would tell her I will not compensate anything in terms of cost if the tutor is good. We engage this tutor to ensure that she passes the subject. (Melani)

Ben was not performing at the required level in his class but he wanted to be an engineer.

Although Bing could see the need of a tutor for his son, he said that he was unable to afford it. Even though Van did not have any tutors at the time of the interview he said, "If parents wanted to spend some money on a good tutor it can be a great investment". His mother stated that the tutor should be within the limits of her affordability. It was also found that Vinh was saving money for Van to have a tutor when he needed one. Further, she said:

I would only pay within my ability. If there's a very good teacher but I cannot afford that, then I will tell my son, I'm sorry. We have to find another one. Yeah. I always tell my son, it is my belief as well because I grew up that way, we should do the best in our circumstances. We shouldn't ask for the best of everything but we can make the best of what we have. It is what I believe, Yeah. (Vinh)

Since the cost of tutoring varied within a wide range, parents can choose a tutor according to the amount they can afford. Even so, the selection process appeared to be a challenge for both parents and children.

7.2.4 Search for a tutor

It seemed that parents and children search for tutors through their connections such as networks of friends and relations. If Emma wanted to find a tutor, she said that she would probably approach her mathematics teacher and ask if he knew someone, or ask friends if they had tutors. Otherwise, she could ask her sister who was studying at a university at that time, to see whether she would be able to find any university students who were willing to tutor. The first person Eric would look for was a student from a university who had done the secondary school mathematics within the last couple of years. Next, he would ask other people, especially Emma's mathematics teacher. If Gresha needed a tutor she said

that she would give the responsibility for searching for one to her father because she knew that he had high standards as he was a mathematics teacher.

Ian was happy to have anyone who was better than him in mathematics as his tutor but he needed one-on-one tutoring. His tutor for Further Mathematics was an older student with whom Ian used to play ten-pin bowling. He achieved outstanding results for his Year 12 and Irene invited him to tutor Ian. That particular tutor was a university student at the time of Ian's interview. Ian said that the tutor did not have to help twenty other students at the same time and for him that made learning from a tutor better than learning from a school teacher.

If Tina needed a tutor she would like to have a university student but she wanted her parents to select one for her. Before making a decision Tania would like to talk to Tina's mathematics teacher to find out why she needed a tutor. She believed that it could be either a problem of not trying and listening enough or it might be due to inability to grasp the concepts taught in class. Tania said that if they were to employ a tutor she would interview the person first. After recruiting the tutor Tania would ask her child whether the tutoring had been helpful for her to catch up. She would also monitor whether the results were improving or not.

Recommendations from other people were important for Indi to make a decision on a tutor. She would ask students who already had the tutor to find out whether it was helpful to have that particular tutor. Indi would also look for group tutoring because she found them to be more relaxed and easy contexts in which to learn. In an individual class it would be only the student and the tutor and she felt that there would be more pressure. Indra preferred current school teachers as tutors because she believed that they might be more experienced

and would know the curriculum better. She would also look for the popularity of the tutor and she hoped to be able to come to know about a tutor by the word of mouth. Indra expected a lot of notes, handouts, and practice questions from the tutor so that her daughter would be able to do more work. She thought individual classes were beneficial to students as the tutor had to focus on only one student whereas in a group class there would be many students who needed help.

The most important requirements Maya had when looking for a tutor were the experience of the tutor and whether the tutor could match the way of teaching with her learning. In addition, she wanted to know whether the tutor would provide extra worksheets, which she did not want. Maya was also interested to know whether the tutor preferred to work through the school text book or another one with the students. As she was already learning from her textbook at school she preferred another textbook with the tutor. Maya was not interested in whether her tutor was a school teacher or not as long as the teaching methods were effective and easy to follow. Similar to Maya, Melani considered experience as an important requirement of a tutor. She said:

Looking at the years of experience of a tutor is important and of course if the tutor has many years of experience they probably understand the curriculum better. Therefore it would be easier for the student to learn in a focused manner. An experienced tutor would be able to deliver all that. (Melani)

Melani had similar ideas to Indra about one-on-one and group tutoring. She commented that group tutoring could be of no difference to a classroom at school and she preferred individual tutoring. Further, she said:

Having a one-on-one tutor the student may feel comfortable on letting her guard down because sometimes when there is group tutoring peer pressure comes in and the student may not want to answer a question. They may say that it's a stupid question and that would reflect very badly on her image or her ego. So one-on-one tutor can establish a good rapport with the student and [the student] can afford to ask as basic a question without being judged. That's why a one-to-one tutor would be good. (Melani)

Some parent participants in the survey, who were happy to provide tutoring for their children, stated the importance of having one-on-one tutoring over group tutoring as follows:

Even though my daughter is pretty good in all the subjects she is doing for VCE, she is weakest in mathematics. We have been providing with tuition for the last couple of years but often with little success. Only one to one tuition seems to be working for her. I believe in primary schooling sufficient mathematics foundation is not provided. Hence when kid starts to high school they fall behind in mathematics. (a survey respondent – parent)

My daughter is weakest on mathematics. She puts lots of effort for all her subjects but with mathematics the results has not been encouraging. So she has decided to put the least effort for maths since only 10% is accounted of the weakest subject at vce level. I believe in primary school enough foundation is not provided and hence they fall behind in secondary school mathematics. Currently she is having one to one tutoring which seems to be working a bit for her. (a survey respondent – parent)

We tried a tutor when he chose to do maths methods, unfortunately due to very poor teachers in year 9 and 10 he was less than prepared to take on methods and dropped back to further maths. He does not think he needs a tutor for further and we are allowing him year 11 to prove himself. If his marks are below standard he will have a tutor next year. As for checking homework, I make sure it is done but I do not check the content, maths not being a forte of mine I would not know if it was correct or not. (a survey respondent – parent)

She is one of the best students in her class but not with mathematics. Group tutoring did not work for her but one to one tutoring has worked to some extent. (a survey respondent – parent)

When looking for a tutor, Ben as well as Van would ask their teachers and friends whether they could recommend someone. Ben said he would also search for the availability of a potential tutor on the Internet. If required to find a tutor, Vinh would consult other parents of her son's class to get a list of tutors. Then she would talk to her husband and decide on a suitable one for Van. Vinh said that some group classes have too many students for the tutor to pay individual attention. She wanted to choose a tutor who can inspire her son to study and help him to identify his strengths and weaknesses. This person might not necessarily be a school teacher but could be a university student who had the expected qualities of a tutor. Vinh was able to find out such information from her network of friends.

In addition to the above requirements, a student who participated in the survey mentioned that it would be important to look at the history of results of the students of any particular tutor. Another participant described the choices available:

Tutors have to be the best in the trade, otherwise they won't be able to survive.
Parents have no choice in selecting school mathematics teacher but there are heaps of maths tutors to choose from. (a survey respondent – parent)

Providing a tutor seems to be another problem rather than a solution because it creates priority issues as described below.

7.2.5 Priority issues

Emma said that having a tutor could be a pressure if the students were expected to do lots of extra work, which might not even be relevant to the current topic at school. Hence, it seemed that there were priority issues with the schoolwork and the work related to tuition. According to what Indra had heard from her daughter, some students had given less priority to schoolwork. She said even though the school teacher was good, some students were paying less attention and distracting other students in class because they had already finished the topic with the tutors.

As explained by Bing the school should be the major place for learning and the tutor should only be an additional support. He added that the learning destination should be the school and not the tutor. Further, Vinh believed that the tutor's support should be a kind of a rod to fish rather than a fish. She wanted the tutor to give Van the rod but not the fish so that he could fish everywhere.

The next chapter analyses and presents the data on parental control.

7.3 Summary

Factors of parental support were defined as homework involvement and providing private tuition. The data in the study show that when parents want to be involved in homework they seemed to help. Some parents checked to see if the homework was done and submitted before the deadlines. Another group of parents did not directly help with homework but monitored their children from a distance. Sometimes these parents asked about the homework and kept an eye on their children to check if they were engaging in those activities. While some parents believed that homework can be important to understand the learning at school, some other parents did not see homework as important. It also seems that there were parents who could not help their children with homework because they had forgotten what they had learnt in high school or due to lack of knowledge in mathematics. Sometimes such parents provided their children with the services of a tutor.

In some cases parents identified the need for a tutor and in other cases children requested that their parents provide the services of a tutor. In the event that a parent decided to have a tutor to support a child in mathematics the parent assessed the necessity of a tutor and discussed with the child and the tutor the expectations of each involved. In some cases it was not the parent who decided to have a tutor but it the child who requested tutoring. Parents and children had several expectations of tutoring. Sometimes the school teacher might not be clear enough for some students and they would expect the tutor to explain what they did not understand at school. Some students understand school work and do well at school but they wanted a tutor as additional support to do even better. Some students used their tutor as a resource to do their homework. It was also found that some students had tutors because they want to compete with most of the classmates who have tutors.

It seems that tutors are found through channels such as personal contacts, word of mouth, and advertisements. While searching for a tutor, parents did not forget to check for the affordability. Not all the parents could afford to pay a tutor but they were willing to sacrifice other expenses for the benefit of their children. There were tutors such as university students who did not charge a lot of money while there were other popular and fully booked tutors who charged more.

When students have tutors they may face other problems with the amount of school work and tutoring work. However, the point parents often overlooked is that there are priority issues with schoolwork and work given by the tutor. Some students seemed to refuse to have a tutor because they felt tutoring would not be supportive when it meant more work.

Chapter 8: Parental Control

Parental control is separated into three sub categories: family rules, perceived parental control, which is itself an amalgamation of other variables; and digital deprivation. In this discussion I provide further insights into the active and important relationships between parents and children and the way these relationships differ across cultures. Parents' and children's responses are divided into sub categories as identified in the analysis, since a range of parental practices are involved or applied in managing children in order to keep them on track in education. The following section reports the family rules applied in respect of the children's education.

8.1 Family rules in education

In relation to secondary school children, the participating families seemed to have different levels of rules such as general, unspoken, warnings, or no rules. While some of the families interviewed had rules which were not particularly strict, others reported quite strict rules. The different levels of rules within and among families and the ways of implementing these are described in the next section.

8.1.1 Setting up general rules

Bing and his wife considered mathematics important because they wanted their two sons to become engineers in future. Hence, Ben was expected to do well in mathematics. As a rule he had to catch up with and finish all his mathematics homework first, giving priority to the subject. Likewise, Vinh wanted her son to finish homework before entertainment, partly because she felt Van was addicted to digital media. Vinh commented that she believed she was failing in controlling Van once he had become a teenager.

Generally, Irene would allow Ian to visit his friends but she had rules for him. In fact, Irene seemed to be happy when Ian wanted to socialise, because otherwise he would be in his room playing computer games most of his spare time. Even though Irene's rules were not related to education, these rules could be applicable to any student. Her rules were:

That he doesn't drink alcohol or take drugs and that he's polite. That he uses his manners with the family that he's staying with. That he takes his mobile phone so that he can contact me or I can contact him if I needed to speak to him or he needed to speak to me. That's about it. (Irene)

There were similar rules for Ben too. His parents would ask him to stay safe and stay with friends all the time without getting lost or getting into trouble. If Indi wanted to go out she would be expected to tell her parents everything about the plan beforehand. She would also tell them details about her outing after coming back. Because of that trust between Indi and her parents, they did not have any particularly strict rules, except the general rules such as being safe and taking care of herself.

If Maya wanted to go out, her parents would expect it to be Friday after school or during the weekend. If she was attending a party, it should be alcohol free, and she was allowed to go there only if her close group of friends were attending too. Melani wanted to check whether Maya was going to the exact place where she had said she was going and nowhere else. Hence, Melani preferred to drop her wherever she went. In addition, Maya had to obey a set of quite strict rules. The event had to be during the day and could not be at night, parents should be supervising the party, and the event should be in a home and not in a public place.

One day Vinh was informed by Van's mathematics teacher that Van had not submitted an assignment. The following is an example of how Vinh established a rule for her son.

Okay, ... if there is a day when I receive an email or call from any of your teachers, whether main subjects or not, then for one week no entertainment and you have to show me all your assignments. (Vinh)

Van had not accepted the rule or responded to Vinh and she kept on saying:

It's a rule. Whether you say yes or not. It's a rule and remember I'm your mother. I'm not your friend. ...Remember you are not eighteen yet. You need a guardian. I'm more than a guardian, I'm your mother. So it's a rule. (Vinh)

All of the above responses are from Asian–Australian families, which implies that there are more general rules for Asian–Australian children than for their European–Australian counterparts. Furthermore, some families seemed to have unspoken rules, which were expected to be followed by children every day as a standard within the family.

8.1.2 Having unspoken rules

According to Greg his daughter was interested in mathematics and science, self-motivated, and focused. Therefore, he did not require a set of rules to make her study. Gresha knew her parents' expectations and she did her work reasonably well. Greg did not have much trouble and he said:

I suppose it's an unspoken rule rather than me waving a stick, you know, they always stray a little bit but generally she's been pretty good, I can't complain really. (Greg)

Although Irene had general rules for Ian when he wanted to go out with his friends, Ian did not feel that those were rules. He considered them as implied rules which were included in his normal behaviour such as being polite and well mannered. Ian used to tell his parents about his plans and organise times to get dropped off and picked up. His parents knew all his friends and where they lived. Hence, it was not necessary to talk about rules.

Like Ian, Tina was well-adjusted to her family rules and she considered the rules as obvious and reasonable. She recalled some of the rules:

If it's after school, then not to be late, obviously. If I was going to a friend's house for dinner, then probably they'd pick me up by 9 o'clock. And normally on a school day if I was going to a friend's house for dinner, I'd be doing homework with my friend. If I went out on Saturday on the weekend, like all Saturday, then I wouldn't go out on Sunday. So it's not like I'm just allowed to be out all the time. There's a time limit, I guess. (Tina)

All of the above responses are from European–Australian children. By comparing general rules and unspoken rules within families, it is concluded that Asian–Australian families have stricter general rules than European–Australian families.

Warnings are another type of parental involvement used to control children.

8.1.3 Warnings

If Emma was trying but was not able to achieve good results, her parents would not be angry. She believed that her parents would not force her to do anything, but provided support for her to improve and do better if she could. However, Emma said if they noticed that she was not doing her work they would probably warn her. As she said:

If I'm stressing at one point and then going out with friends at another point they'll notice and be like, "Look, you're stressing yourself out. Do your work."... "Look, you've kind of got to not go out." (Emma)

When Indi's parents found out that she was not up-to-date with her work they would not let her waste time doing nothing. Even though they would not force her to do work they would warn her often until she was able to catch up.

Ben was not performing well in mathematics but his parents were not able to help him. As there was after school support for mathematics at Prince Hill Secondary College once a week, Bing both warned him and encouraged him to stay after school to attend those classes. Some parent–child dyads did not seem to have rules because they did not require them as reported below.

8.1.4 Making no rules

When asked about family rules in education Eric said that they had no rules for Emma because she was someone who needed to be encouraged not to overwork. As Eric explained:

If anything, we need to get her to just pull back slightly from the books so that she gets enough sleep. (Eric)

Gresha's parents did not need to make any rules for her as she was doing well in her educational matters. She said that she used to do her homework as soon as possible and that was exactly what her parents wanted. Likewise, Tina's parents knew that she was self-driven with her studies and they did not require rules to make her do work.

Although Ian had a few general rules when going out, there were no rules for his education. As long as he was able to pass his subjects, his parents seemed to be happy. They expected Ian to study or work full time but they did not put pressure on him.

Similarly, Indi's parents used to warn her about finishing schoolwork but they did not check her work or have any rules about it. Hence, Indi believed that it was up to her to finish work or not, but she tried to keep up-to-date. It seems that if children are self-motivated in education, parents do not need to use rules or power in order to improve the academic achievement of children.

The next section discusses parents' control of their children through beliefs, opinions, and in other ways.

8.2 Perceived parental control

This section includes perceptions often held by parents regarding controlling their children based on what they were aware of and how things seemed to them. Both parents' and children's data showed that the activities involved in perceptions of control included: assertive involvement, reluctance to grant permission, keeping tracking, limiting socialisation, and punishment.

8.2.1 Assertive involvement

Although Emma appreciated it when her parents were involved with her studies, she said it could be unfair for children if parents wanted to be involved forcefully. As she mentioned, nobody would be happy if they had to do something they could not enjoy, even though it might have long term benefits. Ian said he had a few friends who were in similar situations.

Describing the assertive involvement of parents Ian added:

If they're being too involved then they really shouldn't be doing that, 'cause it's really, it's up to the student to decide if they're going to do well or not, but, you know, when the parents get involved, I feel like it would be a bit of a put off, I'd say. Like you wouldn't motivate them as much, 'cause yeah, if the parents are being nosey then it won't be pleasant. (Ian)

Over the years Irene had known her son well enough to understand the above ideas he held.

She explained the situation:

I guess I'm a parent who tries to allow my son to have some control over where he goes and what he does. I guess I just know him. I think if I pushed him he'd probably get a bit anxious and that wouldn't be worth it then. (Irene)

As Indi explained, parental involvement in her children's education was reasonable and was appreciated by children because of their support and the amount of money spent.

However, it seemed that the involvement should be within certain limits. Otherwise, it could create unnecessary pressure on children and they might be stressed out. Indi pointed out that it was wrong to ask children to do the subjects parents wanted. However, if they were interested in asking children about their difficulties and wanted to help them, Indi said parents would have every right to do so. Conversely, if parents wanted to check what their children were doing two or three times an hour, Maya considered it to be overreaction. She said it would be annoying if it happened to her and she described it as too much involvement. For Ben, parental involvement was a distraction when it happened more than once a day.

When Van achieved low marks for a particular subject, his parents used to put pressure on him to keep on studying. Hence, he did not like the involvement of his parents in his studies when it was too much. Describing parents' aspirations for their children to become doctors, lawyers, and engineers, Van said it was not fair. Further, if parents forced their children to become what parents wanted them to be, it would be a pressure on children. Also, the children might not have the basic skills required to achieve the target. He added that children should be able to discuss such issues with their parents and also they should be able to disagree with parents in these situations. When asked a similar question, Vinh expressed that she would prefer to encourage her son but not to make demands. She thought it worked well but sometimes she expected more and did not have enough patience. As a result Van asked, "Why do you have to put pressure on me? I can survive at school. Isn't that enough?" She admitted that it was really hard to work with him:

I encouraged my son to do some self-study. But it hasn't been working with him. ...I was very different from him when I was in his age. ...He's not ambitious. He's not competitive. (Vinh)

The above examples show that some parents become too involved in their children's education, which seems to put pressure on parents and children, creating negative effects on both. As seen in the following sub-section, parents' actions could be different when they grant permission to their children.

8.2.2 Granting permission

When required to seek permission, Gresha would not ask her parents if they were in a bad mood. She would wait for an opportunity and talk to her mother first. The following excerpt shows how she asked permission to go out with her friends:

I would ask mum. ... Yeah, I would just say I've been doing all my homework, I'm not slacking off, I'm trying really hard, I think I deserve to go out with my friends and... (Gresha)

Most of the time Gresha was able to convince her parents. Greg elaborated on granting permission to Gresha:

We know that Gresha has made good friends who aren't going to go out smoking and drinking and doing that sort of stuff, ... and we know the parents of a lot of her friends, and that's why we are likely to give permission. (Greg)

Similarly, Tina was granted permission by her parents to go out because she, too, was doing well with her studies and homework in particular. Tina commented on this:

I just ask and if they think it's reasonable, which they always do... because... if they know that I don't have homework or anything, then they'll say yes. And normally they say yes anyway because they know that... if I want to go out, they trust that I'm managing my time effectively, so yeah, I just ask in a nice way. (Tina)

Ian was not required to give reasons when seeking permission from parents to go out or for a sleepover. In fact, Irene was pleased to see him going out because he usually spent his after school hours and weekends playing computer games alone in his room. Once in a while when there was a sleepover planned for a particular date Ian would let his mother know about it. If their family had nothing planned for the day his mother would agree and it had never been a problem for Ian.

When Indi was planning to go out, she was required to tell her parents about it two or three days before. If it was during the day their response would be positive most of the time. However, on certain occasions Indi was not granted permission until she showed her parents that she was studying hard, especially when it was a sleepover with her cousins. Her mother emphasised that Indi was never allowed a sleepover with her friends. Likewise, if Maya wanted to seek permission to go out she would have to find out all the details beforehand. Here is her response:

I would have to find out all the details of where I'm going to ... who, what, when, how ... those kind of questions. If it's like a late party or something like that, make sure ... maybe I have someone who can fetch me home, and only when I confirm those kind of details, then only I ask my mum because if I'm really desperate to go out then I have to find out those details first. (Maya)

Even so Melani would not give a direct ‘yes’ or ‘no’ reply to Maya. She would take two to three days asking more questions before permission was granted. Similarly, Bing would check all the details about the occasion, location, and other friends accompanying with him before allowing Ben to go out. He recalled:

Their [Ben and his brother’s] friends also came to play with them at our house and in the park nearby, yeah that’s okay. But if they want to go for sleep over, definitely I’ll have to ensure with whom they’re going, if they live closer and we know them, you know, their parents or families ... (Bing)

At home Van behaved in a similar manner to Ian’s. He often played computer games after school. Hence Vinh, who did not like her son’s habit of gaming, preferred it if Van wanted to go out with a friend. As he had few friends, Vinh sometimes arranged one of her friend’s sons and encouraged Van to go out to the city, to a park, or to watch a movie. However, Vinh was not comfortable if her son wanted to hang around with a friend she did not know. In such a situation she would be reluctant to grant permission. The following excerpt from Vinh is in line with the comments made by Indra, Melani, and Bing.

My response would be, “With whom? Can I have a talk with your friend’s parents?” And that two parents would exchange information with me to make sure that the children are doing something under control. Yeah. And I would drive him there because I need to have a look of the environment of the neighbourhood and everything. Yeah. I think it may take me some time to get to know more about the friend before I let him go. (Vinh)

After granting permission, some parents assigned another task for themselves. That is to keep track on the whereabouts of their children, which is described in the following subsection.

8.2.3 Keeping track

Keeping track is another parental practice seen in the data collected. Usually Emma’s parents let her visit friends or go out with them but they wanted to check where she was from time to time. Emma commented on this:

Well, my parents are pretty lenient. They’ll usually just be like, “Yeah, sure you can do what you want”, but they still want to know where I am and everything, if that makes sense. (Emma)

Gresha's parents used to do the same thing. When away from home with friends, Gresha was required to keep in touch with her parents. She was expected to make sure that they were aware of where she was and that she let them know the time she would be back. Greg added that they would expect her to come home early.

Tina had a good understanding of what her parents would expect and what her parents would do while she was away from home. This is summarised by the following comment:

Well, if I'm going to a friend's house and it's a good friend that they know the parents, then they probably wouldn't call too much 'cause they trust that my friend's parents will not let us just go out in the middle of the night or anything. If I go to a party and I'm sleeping at someone else's house, then they'll probably give me a call just to make sure that I'm okay. And if I'm going out somewhere shopping or something with a friend, then they'll just call, may be once or twice just to check I guess, so yeah. (Tina)

Indi's experience in such a situation was different from other participants. If she wanted to go out with her friends she would let her parents know everything about the plan, including where, when, and how she would go, with whom, what she would be doing, and the time she would come back. Therefore, her parents were not required to check or keep tracking her. Also, after coming back, Indi would tell her parents what they did while away from home. In fact, that was what her parents expected too.

Even when Maya was at home, Melani had a habit of checking what she was doing. Melani emphasised this:

I don't check what work she does but she's always in front, that's why it's good to put her work station at the front not in the room. So I can always check on her, what she's doing. (Melani)

Maya said it would be definitely annoying if her parents were asking her what she was doing, two or three times an hour. Of course, Melani was monitoring Maya, but she did not talk to her. Hence, Maya did not feel that her mother was paying attention to her. If Maya was going out, Melani would drop her to make sure that her daughter went to the place

where she told her that she was going. The following excerpt further elaborates the reasons for what she was doing:

Being a more liberal parent, I don't plan in such a way as to dictate their course of life but I'm always at the sideline to ensure that they are on the right path and pull them in line when they go out of line. Therefore, I think I play a very big role in my children's learning into their life up to a point where I feel that they are independent. Then I know I can rest assured that I've done my duty as a parent. (Melani)

When Ben wanted to go out, Bing would take him to the place but he said:

We keep our eyes on them, what they're doing, you know, this and that. (Bing)

However, keeping track was unnecessary for some students in this study, who were self-disciplined and able to take responsibility for their own actions. Some students gave priority to studies and limited socialising.

8.2.4 Limiting social activities

Because of the workload from school, Emma reported she limited her time socialising.

When asked how she spent her after school hours and weekends her response was as follows:

Usually during the week, mostly after school I'll go home, do homework and then relax by myself. That's like my routine when I get home. But on the weekends, usually on Saturdays, on Saturday night, I'll go out and then maybe Sunday during the day I'll do something with friends. But mostly during the week, once or twice, like usually Fridays I'll do something with friends. Probably a sleepover every couple of weekends because, yeah, it's a good way to catch up with girlfriends and stuff, yeah. (Emma)

Eric had a similar idea about Emma's daily routine. As he stated, during week days Emma had netball or choir after school. Then, she engaged in her studies for the rest of the day.

As Eric said, there was no socialising at all during the week. Even though it was different on weekends, Eric was happy about the way Emma was managing her time and there was no requirement for him to limit her social activities. The excerpt below explains this further:

[On] Friday night she's just about to come through the door, that's when she can chill out and enjoy herself Friday night and probably much of Saturday as well and then back to the books on Sunday typically. Sometimes if she's got something on

Sunday then she'll work quite a few hours on Saturday. She knows how much work she's got to do. We reward her hard work by basically trusting her but we will say when we think there's just a bit too much on the social agenda, but she's very good at self-regulating that. (Eric)

Similar to Emma, Gresha was mindful about managing her time.

I would usually go for a sleepover only on holidays because on the weekends I have too much homework. I would go out maybe once every two weekends, not too often because then I get very stressed if I'm not prepared for a test, because I really... I can stress a lot about those types of things. (Gresha)

Ian preferred to be in his room alone but he played online games with his friends and other people. Irene was not happy about Ian's social life. She became emotional when describing how he spent his spare time. Here is her response:

He spends most of his after school and weekends usually in his room playing games, Internet gaming, or listening to music. He skypes to some friends and people that he games online with and he does a bit of homework [laughs]... He doesn't have enough social life. I wish he was out with his friends more, [pause] but I trust him. He's a very responsible young person. (Irene)

During school term, Tina did not have time to socialise because she had a lot of schoolwork to do. Pointing out the impossibility of organising a time to catch up with her friends she said, "I just don't have time and I'm busy. Then they're busy on another day or something." Further, she recalled:

Yeah. If I have a friend's party or a big party, then I would normally do a sleepover after that, but that's once a month or maybe even less than that, so I don't actually [socialise], not that much really. (Tina)

Tania interpreted the above situation differently:

She would only go out and stay the night somewhere on a Saturday night when it wasn't school term. So a sleepover perhaps once or twice a month, and she does like to at least do something once a week I would say with her friends, but it could be playing sports too, so not necessarily just to socialise. (Tania)

Hence, Tania considered playing sports as socialising. If Tina had been busy with her sports and wanted go out with her friends Tania might not allow her to do that. Even so it was noticed that she seemed not to be so strict in limiting Tina's social events because she was laughing when describing the situation.

We think it's important too that she spends time with the family, we might say – we might put some restrictions on her. We might say no. [laughs] But she usually has a pretty good argument persuading us too. [laughs] (Tania)

Having the attitudes and beliefs of Asian background and culture, Indi's parents never allowed her to go for a sleepover with her friends. She was only allowed to visit or stay with her relatives. During school term she visited her friends only if it was a birthday party or any other important occasion, but her parents did not let her stay till late. However, in holidays she managed to go out shopping with her friends at least two or three times.

Indi believed that she had no time to socialise, and she had discussed with her mother what she was experiencing in the classroom. In class, teachers would not be happy if students were talking. Outside class, students preferred to play. They had no time to talk to each other. Hence, Indi's social activities were automatically limited.

Maya rarely went out with her friends. If it was a party or any other special occasion she would go but she said that she was unable to afford time for socialising. After school she usually had a nap and kept on working till she finished all her homework and other studies. When she wanted to get a break away from studies or when she felt that she was cooped up in her study room she might go out shopping with her mother. She had her limits and boundaries when going out with friends. The following excerpt further elaborates her thoughts:

Well nowadays... [teenagers] around my age drink; although they're under-age they drink and all these weird things. I make sure that I'm not going to those kind of parties and I make sure the parties are going to be clean, pretty much ... no alcohol or any of those stuff ... and I go only with all my close friends, just my close group of friends. Other than that I don't think so. (Maya)

Bing and Vinh were happy to let their children go out with their friends but they would not allow their children to go for a sleepover with any of the friends. In particular, Vinh preferred her son to socialise more during the day. She said that socialising would help children understand real life. Even though Vinh encouraged her son to go out with friends

she wanted to know everything that happened away from home. As explained by her, she was unsuccessful with her expectations:

In fact I encouraged him. But of course I say I encourage you to have a life outside of family but it doesn't mean that you hide it from me. I don't need to be there with you, but I need to know, I need you to be honest where you are going, with whom and for how long. Yeah, and I encouraged him a lot ... but unsuccessfully. (Vinh)

The above excerpt from Vinh itself suggests why she was unsuccessful with her attempts to get her son socialise with his friends. It would seem that Vinh was limiting Van's freedom even though she asked him to go out.

In addition to the above limitations, some parents punished their children when they neglected their studies. Nevertheless, it was not physical punishment, but meted out in the following ways.

8.2.5 Punishment

Among the different types of punishment, one for Maya could be cutting down her freedom. At the time of the interview, she felt that she was given every freedom that she wanted to have and that she could possibly think of, without any limits. Regardless, there would be restrictions if she was not performing well in her studies.

If they [parents] know that I am falling back a lot and I'm being my unusual self, then they would start having limitations on what I do and what I can do personally, maybe like ...have a restriction on internet usage and mainly focussing on my studies. (Maya)

If Van received low marks for mathematics he would be forbidden to go anywhere outside home, except for school. He would be asked to keep on studying not only mathematics but also all the other subjects. He recalled:

First they will not be happy with me and ground me. I have to study a lot, just study, study, and study maths and everything. They will just get on with everything I do. (Van)

Vinh said that her husband was stricter than she was, and Van was mostly controlled and punished by him as shown in the following extract:

My husband censors and controls him very strictly ... like in the army. Yeah, he's very rigid. What time to do what ... and if not, punishment. Yeah, I don't like that.
(Vinh)

It seems that the type of punishment could be different and varied among families. None of the participants reported hitting with a cane or stick as a punishment.

In this digital era, parents used digital deprivation as a prominent way of punishing children, which is presented below.

8.3 Digital deprivation

In addition to family rules and perceived parental control, the third method of parental control found was digital deprivation. At present, digital technology has become inseparable from human beings, but sometimes parents find it a disruption to the learning of their children. While the use of digital equipment can enhance teaching and learning, the addiction to such items seems to be a matter of concern for parents. Data gathered in this study showed that parents confiscate items, cut-off entertainment, or limit entertainment in order to push their children towards academic activities. However, there were some indulgent or permissive parents who did not have concerns about the excessive use of technology. Hence, they did not restrict their children's interests in digital devices.

8.3.1 Limiting entertainment

When I asked Greg about the times he placed restrictions on his daughter with the use of digital devices he said that he had not done this yet because Gresha was doing well.

However, if for some reason she had not done her homework, he said:

I wouldn't be happy about it and I would obviously ask her to catch up, and if she doesn't do her homework. Then, obviously there might be some penalty for that. May be we wouldn't let her watch the TV at night until she finishes her homework.
(Greg)

Here is Tina's response on digital deprivation:

If I got a low mark because I hadn't studied, then they would be angry at me because that's my fault, and they'd probably take my phone away. (Tina)

As seen above, some parents would limit entertainment to control their children but it seems that further action was regarded as necessary in some cases. Confiscating digital equipment is one such parental action as mentioned by participants.

8.3.2 Confiscating items

To control the distractions through digital media some parents stated that they confiscated items from their children. For example, as discussed in the previous Section 8.3.1, Tania confiscated her daughter's phone when she was being distracted by her friends. Tina was not angry about it because she was able to understand her mother's concern.

Vinh's procedure of confiscating her son's items was different because Van required his iPad for schoolwork. Hence, Vinh asked Van to finish his work before 9pm on any weekday but he had fewer restrictions on weekends. She wanted to control his access to inappropriate websites too. After the allowed time period, Vinh would take the device away from Van so that he would not be able to go onto the Internet or watch movies overnight. She returned the iPad the following morning because Van had to take the device to school. On several occasions she had forgotten to do so and the child had to face the consequences in his classroom. If children were able to control their actions, concentrating more on their educational activities parents did not need to put restrictions on them. This is illustrated in the following section.

8.3.3 Having no restrictions

Gresha had no restrictions on her use of digital devices because parents were happy about her performance at school. Even though Greg said that he would cut off her entertainment

as a punishment if she failed to do her work, he had never come across that situation. The following extract shows why Gresha had no restrictions from her parents.

After school, for about an hour and a half I just sort of relax, eat some food and watch a bit of TV, then after about that time I would go straight on to my homework and work solidly until it's finished, and if it's finished and I still feel like I could continue I would do revision for other things, for upcoming tests and for future exams and prepare myself for that. (Gresha)

Similarly, both Indi and Ben were allowed to watch television or go on Facebook after school because they also used to do their schoolwork and did not require restrictions on entertainment. Although Ian was a year 12 student, he played online interactive computer games in his room most of the time after school. His parents imposed no restrictions but they wanted him to go out and enjoy others' company every now and then. Ian was not interested.

After school Van would play computer games at home for hours. However, within that period he used to finish his homework too. After dinner he would watch movies on his iPad but he did not like watching television. Those movies seemed to be scientific, adventure, or funny according to Vinh. In addition, using his iPad and laptop, Van was able to improve his knowledge through the news and current affairs. However, as mentioned in the previous section, with regard to the use of digital devices or entertainment, Van had no restrictions from his parents until 9 pm only.

The overall qualitative analyses in Chapters 6, 7, and 8 can be presented together as shown in Figure 8.1. Based on the research questions, the next chapter provides a discussion of the quantitative and qualitative findings presented in this and the previous chapters.

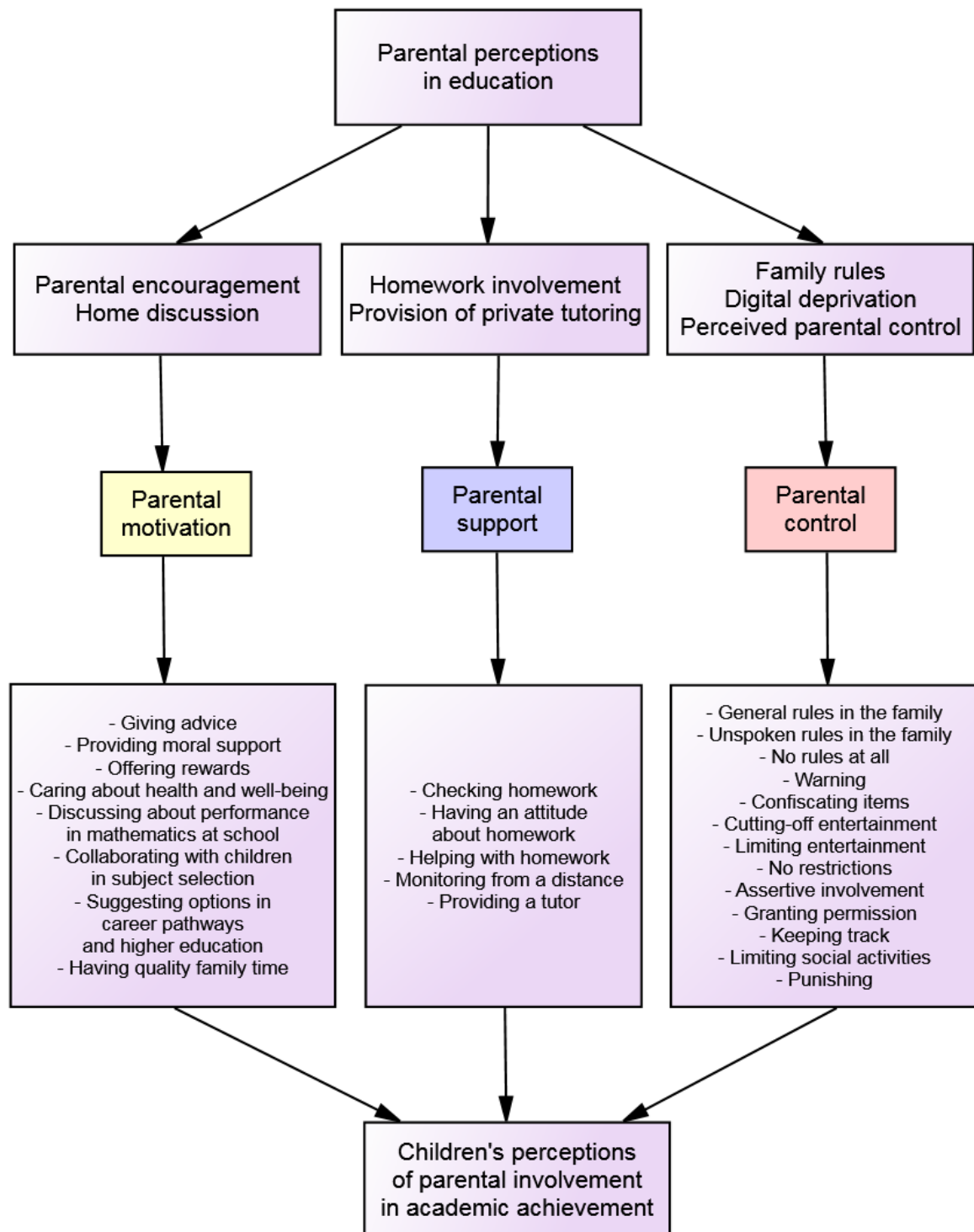


Figure 8.1. Summary of findings in qualitative analyses.

8.4 Summary

This chapter has explored the three factors guiding parental control – family rules, perceived parental control, and digital deprivation. Family rules among participants consisted of practices such as setting up general rules, having unspoken rules, or frequent warnings. However, some children were self-disciplined and did not require any rules. This enabled parents to have no rules in certain situations.

Under perceived parental control, it appears that at times parents were involved with their children assertively. Even though some parents granted permission, they did not allow children to be away from home for long. Some parents kept track of the whereabouts of their children from time to time. Parents also seemed to try and limit children's social activities. In some cases, children themselves limited their own social activities, because they preferred to finish their school work instead of going out with friends.

There are some parents who punished their children by material deprivation. To control the use of digital equipment, these parents tended to limit entertainment and sometimes confiscate items. Nevertheless, there are parents who did not place any restrictions on the use of digital media or related equipment.

Chapter 9: Discussion and Conclusion

This chapter includes a discussion of results found in the research study which involved students and their parents in three schools in Melbourne, Australia. Drawing on the designed conceptual framework, related theory, and literature review, this discussion is based on parents' perceptions and their involvement in education, and children's perceptions in academic achievement. Previous studies have found a positive relationship between parental involvement and children's achievement (e.g., Briley et al., 2014; Davis-Kean, 2005; Fan & Williams, 2010; Fan et al., 2012; Hong & Ho, 2005; Kashahu et al., 2014; Murayama et al., 2016; Phillipson, 2010; Phillipson & Phillipson, 2012; Wilder, 2014; Zhang et al., 2011). The current research advanced these findings by investigating issues that have not been sufficiently considered in the existing literature. This study considered parental involvement as parents' actions at home that facilitate the academic achievement of children and explored perceptions as a set of attributes including their attitudes, beliefs, expectations, aspirations, values, and academic standards, which constitute parental involvement. The thesis responded to the following research questions:

1. *How do parents' perceptions about and parental involvement in mathematics education affect the way children think about mathematics achievement?*
2. *To what extent do these perceptions and involvement differ*
 - (a) *between Asian–Australian and European–Australian backgrounds?*
 - (b) *between genders of children and parents?*
 - (c) *among year levels of children?*

The study found that parental involvement appears in various forms such as parental encouragement, home discussion, homework involvement, providing private tutoring, setting up family rules, perceived parental control, and digital deprivation. The variables,

provision of private tutoring and digital deprivation had not been accounted for as parental involvement factors in previous studies in this field. In the current study, parents' as well as children's responses highlighted parents' significant roles as motivators, supporters, and those who are in control of their children. Each role consists of several practices as reported by the participants in this research. Parents' and children's data were gathered by asking similar questions to both groups to improve the reliability of findings. The quantitative and qualitative findings were integrated for methodological triangulation and the findings of parents' and children's data were used for data triangulation. The results were presented as shown in Figure 9.1.

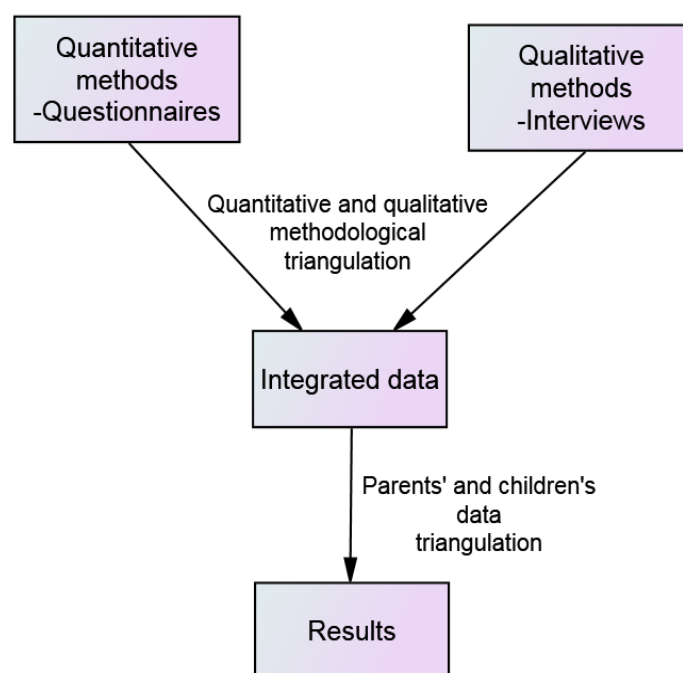


Figure 9.1. A methodological/data triangulated model of integration.

To answer the research questions, I discuss the implications of the results in relation to the following main themes, which in some cases appeared to involve reciprocal or bidirectional relationships. These links are shown in blue in the model in Figure 9.2 and are discussed in the relevant sections:

- Parents' and children's perceptions in mathematics learning
- Parents' perceptions and their involvement in mathematics education of their children
- Parental involvement in and children's perceptions of mathematics achievement

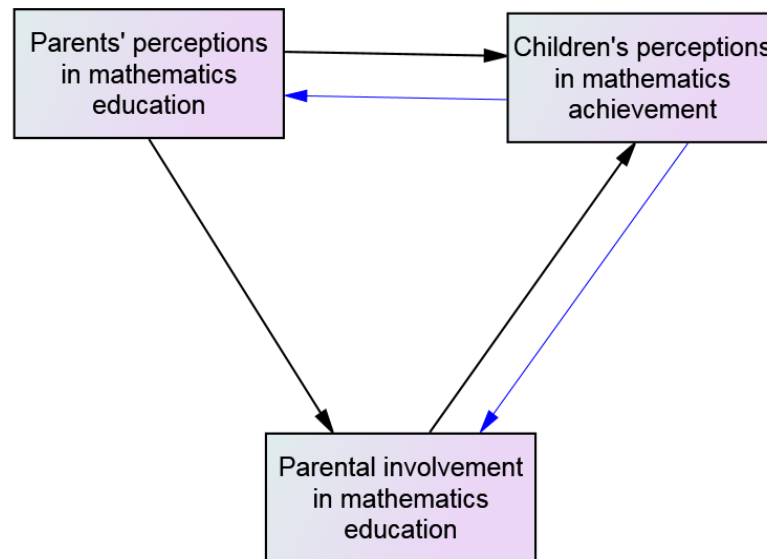


Figure 9.2. Bidirectional model of relationships in perceptions and involvement.

In this discussion, sections 9.1, 9.2, and 9.3 provide answers to research question 1 and sections 9.4, 9.5, and 9.6 compare demographics to answer research question 2.

Subsequent sections of this chapter include recommendations to improve parent–child relations in mathematics education, followed by suggestions for future research, and conclusion. The discussion begins with the first theme, which concerns parental perceptions in mathematics education.

9.1 Parents' and children's perceptions in mathematics learning

This study found that parental perceptions in mathematics education and children's perceptions in achievement were largely and positively linked with respect to all the parental involvement factors explored, in agreement with previous studies that reported

similar conclusions (Bandura et al., 1996; Briley et al., 2014; Davis-Kean, 2005; Fan & Williams, 2010; Fan et al., 2012; Hall et al., 1999; Hong & Ho, 2005; Kashahu et al., 2014; Murayama et al., 2016; Wilder, 2014; Zhang et al., 2011). However, some of these studies focused on only one or two attributes of parental perceptions. In particular, Bandura et al. (1996) argued that parental aspirations accounted for a sizable amount of variation in academic achievement of children. As Hall et al. (1999) found, parental attitudes appeared to be influential in mathematics performance of children. Kirk et al. (2011) reported that parental expectations are influential in educational aspirations of children. Further, Fan and Williams (2010) argued that “students who perceived that their parents valued their education and had high expectations for their academic success were likely to feel interested and engaged and confident towards their academic endeavours” (p. 69). Nevertheless, as Ural (2015) explained, if parents transmit a fear of mathematics to their children it might result in a fear of mathematics for children too. Hence, children’s perceptions in achievement appeared to be influenced positively or negatively by parental perceptions.

With reference to the methodological/data triangulated model in Figure 9.1 and the bidirectional model of relationships in Figure 9.2, a discussion ensues of the findings of how parental perceptions in motivating, supporting, and controlling affect children’s perceptions in mathematics achievement.

Parental perceptions in motivating their children

Parents’ motivation serves as an avenue for them to intervene in their children’s academic performance. As explained in Chapter 4, parental encouragement and home discussion are two factors categorised under parental motivation. The findings indicated that when parents have more positive perceptions of encouragement of their children and discussions

at home, their children also have more positive perceptions regarding their achievement. The children who perceived that their parents valued their education were likely to be interested and engaged in their academic endeavours and they had higher expectations for academic success. This finding highlighted the importance of parental motivation as a factor that contributes to children's academic achievement and it was found to be consistent with previous studies (Fan & Williams, 2010; Fan et al., 2012; Kashahu et al., 2014). For example, Kashahu et al. (2014) found that when parents have high expectations for their children's academic achievement in any particular subject, the children will have even higher expectations for achievement.

The results implied that parental perceptions were conveyed through parental motivation in shaping their children's perceptions to achieve academically. The strong and positive associations between parental perceptions and children's perceptions confirmed and provided evidence that these parents were able to communicate the message to their children successfully. This finding affirmed the arguments of Fan and Williams (2010), who pointed out that parents' educational aspirations for their children also have strong positive associations with their children's academic engagement and intrinsic motivation in mathematics. When parental perceptions of mathematics education were transformed into children's perceptions of achievement, the children were intrinsically motivated and they showed their interest and engaged in academic activities with the expectation of achieving their own goals as well as their parents' goals. The result is a positive outcome of parental encouragement and parent-child discussions at home.

The next section discusses parental perceptions in supporting their children to enable academic success.

Parents' perceptions in supporting their children

In this study, homework involvement and provision of private tutoring were considered as two factors that provided support for children. It was found that when parents had higher perceptions of being involved in children's homework, children had higher perceptions of academic achievement as indicated by the positive relationship between the two factors. In addition to comparisons between homework involvement and children's achievement, this thesis extended previous studies (Dumont et al., 2012; Fan & Williams, 2010) by comparing parents' perceptions in homework involvement, parental involvement in homework, and children's perceptions in mathematics achievement. There were not enough evidence in this study to support a finding from Pezdek et al. (2002) who reported that parents overestimated their children's mathematical abilities and the time parents spent helping their children with mathematics homework was unrelated to children's performance in the subject. This study, however, found that parental perceptions in supporting their children's homework can be a positive outcome of parent-child involvement if the parent wants to help and the child wants to be helped.

The most prominent reasons for having a tutor were: the attitude of parents that learning from school was not enough to achieve good results and these parents wanted their children to do well in class. On the other hand, the most noticeable reasons for not having a tutor were: the attitude of parents that learning from school was enough to achieve good results and the ability of parents to help their children without a tutor. The current study found that parents' perceptions about tutoring and children's perceptions of mathematics achievement with tutoring were similar and the relationship between the two factors was positive as informed by parents as well as children. This finding extended the previous studies (Bray, 2003; Hof, 2014; Kinyaduka, 2014) by showing that parents and children

had similar thoughts about academic achievement with tutoring. However, the outcome of the provision of private tutoring may not always be positive. Also, higher achievers are not necessarily the students who have tutors. These are discussed further in section 9.3.

The next section discusses parental perceptions in education and of their involvement in controlling their children.

Parental perceptions of controlling their children

The factors included in parental control were implementing family rules, perceived parental control, and digital deprivation. Results indicated a strong and positive espousal of parental control in both parents' and children's perceptions. Hence, the current study found that an increase of parental perceptions of the value of controlling their children would cause an increase in children's perceptions in academic achievement. However, when parental aspirations exceeded their children's expectations (Boxer et al., 2011; Rutherford, 2015) children seemed to have a high level of anxiety, emotional and behavioural difficulties, and lower wellbeing due to perceived pressure, as seen in the interview data. Nevertheless, it was noted that such negative effects can be reduced by increasing children's academic self-concept (Rutherford, 2015) through motivation and support.

Parental over-aspiration can be detrimental for children's achievement as described by Murayama et al. (2016). Hence, a key implication resulting a positive outcome was the flexibility of parental perceptions, so that parents do not put pressure on children when the latter are seeking to achieve goals. Willingness to change or compromise in parenting was evident in the interviews with Eric, Greg, Irene, and Indra in this study.

The following is a discussion on parents' perceptions in education and children's perceptions in academic achievement as a bidirectional relationship.

Bidirectional relations in parents' and children's perceptions

In relation to motivation and support, a further implication of parents' and children's perceptions in achievement was the bidirectional interaction of these factors. Parental control and children's achievement though, do not seem to be bidirectional. On the one hand, the results indicated that when parental perceptions of education were high, the way children thought about academic achievement also highly positive. On the other hand, if children had high perceptions of their likelihood of achievement, this in turn, can increase parents' perceptions in motivating and supporting their children, which is a positive bidirectional relation implied by the strong association between parents' and children's perceptions. It appeared to be a circular pathway where parental perceptions affected children's perceptions and that meant they sought further parental involvement, which in turn fostered positive perceptions of the likelihood of achievement. This is a mutually supportive environment where both parents and children can achieve their academic goals. This finding was consistent with other studies (Briley et al., 2014; Gonzalez-DeHass et al., 2005; Murayama et al., 2016; Zhang et al., 2011) which provided insights into the reciprocal relationship between parental and children's expectations.

In agreement with the current study, while Murayama et al. (2016) found a mutual influence between parental aspirations and children's academic achievement, Briley et al. (2014) found a similar relation between parental expectations and achievement. Moreover, parental expectations as an attribute of parental perceptions were consistent with expectancy-value theory (Wigfield & Eccles, 2002) which supports the conception of a circular pathway, whereby children's previous achievement affects parental expectations, which again affect children's expectations. In addition to expectations and aspirations, this study extended previous studies by considering other attributes such as attitudes, beliefs,

values, and academic standards. As Kirk et al. (2011) noted, parental perceptions do not account for all the variations in children's perceptions. There may be other factors such as parent-school participation, parent-teacher communication, parents' education level, SES, and students' prior knowledge, which were not taken into account in the research design described in Chapter 3.

The following section of the discussion is based on the second theme, which is parental perceptions and parents' involvement in the mathematics achievement of their children.

9.2 Parents' perceptions and their involvement in mathematics education of their children

As shown in Figure 9.2, parental perceptions are linked with their involvement in children's education. Previous research in the field has shown that parental involvement arises from parents' perceptions (e.g., Harris & Goodall, 2008). Survey data in this research study showed different levels of strength in correlation between parents' perceptions regarding education and each of the parental involvement factors. Further, when triangulated, there were small variations in the results according to parents' and children's data. It was found that both parents and children were aware the power of education and agreed that good education is an avenue or a prerequisite to future success in life, which was consistent with the findings of Ule et al. (2015).

Integrating findings of the surveys with interview data the following sections further discuss how parental perceptions affect their motivation, support, and control of children in mathematics education.

Parental involvement in motivating their children

Even though some participants reported motivation as a parental duty, in reality it seemed to vary with the specific actions of each parent. The findings showed that the higher the parental perceptions, the higher the parental encouragement would be. Further, an increase in parental perceptions resulted in an increase in home discussion. Hence, the above results implied that parental perceptions would positively affect parents' motivation of their children. Results found in qualitative analyses of this study went further than previous studies, elaborating the complexities in parent–child involvement. To address the gaps in the literature, the following sections discuss in greater detail analogous parental practices and actions that motivate children in mathematics education.

The majority of the parents in this study reported that they used different approaches to advise their children. This was consistent with one of the findings of Fan and Williams (2010), which indicated that parental advice at home was positively associated with academic engagement. Even though some of the parents were not able to help with the content of mathematics for secondary school students, those parents reported advising their children in other ways to keep them on track. Children seemed to admire these efforts of parents, but they preferred to have some limits in such parental involvement. Some children reported their desire for independence. As a parent, Eric reported, if the outcome seems negative, parents could step back and use different approaches to relate to their adolescent children. Hence, the findings imply that parental advice should be given at a suitable time, as and when most required, and should not occur at every hour of the day. Further, the results suggest that parents should know their limits in advising children, so as to maintain a good relation with them and to encourage them.

Some children might study with a lot of effort but not achieve good results. In such circumstances, in order to encourage children, the parents in this study seemed to provide

moral support and praise them without putting pressure on them. Indeed, this can help some children to heal their negative feelings about poor performance in mathematics by committing to growth and keeping on learning (Dweck, 2016). Children reported that it was helpful to have that moral support from parents to build confidence. Some senior secondary school students seemed to put pressure on themselves because they wanted to be successful in their future. Further, they wanted to make their parents happy about their performance and cause them to be proud of them, which appeared to be a win-win situation in parent-child involvement.

When the children in this study were young, parents gave presents to them when they earned good marks or achieved something remarkable. However, the rewards for senior secondary students were different from what they had been given when they were smaller children. Both parents and children reported that the rewards offered to older children were not beautifully wrapped gifts. Sometimes, rewards were just encouraging words which could still provide happiness in children's minds. More often those rewards were in the form of trust, freedom, or letting the children to go out with their friends. However, the children had to earn that liberty by getting their work done beforehand and being up-to-date. Despite such opportunities for socialisation one student, Indi, reported that she never expected rewards from her parents because she believed if her parents were happy and proud about her work, it would make her happy too. Indi seemed to have enhanced her intrinsic motivation (Deci & Ryan, 2012) by herself without any rewards from her parents. Hence, tangible rewards may not be an effective way of motivating secondary school children. These findings about the type of rewards, thus, supported the previous findings of Fan et al. (2012), which suggested that offering verbal rewards may enhance and extrinsic rewards may hinder intrinsic motivation based on the context in which they occur.

If their child put too much effort into their mathematics studies, child's health seemed to be a concern for some parents. One such parent, Eric, worried about his daughter Emma who used to stay up doing mathematics at night and did not get enough sleep. He thought this might not be advisable. From my own experiences, I remember my father asking me not to study all the time and suggesting I go outside and play badminton with him. In this study though, there were students who were self-disciplined about maintaining their health, since healthy food and eating habits are essential in the learning process, which requires thinking and grasping the ideas being taught. Parents appeared to make sure that their children had enough food and drink while they were at school and studying at home till late hours at night. I had a habit of finishing all my mathematics and other homework before I go to school next day. This reminds me of my mother who used to stay awake most of the time to provide me with everything I needed while I was studying in the middle of the night. This kind of parental mindset and providing such background support and advice seem to be important regarding children's well-being and academic achievement.

About the study environment, many parents reported providing a quiet and comfortable place for their children. However, the findings showed that houses could be noisy sometimes with television and other electronic devices. One child might need to study while another child needed entertainment. Parents might need to consider such situations to encourage one child who wanted to study and also not to disappoint the other child. Davis-Kean (2005) explained the above as the affective relationship between parents and children. It involved the provision of a cognitively stimulating and emotionally supportive environment (Kashahu et al., 2014) as well as the importance of adjusting the home environment to meet the needs of children (Davis-Kean, 2005). Accordingly, parents' involvement in such a manner seems to be helpful for children to achieve academic success.

In general, the use of technology can create positive or negative outcomes, depending on the way the children use it. For parents, sometimes it can be a relief when they are able to know the whereabouts of children but it can also be a matter of concern at other times. As Tania described, friends' messages over a mobile phone could be disruptive when Tina wanted to concentrate in her studies. Hence, when providing technology parents seem to encourage their children to use the devices appropriately and wisely.

Many parents had suggestions which seemed helpful for their children when they did their subject selection, particularly in mathematics. It was also reported that some parents forced their children to pick the subjects they wanted their children to do, though it placed pressure on children. However, in most cases, the child had the opportunity to make the final decision considering the input from parents. While some parents believed mathematics is important others considered all subjects the same. Those parents who gave mathematics a priority seem to motivate their children in learning the subject. As some subjects are prerequisites for university courses and future careers, parents wanted to advise their children so that there would not be any regrets in future. Parents thought their children were not mature enough to make such important decisions on their own. Hence, they wanted to help their children. Eventually, this seemed to be a positive outcome if children want to be helped too.

Parents reported that they expected to have quality time with their children to enjoy together at least once a day. When it was impossible, some planned weekend outings to spend with the family as a unit. Some parents thought they were missing such opportunities as their children were frequently going out with their friends, leaving the family behind. Hence, these parents emphasised the importance of family time which

enabled them to discuss their children's performance at school (Desforbes & Abouchaar, 2003) which seems to have an impact on academic success.

Each of the above parental practices identified in this study seems to have the ability to motivate children in academic achievement and contributes to filling the gaps in the literature. The next section discusses parents' involvement and their practices in supporting children.

Parents' involvement in supporting their children

Many studies in the field reported that parents sought to support their children in achieving better academic outcomes (e.g., Harris & Goodall, 2008; Ule et al., 2015). The current study found moderate and significant correlations between parents' perceptions and homework involvement according to perceptions of parents. The same factors showed large and positive correlations according to children's reports. Even though the correlations between parents' perceptions and their involvement in the provision of private tutoring were small, parents' and children's thoughts were in the opposite direction as the correlations were negative and positive respectively. Because of these differences, interview data are further discussed.

Some parents helped their children with senior mathematics while others were not able. Similarly, some children wanted to be helped while others did not. Hence, it was found that there were four different groups of parents and children linked to help with homework. They were: parents who could help and children who wanted to be helped, parents who could help and children who did not want to be helped, parents who could not help and children who wanted to be helped, and parents who could not help and children who did

not want to be helped. It was found that the parent–child relation varied according to the above categorisation.

Parents had different opinions about homework involvement. While a group of parents thought homework was very important to understand what the children learnt at school, some other parents did not see the importance. Some of them thought it was the responsibility of the child to do the homework. Those parents who valued homework were more involved in their children’s education than other parents. As McNeal (2012) revealed, the lower achievement of students who have difficulties in academic attainment may result in their parents becoming more involved. Ben was an example of such a student among the participants of this study. For some parents private tutoring appeared to be a solution in such circumstances.

Parents preferred to have tutors for their children to clarify the content learnt at school. Further, some parents and children believed that a tutor was a faster and easier way of getting help when required. According to a study by Dindyal and Besoondyal (2007), there were various reasons for engaging private tutors in mathematics, which ranged from performance improvement in the subject to being forced by parents to have additional support. These researchers also revealed that private tuition was taken by weaker students as well as students of all abilities. As noticed in the interviews, employing a tutor was the last option for some parents because there were other avenues available for help in mathematics. Parents themselves, siblings, teachers, friends, and online resources were available for a child in need. However, parents in some communities provided the services of a tutor even when the child was doing well at school.

In this study, parents and children thought the work of a school teacher and a tutor should not be the same. Parents expected a tutor to provide extra support for children to

understand mathematics better rather than helping with their children's homework. Further, a tutor should be able to diagnose the areas where a student was weak and should have methods to deal with the issues. In addition, tutors were expected to provide challenging work for children and short cuts and extra tips for examinations. Children raised an issue in prioritising the homework set in school and tuition. Even though parents did not agree, children preferred not to have homework from a tutor because they thought that they already have enough schoolwork to complete at home. Hence, having a tutor can cause conflict between parents and children.

Though some parents were happy to have tutors for their children, expenses seemed to be a concern. While some parents were prepared to pay any amount for tutoring in any subject their child needed, others tried to limit the number of subjects for tutoring and looked for tutors who were affordable within their budget. They found university students as tutors to be the cheapest. Tutors were usually found through personal connections or word of mouth. Recommendations of other people and the years of experience seemed important when selecting a tutor. The method of tutoring, such as one-on-one, group, or large scale tutoring, and the history of results were reported as other decisive factors. However, many parents follow others without considering specific requirements of their children.

The above findings regarding parental practices in supporting children set this thesis apart from other studies in the field. The following section discusses parental involvement and their practices in controlling children, which is another contribution to the existing literature.

Parental involvement in controlling their children

In addition to parental motivation and support, this study was designed to seek information about parental control, extending the findings of previous studies. One such investigation

by Fulton and Turner (2008) indicated that perceived parental practices were a significant predictor of children's academic performance. Instead, the current study found that parental perceptions and their control had a small positive correlation between them. This implied that parental perceptions could influence the way they controlled their children.

The present study found that there were rules for children in some families. These were not strict rules but standard rules within families for the general behaviour and well-being of children. Such rules were different from one family to another and could be less effective depending on the amount of trust between parents and children. Before they granted permission for children to do something non-academic, some parents wanted to check whether all homework was done and the child was up-to-date with schoolwork. There were parents who requested all the details about the external event before they granted permission. The children who did their work and wanted to tell their parents what they would do while away from home, were able to get permission easily. While children were away, some parents kept on tracking them to make sure they were doing well. Sometimes they called their children or sent text messages. This was explained by Huver et al. (2010) as being related to the emotional instability of parents who have high expectations and are anxious to know the whereabouts of their children. Furthermore, they found that more emotionally stable parents exerted less strict control over their children. This study found that the amount of tracking was reduced when children let parents know about everything happening outside and everyone involved with them.

Notably, within this particular group of participants it was not the parent but the child who limited the extent of socialising. As senior secondary students they were more interested in their studies than socialising. As a result, when these children wanted to socialise they were able to convince their parents without any difficulties.

The current study, however, affirmed that when children were not doing what they were supposed to do with their studies, parents considered controlling children. As a consequence parents would limit their children's entertainment by reducing TV time, limiting internet usage, or not allowing them to use other digital equipment for a certain period. If there were too many distractions via social media, parents tended to confiscate digital equipment to facilitate their children's engagement in academic activities such as homework. However, some electronic equipment was needed for school work and it was impossible to confiscate such items. In this situation some parents implemented ground rules so that children were not able to use digital equipment or the internet after a given time at night.

As corporal punishment or hitting with a cane was rare and did not seem to exist anymore the participants reported other types of punishment such as cutting off freedom, grounding, or forcing them to keep studying. Hence, it was clear that if children know their limits in everything they do and obey general rules, parents may not need to place any other restrictions on them or their activities.

The present study contributes to the literature with its exploration of parental practices and their actions in motivating, supporting, and controlling their children. The next section is a discussion on the third theme, which is parental involvement and perceptions of children in mathematics achievement.

9.3 Parental involvement and children's perceptions in mathematics achievement

A large body of studies in the literature have shown that children whose parents are involved in their education demonstrate superior achievement in mathematics (e.g., Bong, 2008; Fan et al., 2012; Kashahu et al., 2014; Pomerantz et al., 2007; Sirvani, 2007; Topor

et al., 2010; Wilder, 2014). Despite a number of studies supporting the above argument, Blondal and Adalbjamardottir (2009) suggested that there were inconsistencies in this area because parental involvement and children's achievement have shown negative or no association in other studies (e.g., McNeal, 1999). As shown in Figure 9.2, these two factors have a relation that appeared bidirectional. The findings on how parents' involvement – motivation, support, and control – affect children's perceptions regarding their academic achievement and emerging bidirectional relations are discussed below.

Parental motivation and children's perceptions of mathematics achievement

The current study found that parental encouragement and children's perceptions in achievement were substantially and positively correlated. The implication was that the higher the parental perceptions the more the parental encouragement would be, resulting in an increase in children's positive perceptions. Further, the medium and large correlations according to parents' and children's data respectively indicated that home discussion may positively affect children's perceptions. The overall findings of parent–child relations from the interview data were largely in agreement with Bong (2008), who reported children's motivation as feelings of obligation, guilt, respect, thankfulness, closeness to parents, conflicts with parents, and parental pressure. Therefore, motivating children by means of encouragement and discussions at home seemed to be a possible way of improving academic achievement in mathematics.

Next, parents' support and the perceptions of their children regarding mathematics achievement are discussed.

Parental support and children's perceptions of mathematics achievement:

In this study, parents' homework involvement and children's perceptions of academic achievement showed medium and large positive correlations between the two factors according to parents' and children's data respectively. This was consistent with previous findings that suggested when parents were involved, children reported more effort, concentration, and attention, resulting in cognitive competence (Gonzalez-DeHass et al., 2005; Phillipson, 2010; Phillipson & Phillipson, 2012; Sirvani, 2007; Spera, 2005; Topor et al., 2010; Vellymalay, 2012; Wilder, 2014; Xu, 2004). However, these results may well vary in a replicated study with different participants from other areas of the country. Researchers including Cooper et al. (2008), Hill and Tyson, (2009), Moroni et al. (2015), and Pomerantz et al. (2007), to mention a few, have shown detrimental effects between parental homework involvement and children's achievement.

In line with the findings of Areepattamannil and Kaur (2013), the group of parents in this study did not believe that their children saw tutoring as a supportive activity which could improve their academic achievement because there was no significant correlation between the provision of private tutoring and children's achievement. Children's data resulted in a small, positive correlation between provision of private tutoring and children's perceptions regarding academic achievement. However, it was found that the majority of students who achieved more than 80% in mathematics, did not have support from a tutor. Hence, for the students in the three schools in this study, private tutoring seems unnecessary even though 50% of parents provided tutors. When extra support is provided when it is not needed, it may result in negative outcomes.

The next section discusses parents' control and children's perceptions in mathematics achievement.

Parental control and children's perceptions of mathematics achievement

This study found that parental control and children's perceptions in academic achievement had small and large positive correlations according to parents' and children's data respectively. This finding extended the previous studies that found positive relations between family rules and children's intrinsic motivation (Fan & Williams, 2010; Hill & Tyson, 2009; Patall et al., 2008) as the current study included both parents' and children's thoughts as well as other controlling factors such as perceived parental control and digital deprivation. However, it is important to note the views of cognitive evaluation theory (Deci & Ryan, 1985) which imply that social factors such as parental control can be a negative pressure on children and can undermine children's intrinsic motivation. Excessive parental control or parental over-involvement could be factors that mediate a negative relation between parents and children (Murayama et al., 2016). As Blondal and Adalbjarnardottir (2009) concluded, adolescents who experienced their parents as providers of warmth, trust, and respect while setting fair limits and demanding mature behaviour were more receptive to parental involvement (this is discussed further in sections 9.4, 9.5, and 9.6). The current thesis, however, went beyond the boundaries of previous studies by exploring the basic practices of parental control.

The following sub-section discusses parental involvement in education and children's perceptions in academic achievement as a bidirectional relationship.

Bidirectional relations in parental involvement and children's perceptions

Another implication that emerged from this study is that parental motivation and children's perceptions in mathematics achievement were shown to be bidirectional. As illustrated in Figure 9.2, when parental involvement increases children's perceptions in achievement

increases. As a result of the increase in children's perceptions, parents motivate their children more and more.

Parental support exhibited bidirectional relations with children's achievement to a certain level only. It seemed that excessive involvement in homework and provision of tutoring could hinder children's achievement. These findings from interview data were in agreement of the results of previous studies although some researchers have found not only positive effects of parental homework help but also detrimental effects on the academic success of children (Bempechat & Shernoff, 2012; Fan et al., 2012; Farrell & Danby, 2015; Hill & Tyson, 2009; Pomerantz et al., 2007; Xu, 2004). After investigating the quality of parental homework help as perceived by children, Moroni et al. (2015) revealed differentiated results. As they explained, parents' homework involvement was positively associated with children's achievement when it was perceived as supportive, but their help was negatively associated with children's achievement when parents were perceived as intrusive and controlling in the process. In these circumstances, the relationship between parental support and children's perceptions cannot be considered as positive and bidirectional. The current study was consistent with the above results and also in line with the self-determination theory (Deci & Ryan, 1987), which states that children's innate needs for competence, autonomy, and relatedness are undermined when parents are intrusive and controlling.

Next, I discuss variations in parents' perceptions and involvement and children's perceptions of achievement according to culture, gender, and year level.

9.4 Comparisons of culture

As parental involvement is multidimensional in nature, parental perceptions across cultural groups can vary depending on how the perceptions are conceptualised (Hall et al., 1999; Phillipson & Phillipson, 2007). For example, while Fan et al. (2012) found cultural differences in parental aspirations and students' intrinsic motivation, Hong and Ho (2005) could not carry out such comparisons due to the way they conceptualised their model, because intrinsic motivation was not considered in their study. The current study conceptualised parental perceptions as a set of attributes and parental involvement as parents–child interactions related to education at home.

Culture and parental perceptions of mathematics education

For the sample of parents in this study, parental perceptions in encouraging children or parent–child discussions at home did not show significant differences between Asian–Australian and European–Australian cultures. Hence, cultural differences in parents' perceptions appeared to be insignificant in terms of the motivation of their children in education, even though the findings were inconsistent with previous studies (e.g., Davis-Kean, 2005; Fan et al., 2012; Zhang et al., 2011). Further, in homework involvement and provision of tutoring for their children both Asian–Australian and European–Australian parents seemed to have similar perceptions in mathematics education because the data comparisons found no significant difference between the two groups. Similarly, parental perceptions in controlling their children had no significant differences between Asian–Australian and European–Australian backgrounds. Further, data triangulation showed that the way parents thought about their own perceptions in motivating, supporting, and controlling their children and the way children thought about their parents' perceptions

were similar between the two culture sets. However, parental involvement between the groups was found different as described in the next sub-section in page 278.

Further, this research was informed by the theory of relative functionalism (Sue & Okazaki, 1990) which has been used to describe the educational achievements of Asian–American students. They argued that the academic achievement of children of Asian–American migrants can not only be solely attributed to Asian cultural values but also to their migrant status. Thus, as Asian participants in this study, I involved recent migrants who were believed to have their own cultural values of education. European participants who lived in Australia longer than Asian participants did, were expected to have more Australian perceptions of education and were purposefully selected.

Extending the current study further, it seemed possible to investigate Sue and Okazaki's theory of relative functionalism in relation to Asian–Australian and European–Australian parents' perceptions of education. However, the above quantitative findings, which did not show differences between cultures in parental perceptions regarding the motivation, support, and control of children in the Australian context, were inconsistent with Sue and Okazaki's theory of relative functionalism, though this theory had been originally supported by other studies (e.g., Dandy & Nettelbeck, 2002; Henry et al., 2008). Even so, these findings extended the study of Spera (2005), which suggested that parental aspirations, values, and goals for their children do not vary dramatically by ethnicity.

Even though there were no variations found in parental perceptions, as a single factor, there were deviations in parental expectations between the two sets of cultures in this study. Most of the European–Australian parents seemed to be happy if their child was a good student but the majority of Asian–Australian parents expected their child to be one of the best students in class and these variations in parental expectations were consistent with

the theory of relative functionalism. Further, these findings were in agreement with Vartanian et al. (2007) who found significant differences in parental expectations between Asian– and non-Asian–Americans due to immigrant status. Also, Yamamoto and Holloway (2010) suggested that there was variability in academic expectations held by minority groups other than Asian–Americans. These parents were less likely than Asian–American parents to value education or to hold high expectations for their children.

Cultural differences in parental involvement with regard to mathematics education are discussed now.

Culture and parental involvement in mathematics education

Some parental involvement factors were significantly different between the two cultural groups. As Jerrim (2014) found, cultural differences in parental involvement seemed to be due to a combination of inter-linked activities. Those can be listed as school selection, a high value placed upon education, substantial out-of-school tuition, hard work ethics, a belief that anyone can succeed with effort, and high aspirations for the future. Cao et al. (2007) found that parents of non-European students have significantly higher levels of parental encouragement than parents of students of English speaking background in Australia. Inconsistently, according to the current study there was no significant difference between the two sets of cultures in the ways parents encouraged their children. Fan et al. (2012) found ethnic differences in parental advising, even though interview data in this study did not exhibit the same. However, it was found that European–Australian parents and children discussed more than Asian–Australian groups did as shown from parents' data. This finding was consistent with Asian–American parents being less likely to communicate with their children than parents from other ethnic groups (Fan et al., 2012).

These cultural differences in parent–child discussions at home were not prominent according to the children’s data in the current study. Hence, these results show the tendency of decreasing cultural differences from one generation to the next as they settle down in the new country of residence.

According to parents and children in this study parental involvement in homework is not significantly different between the two cultures. However, this result contradicts with the opinions of Bing and Vinh in education and also homework in particular. A possible reason for this can be because those parents were the most recently migrated participants in this study. Dandy and Nettelbeck (2002) note that, in particular, migrant parents who believed in education as the only way to exploit opportunities not available in their homelands were likely to be more involved in their children’s education than others. Their explanation was informed by the theory of relative functionalism (Sue & Okazaki, 1990), which was used by the authors to describe the achievements of Asian–American students. The theory of relative functionalism explored the extent to which migrants adopt the cultural traits or social patterns of another country. Sue and Okazaki (1990) argued that the academic achievement of children of Asian–American migrants could not be solely attributed to Asian cultural values but also to their migrant status. Although tutoring seemed unnecessary for this cohort of students, providing tutors appeared to be significantly different between the two cultures as informed by parents and children. Approximately 20% of European–Australian parents and 66% of Asian–Australian parents provided tutors for their children. This finding was in line with previous studies (Bray & Lykins, 2012; Dindyal & Besoondyal, 2007) which focused on private tutoring of Asian groups in other countries.

The practices of parental control between Asian–Australian and European–Australian backgrounds were found to differ. Even though these findings showed cultural differences in parental control, the results could not explain the academic success of any particular group. A similar limitation existed in the findings of Vartanian et al. (2007) who did not find support for parenting rules in explaining Asian–American educational success. In addition, previous research reported the demandingness and control of Asian–American parents, who value obedience, hard work, and competition among peers (Suizzo & Soon, 2006). Similarly, the current study found that Asian–Australian parents valued obedience and hard work, but they did not report about competition among peers. However, European–Australian children seem to enjoy more freedom than Asian–Australian children.

Next, children’s perceptions in mathematics achievement between Asian–Australian and European–Australian cultural backgrounds are discussed.

Culture and children’s perceptions of mathematics achievement

Based on factors of parental motivation – parental encouragement and home discussion – children’s perceptions in mathematics achievement were found to differ between Asian–Australian and European–Australian backgrounds. Even though cultural differences in parental perceptions have been studied in the past (e.g. Bowen et al., 2012) and discussed earlier, the same in children’s perceptions of mathematics achievement had not yet been explored. Hence, the current study adds parents’ and children’s thoughts to the literature in parental involvement. In the past, Jeynes (2005) determined that the achievement gap between cultures could be reduced by parental involvement. Findings in the current study were in line with Vartanian et al. (2007), who reported significant heterogeneity in the

academic achievement of Asian–Americans. In this study, both parents’ and children’s data showed significant differences in children’s perceptions related to parental motivation between the two sets of cultures. Thus, Asian–Australian and European–Australian children had different opinions about parental motivation and mathematics achievement.

Children’s perceptions of parental support in homework and the provision of private tutoring were significantly different between Asian and European background parents according to data gathered from children. However, those differences were not significant in the parents’ data. This is an unprecedented finding which needs further exploration. Similarly, Asian–Australian and European–Australian children reported having different perceptions regarding parental control. These were significantly different according to children’s data but were insignificant in parents’ data. The above differences in parents’ and children’s perceptions could be explained by acculturation, though a larger sample is needed to generalise these findings.

The next section discusses gender differences in parents’ perceptions, their involvement, and children’s perceptions of achievement.

9.5 Comparisons of gender

Even though this study did not find significant gender differences, it was found that parents’ perceptions and involvement in education and children’s perceptions in achievement strongly influenced each other, regardless of the gender of parents or children. The thoughts of this particular group of participants were different from the findings of Atweh et al. (2012), Forgasz (2008), Vale (2010), and Vale and Bartholomew (2008), to name a few. Such inconsistencies in gender and parents’ perceptions in mathematics education are discussed now.

Gender and parental perceptions of mathematics education

The study found that there were no significant differences between the gender of children or parents with regard to parents' perceptions of encouraging their children or discussing with them. This finding, however, was not in agreement with Lazarides et al. (2017), who investigated whether students' gender moderated the bidirectional effects of students' mathematics motivation and student-perceived parental beliefs or behaviours. They identified different parent-driven processes for boys and girls such as mathematics-related career plans and socialisation processes with fathers and mothers. Their findings were also in line with previous research by Watt et al. (2012), who suggested that mathematics task values were more important for girls than boys, in terms of their academic choice behaviours or career plans. Further, the above finding in this study was inconsistent with Zhang et al. (2011) who found that the effects of parental expectations on children's expectations were stronger among males than among females. Therefore, this particular finding seemed to be specific to the sample in this study.

The present study found that parental perceptions in supporting their children in mathematics education were not significantly different according to gender. This finding was consistent with the study of Bowen et al. (2012) of immigrant families, which showed no significant difference in fathers' and mothers' support and eighth grade boys' and girls' mathematics scores. Conversely, findings of Fu and Markus (2014) were inconsistent with the above because they argued that mothers were a source of support as well as pressure. Further, with regard to gender differences, the results provided no evidence of gender differences in parental perceptions of controlling children. Focussing on parental control of adolescent children in the Australian context, this finding addressed a gap in the literature in this field.

The following section discusses parental involvement with respect to the gender of parents and children.

Gender and parental involvement in mathematics education

Differences in parental encouragement and children's perceptions of achievement were found to be insignificant between male and female parents. Similarly, the relation between parent-child home discussion and children's perceptions of achievement showed no significant difference along gender lines in the parents' data. This finding implied that there was no significant difference between fathers and mothers in motivating their children. Also, this research found that parental encouragement or home discussion as perceived by children was not significantly different between male and female children.

The ways parents supported their sons and daughters in mathematics education did not appear to differ. These findings were inconsistent with those of Else-Quest et al. (2008) and Kashahu et al. (2014) who found that parents support girls more than boys. Else-Quest et al. (2008) reported that mothers showed more affection by comforting daughters more than sons after a failure. Further, Vale and Bartholomew (2008) reported gendered differences in mathematics achievement favouring males at the secondary level. However, triangulated data in this study found no dominance in any gender in supporting mathematics learning of adolescent students.

The children reported differences in parental control in relation to gender. This was consistent with the findings of Fulton and Turner (2008) who reported that parental control in the form of supervision was a positive predictor of perceptions of control for females but not for males. Specifically, they reported that girls seemed accustomed to being monitored more than boys, but boys saw monitoring either as intrusive or as indicating less

confidence of parents in the child's competency to function independently. In this study, however, parents did not remark on this difference according to comparisons in parents' and children's data triangulation. This implied that parents did not see themselves as controllers of their children. This finding seems interesting to study further with a larger sample of participants.

The next section discusses gender differences in children's thoughts about mathematics achievement.

Gender and children's perceptions of mathematics achievement

Children's perceptions in academic achievement due to parental encouragement and home discussion were not significantly different in relation to gender. Parents' thoughts about children's perceptions in parental homework involvement showed a significant difference while children's data showed the opposite. Further, provision of private tutoring had no significant difference between male and female children. With regard to the gender of children, neither set of data in this study produced a significant difference in children's perceptions of parental control.

Reviewing Australasian research into gender and mathematics education, Vale and Bartholomew (2008) found gendered differences in mathematics achievement favouring males at the secondary level, while in another study Kashahu (2013) revealed that girls had higher achievements than boys. Further, examining children's academic achievement through parents' beliefs and behaviours, Davis-Kean (2005) found gender differences in achievement in spite of the small magnitude. However, the current study did not find such a difference, which was in agreement with Hall et al. (1999) and Sirvani (2007). As Sirvani reported, neither gender outperformed the other one. The participated parents wanted their

children to excel in mathematics regardless of the children's gender, which was similar to the result found in this study. Moreover, the results appeared to be consistent with the findings of Muller (1998) in which she concluded that parental involvement did not appear to reinforce gender stereotypes about the performance in mathematics. However, the above findings were inconsistent with the results of Hedges and Nowell (1995) who found gender differences in high school mathematics favouring boys, which were especially strongest among the top-performing students.

In one of the interviews, describing the conversations in the family, Tania said that she used to go to her daughters' rooms and talk with them one-on-one but she did not know how it would be with sons. This implied that she thought boys might be different to girls. Other than the above, there was no other comment about gender differences. None of the other participating parents or children raised any issues regarding gender.

The next section discusses parents' perceptions and involvement in mathematics education and children's perceptions of achievement across year levels.

9.6 Comparisons of year level

The results showed that there were significant differences in parental involvement and year level of students. Likewise, parents' perceptions in education and children's perceptions in achievement varied over Year 7 to Year 12. These findings extended previous studies (e.g. Hoover-Dempsey et al., 2005; Muller, 1998; Patall et al., 2008), which only showed that parental involvement declined with the advancement of year level. Differences in parents' perceptions in mathematics education across these levels are discussed below.

Year level and parental perceptions of mathematics education

The investigation of year level differences in parents' perceptions about motivating, supporting, and controlling their children has addressed a gap in the literature. The study found that parents' perceptions in relation to encouraging their children and discussing with them varied significantly with year level. In particular, parental perceptions of encouraging or discussing with Year 7 and Year 12 students were different.

With regard to perceptions on parental involvement in homework across secondary year levels, the study found a significant difference. In addition, there was a significant difference in parental perceptions about providing private tutoring across secondary year levels. Notably, these differences in perceptions of supporting children with homework and tutoring were found between Year 7 and Year 12. One likely reason is the lack of confidence of parents in helping Year 12 students. As explained by Hornby and Lafaele (2011), these parents might not have sufficient academic competence to effectively help their children with homework. This barrier was more evident when children were progressing through secondary year levels even though some parents in this study were capable of supporting their senior school children in mathematics education, despite their year level.

Parental perceptions related to parental control factors were significantly varied across secondary year levels according to both sets of data. This difference in parents' perceptions about controlling their children lay between Year 7 and Year 12. Possible reasons can be the maturity of Year 12 students, autonomy granting, and the lesser extent of the involvement of parents due to inability to or lack of control when parenting adolescent students. However, a larger sample is needed to generalise variations among year levels.

Findings in year level differences in parental involvement in the mathematics education, which contribute to the gaps in the literature, are discussed below.

Year level and parental involvement in mathematics education

Generally, researchers have argued that parental involvement decreases as the students move to higher year levels in school (Mo & Singh, 2008; Spera, 2005). The findings of this study were consistent with the above mentioned studies. Parental encouragement and home discussion varied across secondary year levels. While parental encouragement declined, parent-child home discussion showed an increasing pattern over Year 7 to Year 12. The latter finding was consistent with a result of Ma (1999). Furthermore, parents' involvement in their children's homework showed a significant difference across Year 7 and Year 12. However, there was no significant difference across year levels in providing private tutoring, which implied that these children had tutors irrespective to their year level at school.

The study found significant differences in controlling children across secondary year levels. Even though the current study was consistent with the fact that there was a decrease in parental control over the years, in the interviews, it appeared that some parents kept on influencing their children. These findings were consistent with the general view (Gonzalez & Wolters, 2006) that students desire more autonomy and less involvement by parents as they advance through secondary year levels. Perhaps more interesting, these findings were partially in agreement, or somewhat contradictory to the findings of Masud et al. (2016), in which the authors concluded that when children grow older, parental control decreases drastically and parents have no more influence on the education of adolescents. Current findings are consistent with Zhang et al. (2011), who noted that, as adolescents grow up parents become sensitive to wishes and goals of their children without influencing them. In

addition, interview data in this study revealed that parental involvement becomes emotional, dynamic, and interactive, causing differences from Year 7 to Year 12.

Nevertheless, it appeared that there must be some parental control on children to make sure that they are on the path that will benefit them. It is evident that all of the above parental control practices require their limits for children to succeed in their academic journey without affecting the parent–child relationship.

Year level differences in children’s perceptions on academic achievement due to parental involvement are discussed below.

Year level and children’s perceptions of mathematics achievement

According to parents’ data, the differences in children’s perceptions across year levels on academic achievement with parental encouragement were insignificant but the same with home discussion were significant. Hence, this study found that these parents encouraged their children to the same extent continuously from Year 7 to Year 12 but the home discussions decreased with the increase in year level. However, children’s experience was somewhat different because they reported a decrease in both parental encouragement and home discussion with year level. Wilder (2014) found that the relationship between parental involvement and the academic achievement of children was consistent across different year levels, which was not in agreement with the findings of the current study.

Even though parents’ data in the study showed a significant difference in children’s perceptions in achievement with parents’ homework involvement, children’s data showed no significance difference. The latter finding was not supportive of a previous study that had highlighted lower homework effort (Trautween et al., 2006) and a decline in ability related beliefs (Wigfield & Eccles, 2000) in higher grades. The two data sets resulted in a

significant difference in children's perceptions about the provision of private tutoring across secondary year levels. In particular, those differences in children's perceptions on homework involvement and private tutoring were significant between Years 7 and 12.

Each data set provided significantly different results across secondary year levels regarding children's perceptions in mathematics achievement due to parental control. The differences that affected children's perceptions in academic achievement appeared across Years 7 to Year 12. Children's perceptions and these year level differences had not been sufficiently discussed in the literature, to which the current study has contributed. However, a larger sample is preferred in order to compare year level differences. As seen in the interview data, it is also interesting to find that when children had higher perceptions in academic achievement they tended to self-control themselves to avoid distractions from friends and social media.

Viewed as a whole, this study is consistent with the large body of literature showing positive links between parental perceptions in education and children's perceptions in academic achievement. However, excessively high parental aspirations or unrealistically positive perceptions can lead to over-involvement, resulting in high levels of parental control and excessive pressure on children, which may increase the risk of negative outcomes (Murayama et al., 2016) such as being overwhelmed with worries, depression, and anxiety. This undermines children's innate need for competence, autonomy, and psychological relatedness as explained in self-determination theory (Deci & Ryan, 1987). It is important to note that greater amounts of parental help may be perceived as more controlling and intrusive by children.

This study has several implications for parents and the school community as indicated below.

9.7 Recommendations to improve parent–child relationships in mathematics education

With the findings of this study, several important implications, public policy recommendations, and initiatives follow. Parents, policy makers, school administrators, and teachers should continue to investigate ways to increase parental involvement in mathematics education of their children to improve the children’s academic performance as well as their cognitive competence. Of course teachers and parents are the most influential in children’s education, but their responsibilities are different. Australian teachers could focus on providing variety in the tasks and choosing illustrative examples in their lesson plans to keep students attentive in class (Sullivan, 2011) while parents could motivate and support their children at home to achieve academic success.

Usually, parents convey their perceptions about education by being involved with their children during out-of-school hours. This involvement consists of several actions, which may positively or negatively contribute to the mathematics achievement of children. Parental encouragement and home discussion can motivate children and positively affect the parent–child relationship in mathematics achievement. Parental involvement in homework and the provision of private tutoring can result in positive outcomes if children are happy to have such support. In this study, about 50% of the children had tutors to provide support in mathematics. This needs attention of the policy makers and the school community because it seemed that half of the participated parents were not satisfied with the mathematics teaching at schools. It may be mainly the teachers’ responsibility but all

the stakeholders including parents have to make sure that the school is the major place where learning happens. Further, even though setting up family rules, perceived parental control, and digital deprivation are useful to control children, parents should know their limits to avoid the possible negative outcomes of excessive involvement in children's mathematics education. The overall benefits of parental involvement when taken as a whole, however, have been substantial enough to influence public policy.

It is also important to note the comparisons of the demographic factors in this study. There were differences in home discussion, provision of private tutoring, and parental control between the two cultural groups. However, it appeared that these differences had the tendency to diminish with acculturation. Hence, cultural differences of migrants within a country seem to appear only temporarily and will not necessarily continue from one generation to the next. This implies that parental involvement is more important than culture in academic achievement of children. Further, the findings showed that gender is not a barrier for mathematics achievement. Also, it was found that parental involvement seemed to reduce across secondary year levels due to autonomy grant and inability to provide support with higher level mathematics.

Therefore, future policy, educational reforms, and initiatives should focus on developing and promoting in-school and out-of-school programs that enable parents to become more involved and spend more time with their offspring, motivating and supporting them to improve their academic achievement. Even though some parental control is necessary, it is advisable for parents to bear in mind the need to provide support in developing autonomy to their adolescent children, at least to an appropriate level.

9.8 Suggestions for future research

Even though this study has many interesting findings to contribute to the literature, there are features that limit the generalisability of these findings. Despite the limitations of this study, I wish to make several suggestions in several directions for future research. Firstly, it is important to collect at least one hundred responses of children from each of the six year levels from Year 7 to Year 12. In total, at least 600 children and 600 of their parents need to be involved in a future study so that the analyses may provide more accurate results. Secondly, future research needs clear definitions of demographics, especially regarding culture, to select more groups for comparison (e.g., East Asian–Australian, South Asian–Australian, African-Australian, and European–Australian) and for year level, to include lower, middle, and upper primary and secondary groups. Thirdly, it is advisable to keep track of parent–child dyads, even for quantitative data, as it helps to relate the study to other existing theories. Fourthly, it is important to take into account the number of years participants had lived in Australia. Grouping participants accordingly may be another aspect that needs attention. In this case, a longitudinal study may be an appropriate option rather than this cross-sectional study. Finally, a future study would need to represent the country as a whole including metropolitan and country schools as well as public, private, and independent schools when inviting participants. This inclusion should facilitate analyses according to socioeconomic status, parents' education level, and parental engagement in schools.

Further, in order to demonstrate the robustness and generalisability of findings, it is advisable to replicate the study with larger samples from all states in Australia and also preferably from other countries to improve this research to the level of an international comparative study.

9.9 Conclusion

The aim of the present research was to examine parents' perceptions and their involvement in the mathematics education and achievement of their children. Several decades of research have demonstrated that parental involvement in children's achievement is associated with a variety of positive and negative academic and motivational outcomes. Yet, there is no universal pattern of parent involvement that results in higher achievement, nor do all forms of involvement enhance learning outcomes (Jeynes, 2011; Pomerantz et al., 2007). It is argued as well that parents' involvement may matter more for some children than for others. The findings of this research provide insights on how parental involvement can make a difference and why excessive involvement of parents is not always better for children. This study has been able to confirm that children are differentially responsive to how parents become involved and the benefits of such involvement depend on what children themselves bring to their interactions with parents. Importantly, higher parental perceptions can cause higher children's perceptions regarding academic attainment and it is a two-way relationship. A similar relation exists between parental motivation and children's achievement too.

At least to my knowledge, no study has explored parental involvement as parental daily actions at home to help their children achieve academic success. While parental encouragement and home discussion are important for academic achievement, homework involvement and provision of private tutoring may have mixed effects depending on how a child feels about and makes use of such support. Nevertheless, an appropriate level of parental control is desirable. The present study addressed several limitations to prior research that examined parental perceptions, parental involvement, and children's academic achievement. These were accomplished by conceptualising parental involvement

as a multidimensional construct, which consists of parental actions facilitating motivation, support, and control in order to improve the academic performance of children. However, it was an onerous task to attempt to categorise parental involvement as positive or negative outcomes because even a positive parental action can be inverted to a negative pressure if there are no limitations to the activity. Hence, parents need to be mindful of becoming involved with their children's education to an appropriate level only.

This research study has integrated and extended theory, adding to the body of knowledge in the field of mathematics education, providing information that can be used by parents, teachers, students, and administrators. The study methodology may be applied to study the demographics of parent–child relationship in academic achievement. The current study investigated demographics such as culture, gender, and the year level of children and found several discrepancies in parental involvement and children's perceptions in mathematics education. The findings fill important gaps in the literature by clarifying many under-researched links between parental involvement and academic achievement in the context of the mathematics education of Australian secondary school students.

The present study extends prior work on parental involvement by examining cultural differences among Asian–Australian and European–Australian parents and children. For example, communication with their children was higher among European–Australian parents than Asian–Australian parents. While according to parents there was no difference in parental encouragement and homework involvement between cultures, home discussion, provision of private tutoring, and parental control showed differences, but children revealed differences in provision of private tutoring and parental control only. Accordingly, both parents and children reported that the provision of private tutoring and the three parental control factors, family rules, perceived parental control, and digital

deprivation, differed between the two cultural groups. The similarities between ethnic groups can be explained by the process of acculturation as explained by Sue and Okazaki (1990). One of the commonly offered explanations of the differences is based on people from different ethnic backgrounds having different perceptions regarding the parental role in children's education (Wilder, 2014). In this study, more Asian–Australian parents chose tutoring as a support for their children than European–Australian parents did and overall, 50% of the participated parents provided supplementary education for their children. Importantly, the study found that the most of the higher achievers did not require tutors' help.

Even though gender differences were not significant, there was an exception according to parents' views. They reported gender differences in children's perceptions in homework involvement. Another exception according to children's views was parental control of male children differed from that applied to female children. Parental perceptions in motivation, support, and control across secondary year levels were found to differ. A possible reason can be that parents support the development of their child's autonomy, which causes parental involvement to decline across year levels (Hoover-Dempsey et al., 2005; Patall et al., 2008). The current study found the year levels where these differences lay but a larger sample is needed to generalise the findings.

In this study, positive and negative impacts of parental involvement on the academic outcomes of children and the limitations have been identified. Additionally, by defining parental actions as parental involvement and with the use of the conceptual framework, I believe that the present study has advanced the research on parental involvement in education to a next level.

By inviting children's own accounts of their everyday lives and also combining these with adult accounts of children's lives, this study has shed some light on other findings through a conceptual understanding and methodological contribution to the field of parental involvement in children's mathematics achievement. Further, the thesis makes an important contribution to the literature by demonstrating that key features of involvement are parental actions such as motivating children in learning, supporting their academic success, and controlling children appropriately. Hence, parents are active participants rather than passive observers in children's education. Further, the cultural differences between the two groups appear to narrow down with acculturation. Hence, in mathematics education within a multicultural society, parental involvement seems more important than trying to uplift the diminishing cultural values of migrants, to achieve academic success of children. Overall, the findings provide solid empirical support for the conclusion that each aspect of parental involvement is closely related to parents' perceptions in mathematics education and needs to be appropriately used to enlighten children's perceptions in academic accomplishments.

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Appendices

Appendix A – Surveys

A.1 Questionnaire for parents

There are three sections in this questionnaire. Please consider all the following questions in relation to the mathematics education of one of your children **at secondary school level**.

We ask you to respond to all the questions you feel comfortable answering.

There are no right or wrong answers and **we assure you that your responses to this survey will be kept confidential.**

Section 1

For **each** statement **please tick only one response** to indicate the most relevant option ranging from **Strongly agree** to **Strongly disagree**.

(A). The following statements describe your attitudes, beliefs, and expectations in relation to the mathematics education of your child.

No	Statements	Strongly agree	Agree	Disagree	Strongly disagree
	Example: My child is good at school work.	✓①	②	③	④
1.	My child puts all his/her effort into school-related tasks.	①	②	③	④
2.	My child can get better marks if he/she tries harder.	①	②	③	④
3.	My child appreciates my feedback about his/her work.	①	②	③	④
4.	I care more about my child's learning skills than the marks for subjects.	①	②	③	④
5.	My child appreciates it when I get involved in his/her education.	①	②	③	④
6.	My child never copies answers from his/her friends.	①	②	③	④
7.	My child asks for help from the teacher whenever he/she requires.	①	②	③	④
8.	Mathematics is one of the favourite subjects of my child.	①	②	③	④
9.	For me, learning secondary mathematics is a waste of time.	①	②	③	④
10.	I make sure that my child spends enough time on studies after school.	①	②	③	④
11.	I assume my child is doing all right when I don't hear anything from the school.	①	②	③	④
12.	My child's learning is mainly up to the teacher and my child.	①	②	③	④
13.	I expect my child to spend more time on mathematics than other subjects.	①	②	③	④
14.	It's important that I let the teacher know about things that concern my child.	①	②	③	④

No	Statements	Strongly agree	Agree	Disagree	Strongly disagree
15.	Parent-teacher interviews are very important to get to know about my child's education.	①	②	③	④
16.	This school does a good job of letting me know about ways I can help out in school.	①	②	③	④
17.	I do not get involved in my child's school because my child does not like it.	①	②	③	④
18.	I check to ensure that my child's homework gets done.	①	②	③	④
19.	I talk to my child about what he/she is learning at school every day.	①	②	③	④
20.	I make my child do his/her homework again if I think it is not done well enough.	①	②	③	④
21.	My child never shows me his/her homework.	①	②	③	④
22.	I am too busy and I have no time to help my child with his/her homework.	①	②	③	④
23.	My child asks me for help with homework.	①	②	③	④
24.	I help my child with schoolwork if he/she asks.	①	②	③	④
25.	I spend time just talking to my child.	①	②	③	④

(B). The following statements describe your ability to help and support in mathematics education of your child.

No	Statements	Strongly agree	Agree	Disagree	Strongly disagree
1.	A student's motivation to do well in school depends on the parents.	①	②	③	④
2.	I am confident that I can motivate my child to try hard in school.	①	②	③	④
3.	I reward my child for good marks for end of semester reports.	①	②	③	④
4.	I usually keep the house quiet when my child is doing homework.	①	②	③	④
5.	I let my child engage in activities that are educational outside the home.	①	②	③	④
6.	I am primarily responsible for making sure that my child is supported to do his/her best in school.	①	②	③	④
7.	I want to employ a tutor to help my child in mathematics.	①	②	③	④
8.	My child asks to employ a tutor for him/her to help in mathematics.	①	②	③	④
9.	I prefer to have a tutor who can prepare my child for examinations.	①	②	③	④
10.	Learning from school is not enough to achieve outstanding results.	①	②	③	④

No	Statements	Strongly agree	Agree	Disagree	Strongly disagree
11.	I can help my child when he/she has difficulty understanding mathematics.	①	②	③	④
12.	I am confident about my ability to make choices regarding my child's schooling.	①	②	③	④
13.	I don't know how to help my child make good grades in school.	①	②	③	④
14.	I have enough income to support my child's education.	①	②	③	④

(C). The following statements describe your family rules, your child's access to resources and the way you monitor your child's activities.

No	Statements	Strongly agree	Agree	Disagree	Strongly disagree
1.	At home my child always listens to music while he/she is doing homework.	①	②	③	④
2.	I allow my child to use Internet or mobile phone only after finishing homework.	①	②	③	④
3.	My child is allowed to chat with his/her friends online anytime he/she wants.	①	②	③	④
4.	My child can use the Internet only with permission from a parent.	①	②	③	④
5.	My child has a timetable to do his/her homework every day.	①	②	③	④
6.	My child likes to do his/her homework while watching TV.	①	②	③	④
7.	My child usually watches television before doing his/her homework.	①	②	③	④
8.	I limit what my child watches on television.	①	②	③	④
9.	While my child is doing homework he/she often texts, tweets, chats on-line or talks to friends.	①	②	③	④
10.	My child can go to bed on school nights only after finishing homework.	①	②	③	④
11.	After finishing homework my child must study at least one more hour every day.	①	②	③	④
12.	My child has an email account or face book account.	①	②	③	④
13.	I keep an eye on my child's progress with school work.	①	②	③	④
14.	I allow my child to go out or sleep over with his/her friends.	①	②	③	④
15.	My child must come home directly after school on any school day.	①	②	③	④
16.	I do not allow my child to stay out with his/her friends till late.	①	②	③	④
17.	I often listen to my child's side of an argument.	①	②	③	④

No	Statements	Strongly agree	Agree	Disagree	Strongly disagree
18.	I allow my child to make decisions about his/her education.	①	②	③	④
19.	In my house my child has a voice in making rules that concern him/her.	①	②	③	④
20.	I have no influence on my child's high school plans.	①	②	③	④
21.	I believe that parents should make the decisions in a family.	①	②	③	④
22.	My child and I together make choices about my child's schooling.	①	②	③	④

Please write down in the space provided if you have anything more to add or any other concerns about your involvement in mathematics education of your child?

Section 2

(D). This section presents scenarios that you and your child may encounter in school or at home. Please tick only one answer from the list provided.

Q1. What percentage of marks does your child get on average in mathematics?

- ☐ 0 - 49
- ☐ 50 - 59
- ☐ 60 - 69
- ☐ 70 - 79
- ☐ 80 - 89
- ☐ 90 - 100

Q2. What is your hope for your child in mathematics?

- ☐ 0 - 49
- ☐ 50 - 59
- ☐ 60 - 69
- ☐ 70 - 79
- ☐ 80 - 89
- ☐ 90 - 100

Q3. How often do you check your child's mathematics work?

- ☐ Never
- ☐ 2-3 Times a Year
- ☐ Once a Month
- ☐ 2-3 Times a Month
- ☐ Once a Week
- ☐ 2-3 Times a Week
- ☐ Daily

Q4. How often do you discuss with your child about the performance in mathematics?

- ☐ Never
- ☐ 2-3 Times a Year
- ☐ Once a Month
- ☐ 2-3 Times a Month
- ☐ Once a Week
- ☐ 2-3 Times a Week
- ☐ Daily

Q5. What level in class do you expect your child to be?

- ☐ The best student
- ☐ One of the best students
- ☐ A good student
- ☐ An average student
- ☐ No matter what level he/she is, I want him/her to be happy
- ☐ Any level he/she is able to be

Q6. Does your child learn mathematics from a tutor?

- ☐ Yes
- ☐ No

If the answer is Yes, go to Q7 and if the answer is No, go to Q8.

Q7. Your child has a tutor to provide extra support in mathematics because (*please tick all the relevant answers*)

- ☐ you are too busy to help him/her.
- ☐ you cannot remember your mathematics.
- ☐ it is difficult to teach one's own child.
- ☐ you want your child to do well in class.
- ☐ your child has to compete with students who have tutors.
- ☐ learning from school is not enough to achieve good results.
- ☐ your child requested you to provide services of a tutor.

Q8. Your child hasn't a tutor to provide extra support in mathematics because (*please tick all the relevant answers*)

- ☐ your child is doing well and doesn't need a tutor.
- ☐ you can help your child without a tutor.
- ☐ your child prefers to learn from you.
- ☐ you cannot afford to pay a tutor.
- ☐ your child refuses to have a tutor.
- ☐ your child doesn't like mathematics.
- ☐ learning from school is enough for a child.

Please write down in the space provided if you have anything more to add or any other concerns about tutoring?

Section 3

(E). This final section is designed to obtain brief information regarding your family background. The information gathered from this questionnaire will be strictly confidential and used for the purposes of this research only. Please tick only one answer to the following questions.

Q1. What is your relationship to the child?

- ☐ Father
- ☐ Mother
- ☐ Other - (please specify) _____

Q2. At home, who is the most influential person in your child's mathematics education?

- ☐ You
- ☐ Your spouse
- ☐ Other - (please specify) _____

Q3. What is the gender of your child?

- ☐ Male
- ☐ Female

Q4. What is the year level of your child?

- ☐ Year 7
- ☐ Year 8
- ☐ Year 9
- ☐ Year 10
- ☐ Year 11
- ☐ Year 12

Q5. What is your ethnic background?

- ☐ European-Australian
- ☐ Asian-Australian
- ☐ Other - (please specify)_____

Q6. What is the language your child speaks at home?

- ☐ English
- ☐ Sinhala
- ☐ Other (please specify) _____

Q7. What is your highest education level?

- ☐ Primary school
- ☐ Secondary school
- ☐ Vocational studies
- ☐ University

Q8. What is your spouse's highest education level?


- ☐ Not applicable
- ☐ Primary school
- ☐ Secondary school
- ☐ Vocational studies
- ☐ University

Q9. What is the highest level of study you expect your child to reach and what do you want him/her to do in future?

Q10. What is the highest level of study your child is likely to reach and what is he/she likely to do in future?

Please insert your email or contact telephone number if you are happy to participate in an interview in relation to this study.

(Your confidentiality and privacy will be maintained at all times. Reports of the project may be published in professional journals and in other publications. No publication will identify the name or any other aspect that will identify the participant. Data will be stored at Monash University, Clayton in locked cabinets for five years and then data will be destroyed.)

 ***Thank you very much for your co-operation
in completing this questionnaire!***

A.2 Questionnaire for children

There are three sections in this questionnaire. Please consider all the following questions in relation to your mathematics education. We ask you to respond to all the questions you feel comfortable answering.

There are no right or wrong answers and **we assure you that your responses to this survey will be kept confidential.**

Section 1

For **each** statement **please tick only one response** to indicate the most relevant option ranging from **Strongly agree** to **Strongly disagree**.

(A). The following statements describe your parents' attitudes, beliefs, and expectations in relation to your mathematics education.

No	Statements	Strongly agree	Agree	Disagree	Strongly disagree
	Example: My parents believe that I am good at school work.	✓①	②	③	④
1.	My parents believe I put all my effort into school-related tasks.	①	②	③	④
2.	My parents believe I can get better marks if I try harder.	①	②	③	④
3.	I appreciate my parents' feedback about my work.	①	②	③	④
4.	My parents care more about my learning skills than the marks for subjects.	①	②	③	④
5.	I appreciate it when my parents get involved in my education.	①	②	③	④
6.	I never copy answers from my friends.	①	②	③	④
7.	I ask for help from the teacher whenever I require.	①	②	③	④
8.	Mathematics is one of my favourite subjects.	①	②	③	④
9.	My parents think, learning secondary mathematics is a waste of time.	①	②	③	④
10.	My parents make sure that I spend enough time on studies after school.	①	②	③	④
11.	My parents assume I am doing all right when they don't hear anything from the school.	①	②	③	④
12.	My parents believe my learning is mainly up to the teacher and me.	①	②	③	④
13.	My parents expect me to spend more time on mathematics than other subjects.	①	②	③	④
14.	It's important that my parents let the teacher know about things that concern me.	①	②	③	④

No	Statements	Strongly agree	Agree	Disagree	Strongly disagree
15.	Parent-teacher interviews are very important to my parents to get to know about my education.	①	②	③	④
16.	This school does a good job of letting my parents know about ways they can help out in school.	①	②	③	④
17.	My parents do not get involved in my school because I do not like it.	①	②	③	④
18.	My parents check to ensure that my homework gets done.	①	②	③	④
19.	My parents talk to me about what I am learning at school every day.	①	②	③	④
20.	My parents make me do my homework again if they think it is not done well enough.	①	②	③	④
21.	I never show my homework to my parents.	①	②	③	④
22.	My parents are too busy and they have no time to help me with my homework.	①	②	③	④
23.	I ask my parents for help with homework.	①	②	③	④
24.	My parents help me with schoolwork if I ask.	①	②	③	④
25.	My parents spend time just talking to me.	①	②	③	④

(B). The following statements describe your parents' ability to help and support in your mathematics education.

No	Statements	Strongly agree	Agree	Disagree	Strongly disagree
1.	A student's motivation to do well in school depends on his/her parents.	①	②	③	④
2.	I am confident that my parents can motivate me to try hard in school.	①	②	③	④
3.	My parents reward me for good marks for end of semester reports.	①	②	③	④
4.	My parents usually keep the house quiet when I am doing homework.	①	②	③	④
5.	My parents let me engage in activities that are educational outside the home.	①	②	③	④
6.	My parents are primarily responsible for making sure that I am supported to do my best in school.	①	②	③	④
7.	My parents want to employ a tutor to help me in mathematics.	①	②	③	④
8.	I ask my parents to employ a tutor for me to help in mathematics.	①	②	③	④
9.	My parents prefer to have a tutor who can prepare me for examinations.	①	②	③	④
10.	Learning from school is not enough to achieve outstanding results.	①	②	③	④

No	Statements	Strongly agree	Agree	Disagree	Strongly disagree
11.	My parents can help me when I have difficulty understanding mathematics.	①	②	③	④
12.	My parents are confident about their ability to make choices regarding my schooling.	①	②	③	④
13.	My parents don't know how to help me make good grades in school.	①	②	③	④
14.	My parents have enough income to support my education.	①	②	③	④

(C). The following statements describe your family rules, your access to resources and the way your parents monitor your activities.

No	Statements	Strongly agree	Agree	Disagree	Strongly disagree
1.	At home I always listen to music while I am doing homework.	①	②	③	④
2.	My parents allow me to use Internet or mobile phone after finishing homework.	①	②	③	④
3.	I am allowed to chat with my friends online anytime I want.	①	②	③	④
4.	I can use the Internet only with permission from a parent.	①	②	③	④
5.	I have a timetable to do my homework every day.	①	②	③	④
6.	I like to do my homework while watching TV.	①	②	③	④
7.	I usually watch television before doing my homework.	①	②	③	④
8.	My parents limit what I can watch on television.	①	②	③	④
9.	While I am doing homework I often text, tweet, chat on-line or talk to friends.	①	②	③	④
10.	I can go to bed on school nights only after finishing homework.	①	②	③	④
11.	After finishing homework I must study at least one more hour every day.	①	②	③	④
12.	I have an email account or face book account.	①	②	③	④
13.	My parents keep an eye on my progress with school work.	①	②	③	④
14.	My parents allow me to go out or sleep over with my friends.	①	②	③	④
15.	I must come home directly after school on any school day.	①	②	③	④
16.	My parents do not allow me to stay out with my friends till late.	①	②	③	④
17.	My parents often listen to my side of an argument.	①	②	③	④

No	Statements	Strongly agree	Agree	Disagree	Strongly disagree
18.	My parents allow me to make decisions about my education.	①	②	③	④
19.	In my house I have a voice in making rules that concern me.	①	②	③	④
20.	My parents have no influence on my high school plans.	①	②	③	④
21.	I believe that parents should make the decisions in a family.	①	②	③	④
22.	I and my parents together make choices about my schooling.	①	②	③	④

Please write down in the space provided if you have anything more to add or any other concerns about your parents' involvement in your mathematics education?

Section 2

(D). This section presents scenarios that you and your parents may encounter in school or at home. Please tick only one answer from the list provided.

Q1. What percentage of marks do you get on average in mathematics?

- ☐ 0 - 49
- ☐ 50 - 59
- ☐ 60 - 69
- ☐ 70 - 79
- ☐ 80 - 89
- ☐ 90 - 100

Q2. What is your parents' hope for you in mathematics?

- ☐ 0 - 49
- ☐ 50 - 59
- ☐ 60 - 69
- ☐ 70 - 79
- ☐ 80 - 89
- ☐ 90 - 100

Q3. How often do your parents check your mathematics work?

- ☐ Never
- ☐ 2-3 Times a Year
- ☐ Once a Month
- ☐ 2-3 Times a Month
- ☐ Once a Week
- ☐ 2-3 Times a Week
- ☐ Daily

Q4. How often do your parents discuss with you about the performance in mathematics?

- ☐ Never
- ☐ 2-3 Times a Year
- ☐ Once a Month
- ☐ 2-3 Times a Month
- ☐ Once a Week
- ☐ 2-3 Times a Week
- ☐ Daily

Q5. What level in class do your parents expect you to be?

- ☐ The best student
- ☐ One of the best students
- ☐ A good student
- ☐ An average student
- ☐ No matter what level I am, they want me to be happy
- ☐ Any level I am able to be

Q6. Do you learn mathematics from a tutor?

- ☐ Yes
- ☐ No

If the answer is Yes, go to Q7 and if the answer is No, go to Q8.

Q7. You have a tutor to provide extra support in mathematics because

- ☐ your parents are too busy to help you
- ☐ your parents cannot remember their mathematics
- ☐ your parents find it difficult to teach you
- ☐ your parents want you to do well in class
- ☐ you have to compete with students who have tutors
- ☐ learning from school is not enough to achieve good results
- ☐ you requested your parents to provide services of a tutor

Q8. You haven't a tutor to provide extra support in mathematics because

- ☐ you are doing well and don't need a tutor
- ☐ your parents can help you without a tutor
- ☐ you prefer to learn from your parents
- ☐ your parents cannot afford to pay a tutor
- ☐ you refuse to have a tutor
- ☐ you don't like mathematics
- ☐ learning from school is enough for you

Please write down in the space provided if you have anything more to add or any other concerns about tutoring?

Section 3

(E). This final section is designed to obtain brief information regarding your family background. The information gathered from this questionnaire will be strictly confidential and used for the purposes of this research only. Please tick only one answer to the following questions.

Q1. At home, who is the most influential person in your mathematics education?

- ☐ Father
- ☐ Mother
- ☐ Both father and mother equally
- ☐ Other – (Please specify) _____

Q2. In section 1 & 2, who did you consider as your parents?

- ☐ Both father and mother
- ☐ Father only
- ☐ Mother only
- ☐ Father and step-mother
- ☐ Mother and step-father
- ☐ Other: (please specify)_____

Q3. What is the year level you study?

- ☐ Year 7
- ☐ Year 8
- ☐ Year 9
- ☐ Year 10
- ☐ Year 11
- ☐ Year 12

Q4. What is your gender?

- ☐ Male
- ☐ Female

Q5. What is your ethnic background?

- ☐ European-Australian
- ☐ Sri Lankan-Australian
- ☐ Other - (please specify)_____

Q6. What is the language you speak at home?

- ☐ English
- ☐ Sinhala
- ☐ Other (please specify) _____

Q7. What is your mother's highest education level?

- ☐ Not applicable
- ☐ Primary school
- ☐ Secondary school
- ☐ Vocational studies
- ☐ University

Q8. What is your father's highest education level?


- ☐ Not applicable
- ☐ Primary school
- ☐ Secondary school
- ☐ Vocational studies
- ☐ University

Q9. What is the highest level of study your parents expect you to reach?

Q10. What is the highest level of study you are likely to reach?

Please insert your email or contact telephone number if you are happy to participate in an interview in relation to this study.

(Your confidentiality and privacy will be maintained at all times. Reports of the project may be published in professional journals and in other publications. No publication will identify the name or any other aspect that will identify the participant. Data will be stored at Monash University, Clayton in locked cabinets for five years and then data will be destroyed.)

 ***Thank you very much for your co-operation
in completing this questionnaire!***

Appendix B – Interview questions

B.1 Interview questions for parents

1. One of your friends says that parents must help their children for homework. What are your views about this? What are your rules about your child's mathematics homework?
2. "Parents are responsible for selecting courses and career pathways for their children. They know a lot more than children. Children simply need to follow parents' instructions".
Why do you agree or disagree?
3. Even though your nephew puts a lot of effort on mathematics learning, the child cannot achieve good results. What advice do you have for your nephew? How important is mathematics in your opinion?
4. How does your child spend his/her after school hours and weekends? How often does your child go out with his/her friends or go for a sleep over? If your child asks for permission to go out or sleep over what could be your response and what are your rules?
5. How often do you check your child's maths workbook or homework? What would you do if your child is or is not up-to-date?
6. If your child says mathematics examinations are hard or if your child gets low marks, what would you do and why do you think it is the solution?
7. Having a tutor may be helpful to overcome difficulties in mathematics. A tutor can help your child with the homework. If your child or you decide to have a tutor what are your expectations and how do you select one of them? If you decide not to have a tutor what are your reasons?
8. Your neighbour says, "I never get involved in my child's education". What is your opinion about this?
9. What are your future expectations about your child? What do you expect your child to do when he/she finishes school?
10. What job or career does your child expect to have? What are your child's reasons for his/her decision?

B.2 Interview questions for children

1. One of your friends says that parents must help their children for homework. What are your views about this? What are your parents' rules about mathematics homework?
2. Parents are responsible for selecting courses and career pathways for their children. They know a lot more than children. Children simply need to follow their parents' instructions.
Why do you agree or disagree?
3. Even though your cousin puts a lot of effort on mathematics learning, he/she cannot achieve good results. What advice do you have for your cousin? How important is mathematics in your opinion?
4. How do you spend your after school hours and weekends? How often do you go out with your friends or go for a sleep over? How do you seek permission from your parents to go out or to go for a sleep over? What could be their response and what are their rules?
5. How often do your parents check your mathematics workbook or homework? What would they do if you are up-to-date or not?
6. If you say mathematics examinations are hard or if you get low marks, what would your parents do? Why do you think it is the right solution or not?
7. Having a tutor may be helpful to overcome difficulties in mathematics. A tutor can help you with the homework. If you or your parents decide to have a tutor what are your expectations and how do you select one of them? If you decide not to have a tutor what are your reasons?
8. Your friend says, "I hate when parents get involved in my education". What is your opinion about this?
9. What are your parents' future expectations about you? What do they expect you to do when you finish school?
10. What job or career do you expect to do after finishing school? What are your reasons for this decision?

Appendix C – Ethics approval and consent forms



Department of Education and Early Childhood Development

Strategy and Review Group

2 Treasury Place
East Melbourne, Victoria 3002
Telephone: +61 3 9637 2000
DX 210083
GPO Box 4367
Melbourne, Victoria 3001

2014_002405

Mr Daya Werrasinghe
Monash University
Education Department
Wellington Road
CLAYTON VIC 3800

Dear Mr Werrasinghe

Thank you for your application of 28 May 2014 in which you request permission to conduct research in Victorian government schools and/or early childhood settings titled *Parental involvement in mathematics education of their children*.

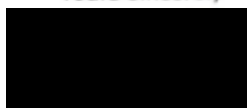
I am pleased to advise that on the basis of the information you have provided your research proposal is approved in principle subject to the conditions detailed below.

1. The research is conducted in accordance with the final documentation you provided to the Department of Education and Early Childhood Development.
2. Separate approval for the research needs to be sought from school principals and/or centre directors. This is to be supported by the DEECD approved documentation and, if applicable, the letter of approval from a relevant and formally constituted Human Research Ethics Committee.
3. The project is commenced within 12 months of this approval letter and any extensions or variations to your study, including those requested by an ethics committee must be submitted to the Department of Education and Early Childhood Development for its consideration before you proceed.
4. As a matter of courtesy, you advise the relevant Regional Director of the schools or governing body of the early childhood settings that you intend to approach. An outline of your research and a copy of this letter should be provided to the Regional Director or governing body.
5. You acknowledge the support of the Department of Education and Early Childhood Development in any publications arising from the research.
6. The Research Agreement conditions, which include the reporting requirements at the conclusion of your study, are upheld. A reminder will be sent for reports not submitted by the study's indicative completion date.
7. If DEECD has commissioned you to undertake this research, the responsible Branch/Division will need to approve any material you provide for publication on the Department's Research Register.



I wish you well with your research study. Should you have further enquiries on this matter, please contact Youla Michaels, Project Support Officer, Research, Evaluation and Analytics Branch, by telephone on (03) 9637 2707 or by email at michaels.youla.y@edumail.vic.gov.au.

Yours sincerely



Joyce Cleary
Director
Research, Evaluation and Analytics Branch

17/07/2014

enc



Monash University Human Research Ethics Committee(MUHREC)

Research Office

Human Ethics Certificate of Approval

This is to certify that the project below was considered by the Monash University Human Research Ethics Committee. The Committee was satisfied that the proposal meets the requirements of the *National Statement on Ethical Conduct in Human Research* and has granted approval.

Project Number: CF14/1306 - 2014000603

Project Title: Parental Involvement in Mathematics Education of their Children

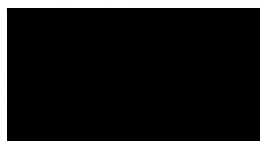
Chief Investigator: Prof Peter Sullivan

Approved: **From:** 27 May 2014

To: 27 May 2019

Terms of approval - Failure to comply with the terms below is in breach of your approval and the Australian Code for the Responsible Conduct of Research.

1. The Chief investigator is responsible for ensuring that permission letters are obtained, if relevant, before any data collection can occur at the specified organisation.
2. Approval is only valid whilst you hold a position at Monash University.
3. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval and to ensure the project is conducted as approved by MUHREC.
4. You should notify MUHREC immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
5. The Explanatory Statement must be on Monash University letterhead and the Monash University complaints clause must include your project number.
6. **Amendments to the approved project (including changes in personnel):** Require the submission of a Request for Amendment form to MUHREC and must not begin without written approval from MUHREC. Substantial variations may require a new application.
7. **Future correspondence:** Please quote the project number and project title above in any further correspondence.
8. **Annual reports:** Continued approval of this project is dependent on the submission of an Annual Report. This is determined by the date of your letter of approval.
9. **Final report:** A Final Report should be provided at the conclusion of the project. MUHREC should be notified if the project is discontinued before the expected date of completion.
10. **Monitoring:** Projects may be subject to an audit or any other form of monitoring by MUHREC at any time.
11. **Retention and storage of data:** The Chief Investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.



Professor Nip Thomson
Chair, MUHREC

cc: Assoc Prof Debra Panizzon, Mr Daya Weerasinghe

Postal – Monash University, Vic 3800, Australia
Building 3E, Room 111, Clayton Campus, Wellington Road, Clayton
Telephone +61 3 9905 5490 Facsimile +61 3 9905 3831
Email muhrec@monash.edu <http://www.monash.edu.au/researchoffice/human/>
ABN 12 377 614 012 CRICOS Provider #00008C

Principal/Educator Consent Form

Project title: *Parental involvement in mathematics education of their children*

Researcher contact details:

Peter Sullivan
 Professor of Science, Mathematics and Technology Education
 Monash University, Clayton 3800, Victoria, Australia

DEECD Ref No: 2014_002405

MUHREC Ref No: CF14/1306 - 2014000603

I have read and understood the information sheet provided by the researcher about this activity, and any questions I have asked have been answered to my satisfaction. I have indicated below my agreement to grant permission to data collection. I understand that I will have an opportunity to view any recordings and that I will have the right to veto some or all of that material. I agree to allow my students and their parents to participate in this project, realizing that I may withdraw at any time, without prejudice.

	Yes	No
Survey		
Individual interview including audio recording		

Copies of the information sheet for this project and this form have been provided to me to keep.

Name of School/Work Place

.....

Name of Principal/Educator

.....

Signature

.....

Date

.....

Parent /Guardian of a School Aged Child Consent Form

Project title: *Parental involvement in mathematics education of their children*

Researcher contact details:

Peter Sullivan
Professor of Science, Mathematics and Technology Education
Monash University, Clayton 3800, Victoria, Australia

[REDACTED]
[REDACTED]

DEECD Ref No: 2014_002405

MUHREC Ref No: CF14/1306 - 2014000603

I have read and understood the information sheet provided by the researcher about this activity, and any questions I have asked have been answered to my satisfaction. I agree to complete online survey, or to participate in individual interview, which may be audio recorded. I understand that my statements will be confidential and my anonymity will be maintained. I also understand that I will have an opportunity to view any recordings and that I will have the right to veto some or all of that material.

Please indicate your consent to be involved in the study by ticking the boxes below

	YES	NO
Survey		
Individual interview with audio recording		

I agree to participate in this project, realizing that I may withdraw at any time, without prejudice.

A copy of the information sheet for this project has been provided to me to keep.

STUDENT NAME:	
STUDENT CLASS:	
SCHOOL NAME:	
PARENT/GUARDIAN NAME:	
PARENT/GUARDIAN SIGNATURE:	
DATE:	

School Aged Child Consent Form

Project title: *Parental involvement in mathematics education of their children*

Researcher contact details:

Peter Sullivan
Professor of Science, Mathematics and Technology Education
Monash University, Clayton 3800, Victoria, Australia

[REDACTED]
[REDACTED]

DEECD Ref No: 2014_002405

MUHREC Ref No: CF14/1306 – 2014000603

I have read and understood the information sheet provided by the researcher about this activity, and any questions I have asked have been answered to my satisfaction. I agree to complete online survey, or to participate in individual interview, which may be audio recorded. I understand that my statements will be confidential and my anonymity will be maintained. I also understand that I will have an opportunity to view any recordings and that I will have the right to veto some or all of that material.

Please indicate your consent to be involved in the study by ticking the boxes below

	YES	NO
Survey		
Individual interview with audio recording		

I agree to participate in this project, realizing that I may withdraw at any time, without prejudice.

A copy of the information sheet for this project has been provided to me to keep.

STUDENT NAME:	
STUDENT CLASS:	
SCHOOL NAME:	
STUDENT SIGNATURE:	
DATE:	

Appendix D – Correlations between items

Parental encouragement

Table D.1

Correlations Among Items Related to Parental Encouragement

	A3	A5	A17	A19	A24	A25	B2	B3	B4	B5	C17	C18	C19	C22
A3	-													
A5	.606**	-												
A17	-.363**	-.528**	-											
A19	.361**	.345**	-.202	-										
A24	.135	.264*	-.227*	.277*	-									
A25	.141	.116	-.183	.376**	.424**	-								
B2	.420**	.558**	-.347**	.197	.009	.043	-							
B3	.092	.181	-.304**	.156	.045	.016	.199	-						
B4	.128	.136	-.147	-.015	.045	-.173	.220*	.231*	-					
B5	.277*	.247*	-.061	.160	.348**	.344**	.237*	.217*	.108	-				
C17	.141	.220*	-.145	.171	.417**	.403**	.256*	-.037	-.081	.286**	-			
C18	.120	.127	.037	.031	.106	.195	.124	.002	-.066	.173	.464**	-		
C19	.132	.268*	-.145	.134	.209	.277*	.142	.059	.050	.158	.518**	.634**	-	
C22	.237*	.300**	-.229*	.255*	.228*	.431**	.292**	.168	.022	.211	.493**	.478**	.554**	-

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Family rules

Table D.2

Correlations Among Items Related to Family Rules

	A10	A18	A20	C2	C3	C4	C5	C10	C11	C14	C15	C16	C19	C22
A10	-													
A18	.272*	-												
A20	.063	.537**	-											
C2	.375**	.279**	.386**	-										
C3	-.323**	-.302**	-.291**	-.366**	-									
C4	.354**	.205	.390**	.493**	-.408**	-								
C5	.213	.267*	.189	.200	-.209	.121	-							
C10	.102	.185	.208	.195	-.072	.297**	.203	-						
C11	.124	-.120	-.099	.099	.156	.045	.155	.275*	-					
C14	-.137	.101	-.152	-.083	.341**	-.248*	-.114	-.355**	-.276*	-				
C15	.218*	-.110	.165	.315**	-.068	.253*	.172	.308**	.341**	-.382**	-			
C16	.172	.144	.235*	.216*	-.214*	.141	.078	-.002	.041	-.245*	.174	-		
C19	-.195	-.133	-.119	-.297**	.165	-.352**	.001	-.394**	-.478**	.376**	-.200	-.177	-	
C22	-.046	.074	.046	-.190	.078	-.153	-.003	-.110	-.238*	.209	-.090	-.100	.554**	-

* . Correlation is significant at the 0.05 level (2-tailed).

** . Correlation is significant at the 0.01 level (2-tailed).

Home discussion

Table D.3

Correlations Among Items Related to Home Discussion

	A25	B2	B6	B11	C17	C18	C19	C21	C22
A25	-								
B2	.043	-							
B6	.097	.273*	-						
B11	.105	.298**	.128	-					
C17	.403**	.256*	.280**	.190	-				
C18	.195	.124	.305**	.126	.464**	-			
C19	.277*	.142	.230*	.165	.518**	.634**	-		
C21	-.167	.150	-.031	.082	-.194	-.182	-.131	-	
C22	.431**	.292**	.283**	.242*	.493**	.478**	.554**	-.248*	-

** . Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Homework involvement

Table D.4

Correlations Among Items Related to Homework Involvement

	A18	A19	A20	A21	A22	A23	A24	C1	C2	C5	C6	C7	C9	C10	C11	C22
A18	-															
A19	.643**	-														
A20	.537**	.492**	-													
A21	-.444**	-.448**	-.275*	-												
A22	-.247*	-.420**	-.199	.556**	-											
A23	.224*	.245*	.190	-.428**	-.434**	-										
A24	.213	.277*	-.056	-.141	-.207	.303**	-									
C1	-.118	-.087	.020	.270*	.134	-.251*	-.318**	-								
C2	.279**	.194	.386**	.091	-.028	-.008	.009	-.007	-							
C5	.267*	.132	.189	-.130	-.066	.021	-.142	-.083	.200	-						
C6	.073	-.004	.112	.229*	.053	-.055	-.116	.246*	.011	.213	-					
C7	.041	.012	.076	.159	.074	-.090	.041	.071	-.069	-.054	.393**	-				
C9	-.060	-.195	-.131	.316**	.116	.017	-.128	.384**	-.070	.035	.475**	.193	-			
C10	.185	.042	.208	.090	.211	-.293**	-.071	-.032	.195	.203	.168	.276*	-.177	-		
C11	-.120	-.236*	-.099	.274*	.265*	-.283**	-.170	.026	.099	.155	-.042	.203	-.081	.275*	-	
C22	.074	.255*	.046	-.304**	-.491**	.217*	.228*	.085	-.190	-.003	.043	.059	-.113	-.110	-.238*	-

** . Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Digital deprivation

Table D.5

Correlations Among Items Related to Digital Deprivation

	C1	C2	C3	C4	C6	C7	C8	C9	C12
C1	-								
C2	-.007	-							
C3	.213	-.366**	-						
C4	-.032	.493**	-.408**	-					
C6	.246*	.011	.134	.114	-				
C7	.071	-.069	.242*	.122	.393**	-			
C8	-.032	.176	-.409**	.427**	.140	.228*	-		
C9	.384**	-.070	.331**	-.047	.475**	.193	-.161	-	
C12	.122	-.167	.213	-.366**	.038	-.093	-.250*	.248*	-

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Perceptions of control

Table D.6

Correlations Among Items Related to Perceptions of Control

	A10	C2	C3	C4	C8	C12	C13	C14	C15	C16	C17	C18	C21
A10	-												
C2	.375**	-											
C3	-.323**	-.366**	-										
C4	.354**	.493**	-.408**	-									
C8	.305**	.176	-.409**	.427**	-								
C12	-.135	-.167	.213	-.366**	-.250*	-							
C13	.154	.039	-.280*	.001	.079	.088	-						
C14	-.137	-.083	.341**	-.248*	-.463**	.369**	.032	-					
C15	.218*	.315**	-.068	.253*	.342**	-.057	-.007	-.382**	-				
C16	.172	.216*	-.214*	.141	.228*	-.188	.047	-.245*	.174	-			
C17	-.115	-.053	.059	-.237*	-.167	.166	.278*	.356**	-.007	-.277*	-		
C18	-.242*	-.359**	.269*	-.473**	-.146	.331**	.112	.263*	-.061	-.125	.464**	-	
C21	.212	.446**	-.190	.182	.232*	.144	-.050	-.252*	.378**	.259*	-.194	-.182	-

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Provision of private tutoring

Table D.7

Correlations Among Items Related to Provision of Private Tutoring

	B7	B8	B9	B10	B11	B13
B7	-					
B8	.795**	-				
B9	.795**	.737**	-			
B10	.549**	.386**	.562**	-		
B11	-.377**	-.294**	-.185	-.033	-	
B13	.070	.102	.108	-.075	-.299**	-

** . Correlation is significant at the 0.01 level (2-tailed).

Appendix E – Results of children’s data analyses

When achieving model fit using SEM with children’s data, it was possible to construct a single model with parental encouragement and home discussion together in the same model representing parental motivation.

E.1 Parental motivation

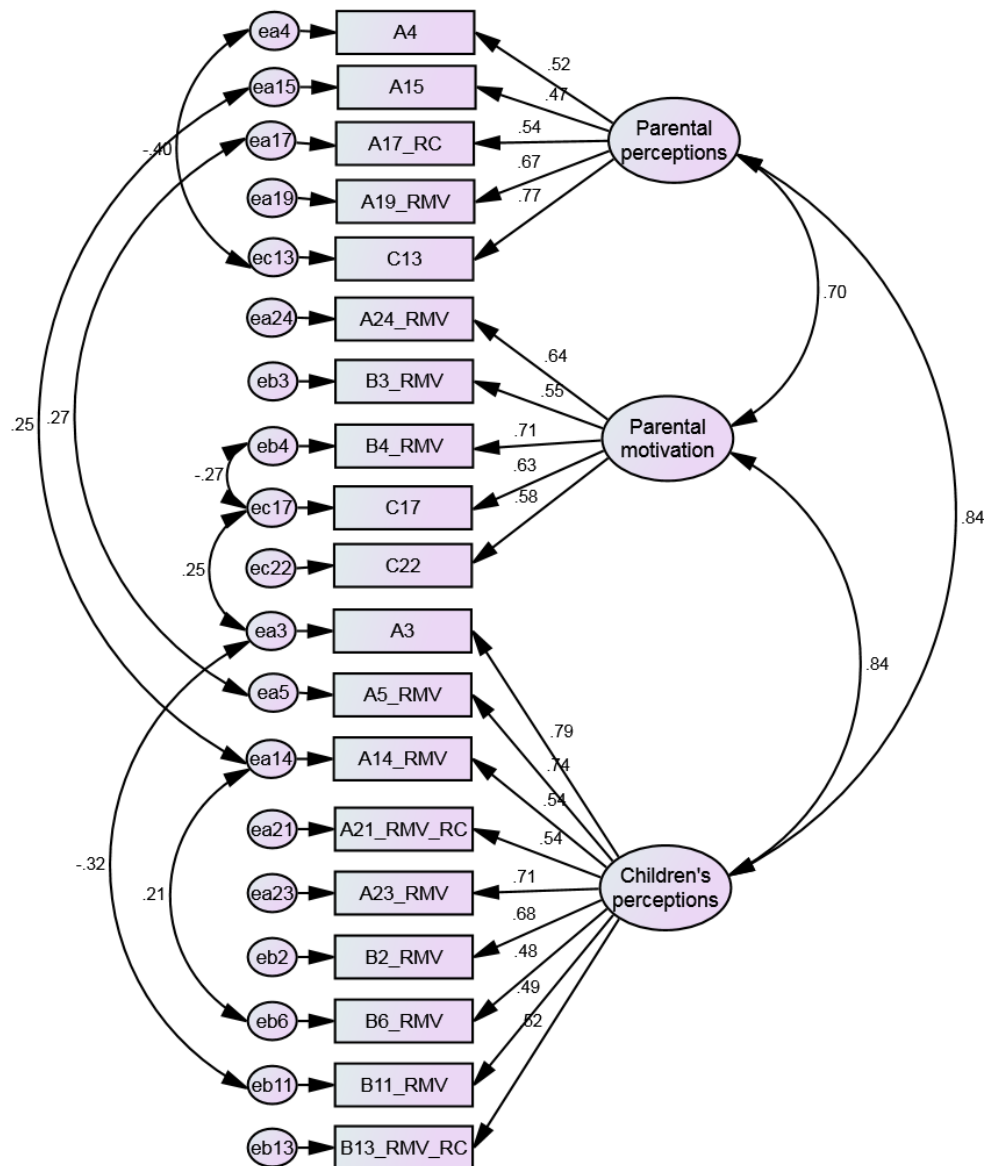


Figure E.1. CFA model with parental motivation.

Note: RMV – Replaced Missing Values, RC – Reverse Coded

E.1.1 Correlations among factors

Table E.1

Correlations Among Parental Perceptions, Parental Motivation, and Children's Perceptions

	<i>M</i>	<i>SD</i>	Parental perceptions	Parental motivation	Children's perceptions
Parental perceptions	2.129	.574	-		
Parental motivation	2.039	.603	.587**	-	
Children's perceptions	2.182	.568	.730**	.683**	-

**. Correlation is significant at the 0.01 level (2-tailed).

E.1.2 Comparisons between ethnic groups

Table E.2

Comparison of Ethnic Group Differences in Relation to Parental Motivation

	European–Australian (<i>n</i> = 33)		Asian–Australian (<i>n</i> = 91)		<i>t</i> (122)	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Parental perceptions	2.127	.570	2.128	.568	-.002	.999	<.001
Parental motivation	2.089	.559	2.005	.598	.700	.485	.005
Children's perceptions	2.389	.575	2.111	.527	2.536	.012	.072

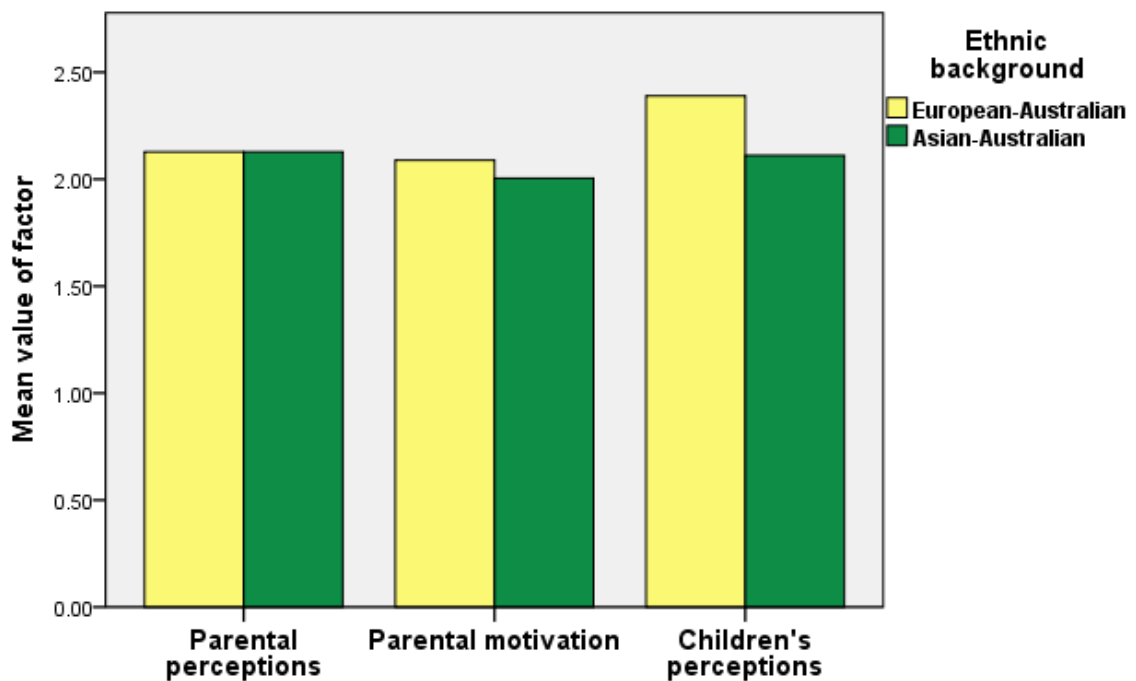


Figure E.2. Graphical representation of parental perceptions, parental motivation, and children's perceptions between the two ethnic groups.

E.1.3 Comparisons between male and female children

Table E.3

Comparison of Gender Differences in Parental Motivation

	Male		Female				
	<i>(n = 57)</i>		<i>(n = 67)</i>				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i> (122)	<i>p</i>	η^2
Parental perceptions	2.091	.556	2.158	.578	-.655	.514	.005
Parental motivation	2.081	.588	1.982	.586	.931	.354	.010
Children's perceptions	2.219	.532	2.157	.570	.621	.536	.004

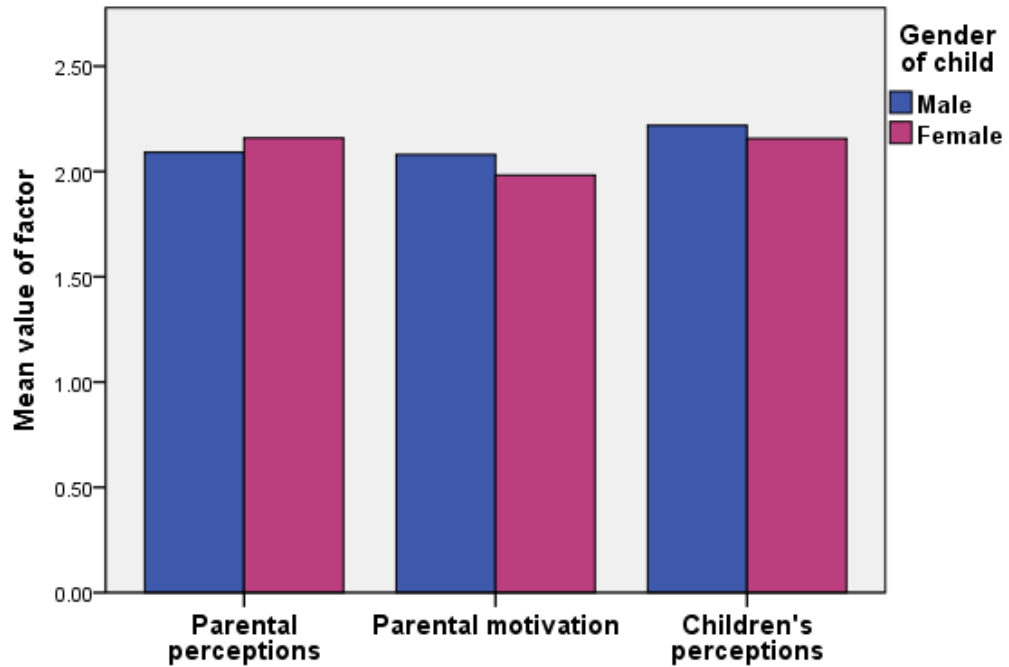


Figure E.3. Graphical representation of parental perceptions, parental motivation, and children's perceptions between the two genders.

E.1.4 Comparisons across year levels

Table E.4

One-way ANOVA for Parental Motivation Among Year Levels

		<i>Sum of Squares</i>	<i>Mean Square</i>	<i>F(5, 118)</i>	<i>p</i>	η^2
Parental perceptions	Between Groups	5.589	1.118	3.894	.003	.142
	Within Groups	33.877	.287			
Parental motivation	Between Groups	5.450	1.090	3.486	.006	.129
	Within Groups	36.904	.313			
Children's perceptions	Between Groups	5.585	1.117	4.142	.002	.149
	Within Groups	31.826	.270			

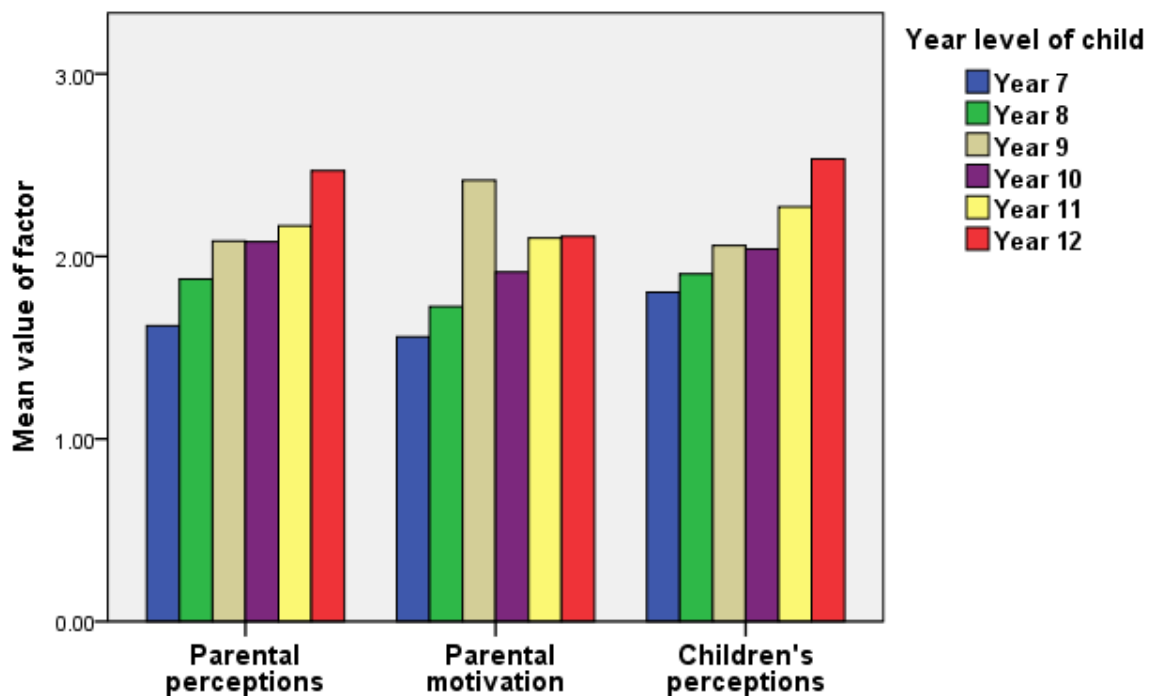


Figure E.4. Graphical representation of parental perceptions, parental motivation, and children's perceptions among year levels.

Post-hoc comparisons using the Tukey HSD test indicated that the mean score for parental perceptions showed significantly different results between Year 7 ($M = 1.62$, $SD = .39$) and Year 11 ($M = 2.17$, $SD = .56$) and also Year 7 and Year 12 ($M = 2.47$, $SD = .65$) at the .05

level. Further, the mean score for parental motivation between Year 7 ($M = 1.56$, $SD = .28$) and Year 9 ($M = 2.42$, $SD = 0.71$) groups and children's perceptions between Year 7 ($M = 1.80$, $SD = .39$) and Year 12 ($M = 2.53$, $SD = .53$) groups, and Year 10 ($M = 2.04$, $SD = 0.49$) and Year 12 groups were significantly different.

E.2 Parental support

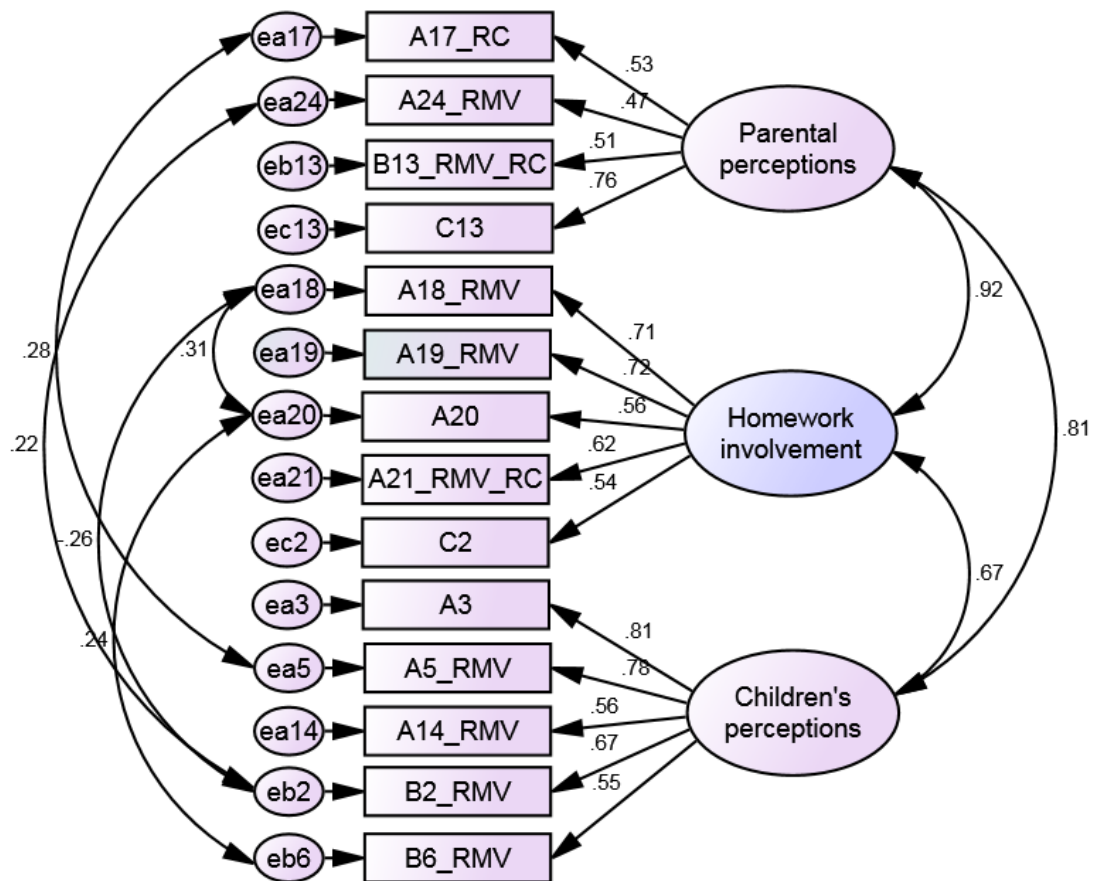


Figure E.5. CFA model with homework involvement.

Note: RMV – Replaced Missing Values, RC – Reverse Coded

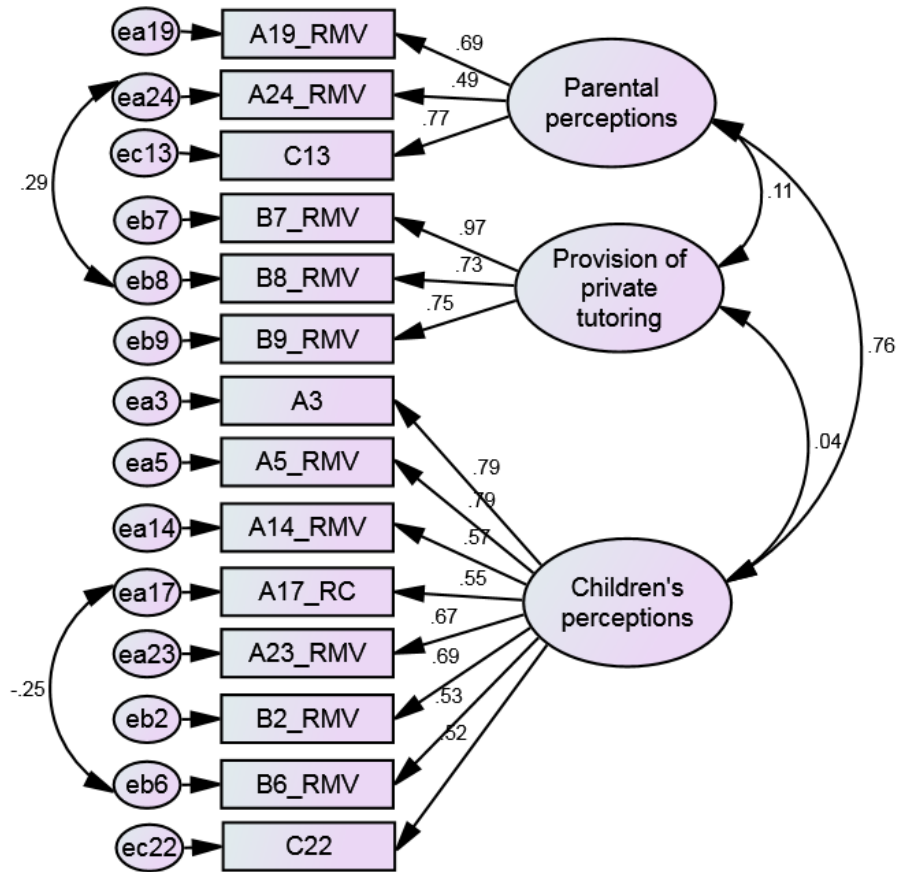


Figure E.6. CFA model with provision of private tutoring.
 Note: RMV – Replaced Missing Values, RC – Reverse Coded

E.2.1 Correlations among factors

Table E.5

Correlations Among Parental Perceptions, Homework Involvement, and Children's Perceptions

	<i>M</i>	<i>SD</i>	Parental perceptions	Homework involvement	Children's perceptions
Parental perceptions	1.914	.553	-		
Homework involvement	2.622	.709	.620**	-	
Children's perceptions	2.100	.609	.609**	.551**	-

**. Correlation is significant at the 0.01 level (2-tailed).

Table E.6

Correlations Among Parental Perceptions, Provision of Private Tutoring, and Children's Perceptions

	<i>M</i>	<i>SD</i>	Parental perceptions	Provision of private tutoring	Children's perceptions
Parental perceptions	2.074	.640	-		
Provision of private tutoring	2.210	.950	.118	-	
Children's perceptions	2.073	.567	.638**	.115	-

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

E.2.2 Comparisons between ethnic groups

Table E.7

Comparison of Ethnic Group Differences in Homework Involvement

	European–Australian (<i>n</i> = 33)		Asian–Australian (<i>n</i> = 91)		<i>t</i> (122)	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Parental perceptions	1.944	.562	1.899	.541	.411	.682	.001
Homework involvement	2.764	.631	2.566	.719	1.395	.166	.016
Children's perceptions	2.331	.682	2.025	.548	2.565	.012	.051

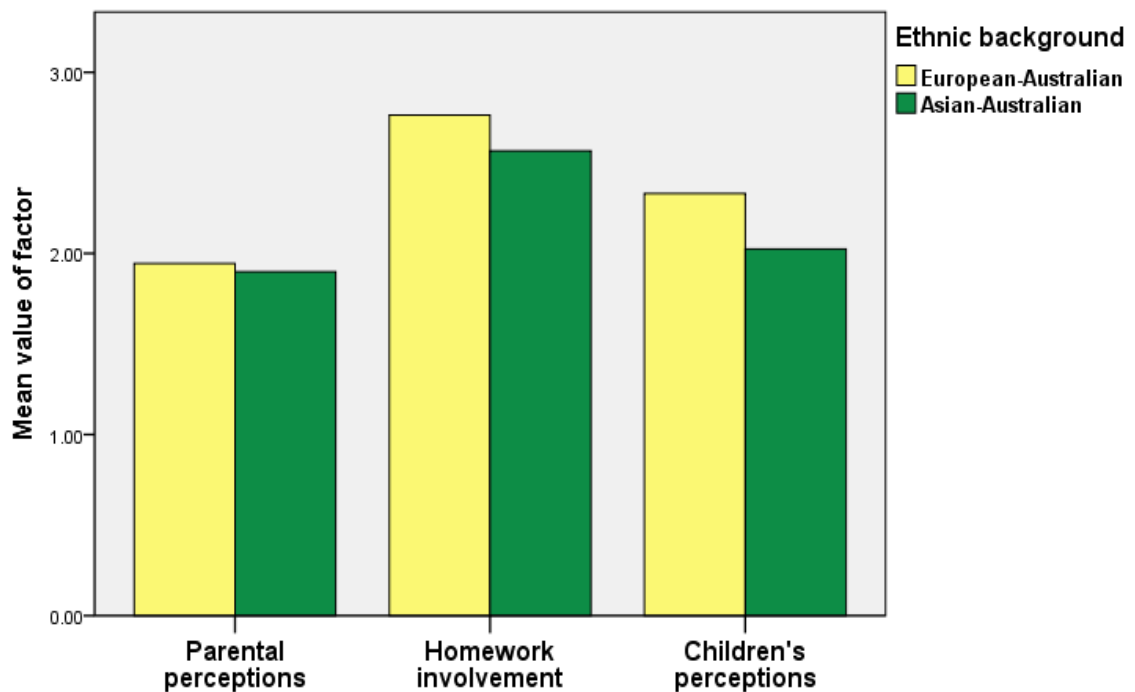


Figure E.7. Graphical representation of parental perceptions, homework involvement, and children's perceptions between the two ethnic groups.

Table E.8

Comparison of Ethnic Group Differences in the Provision of Private Tutoring

	European– Australian (<i>n</i> = 33)		Asian–Australian (<i>n</i> = 91)		<i>t</i> (122)	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Parental perceptions	2.098	.675	2.056	.614	.323	.747	.001
Provision of private tutoring	2.657	1.059	2.021	.829	3.120	.003	.105
Children’s perceptions	2.248	.618	2.012	.518	2.128	.035	.052

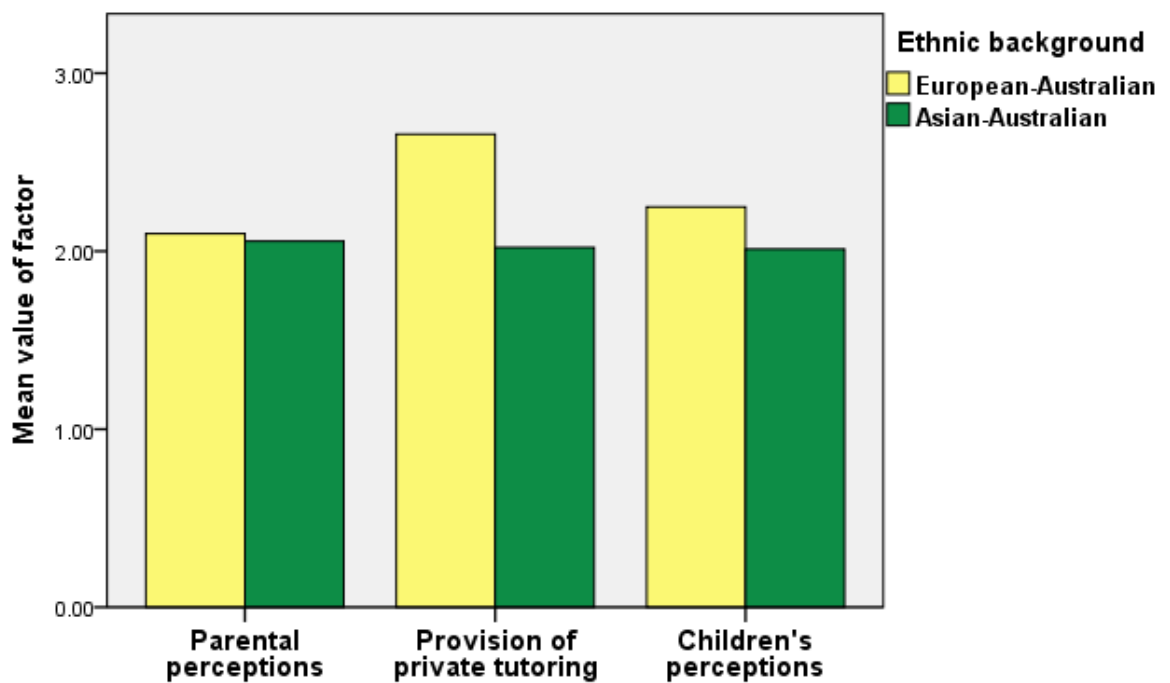


Figure E.8. Graphical representation of parental perceptions, provision of private tutoring, and children’s perceptions between the two ethnic groups.

E.2.3 Comparisons between male and female children

Table E.9

Comparison of Gender Differences in Homework Involvement

	Male (<i>n</i> = 57)		Female (<i>n</i> = 67)		<i>t</i> (122)	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Parental perceptions	1.956	.550	1.873	.541	.842	.402	.006
Homework involvement	2.507	.629	2.713	.747	1.647	.102	.022
Children's perceptions	2.144	.554	2.075	.638	.638	.525	.003

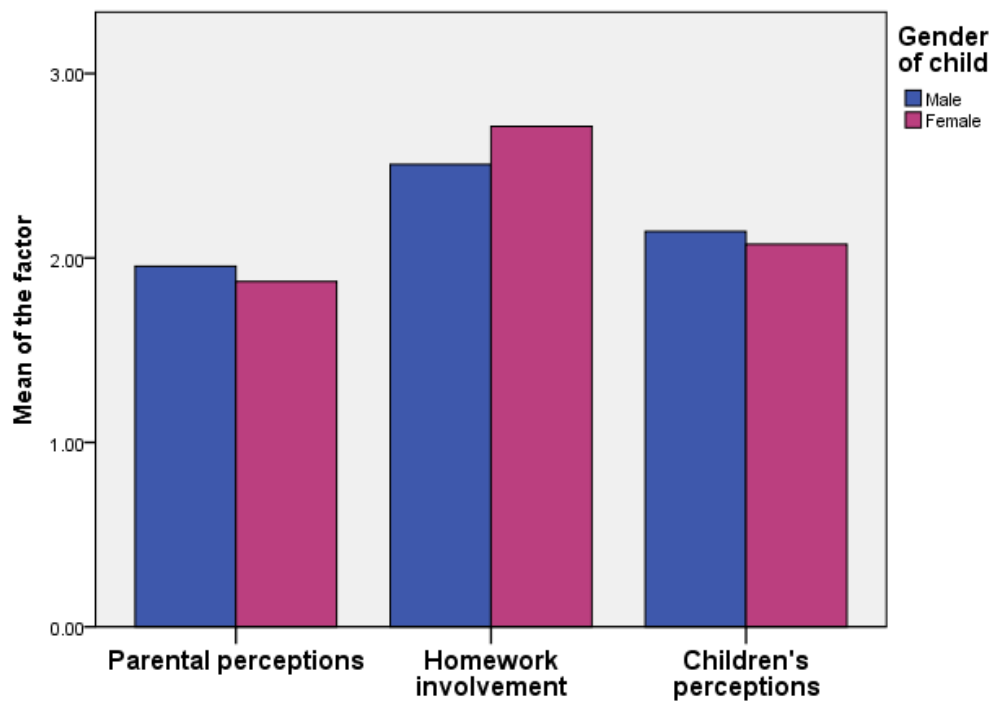


Figure E.9. Graphical representation of parental perceptions, homework involvement, and children's perceptions between the two genders.

Table E.10

Comparison of Gender Differences in the Provision of Private Tutoring

	Male (<i>n</i> = 57)		Female (<i>n</i> = 67)		<i>t</i> (122)	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Parental perceptions	2.087	.628	2.050	.634	.331	.741	.001
Provision of private tutoring	2.308	.959	2.090	.909	1.299	.197	.020
Children's perceptions	2.125	.528	2.033	.576	.924	.357	.010

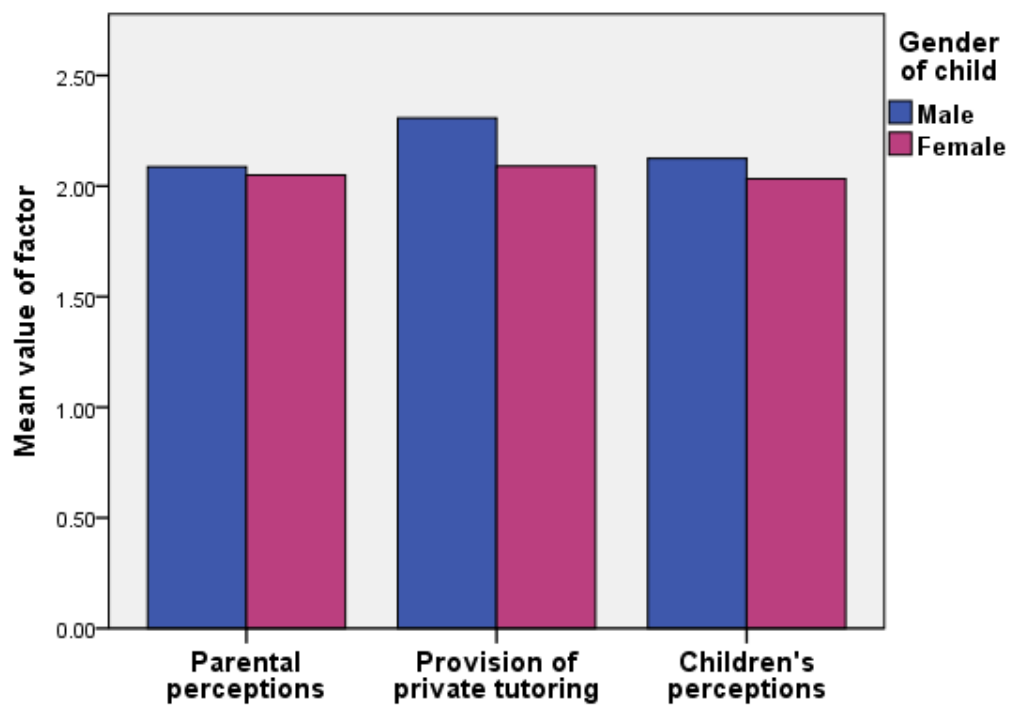


Figure E.10. Graphical representation of parental perceptions, provision of private tutoring, and children's perceptions between the two genders.

E.2.4 Comparisons across year levels

Table E.11

One-way ANOVA for Homework Involvement Among Year Levels

		<i>Sum of Squares</i>	<i>Mean Square</i>	<i>F(5, 118)</i>	<i>p</i>	<i>η^2</i>
Parental perceptions	Between Groups	4.199	.840	3.070	.012	.115
	Within Groups	32.273	.274			
Homework involvement	Between Groups	13.248	2.650	6.648	.000	.220
	Within Groups	41.441	.351			
Children's perceptions	Between Groups	3.272	.654	1.886	.102	.074
	Within Groups	40.943	.347			

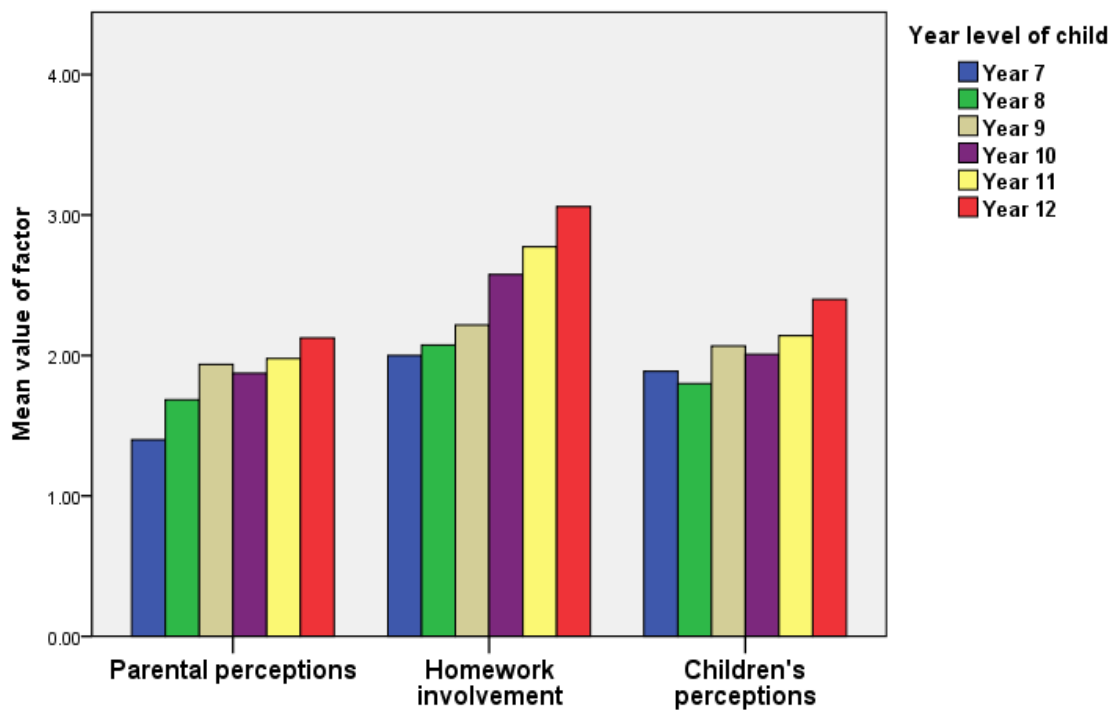


Figure E.11. Graphical representation of parental perceptions, homework involvement, and children's perceptions among year levels.

Multiple comparisons in post-hoc tests indicated a significant difference in parental perceptions between Year 7 ($M = 1.40$, $SD = .34$) and Year 11 ($M = 1.98$, $SD = .54$) and Year 7 and Year 12 ($M = 2.13$, $SD = .56$) as well as homework involvement between Year 7 ($M = 2.00$, $SD = .50$) and Year 11 ($M = 2.77$, $SD = .66$), Year 7 and Year 12 ($M = 3.06$,

$SD = .55$), Year 8 ($M = 2.08$, $SD = .53$) and Year 11, Year 8 and Year 12, and Year 9 ($M = 2.22$, $SD = .62$) and Year 12.

Table E.12

One-way ANOVA for the Provision of Private Tutoring Among Year Levels

		Sum of Squares	Mean Square	$F(5, 118)$	p	η^2
Parental perceptions	Between Groups	6.149	1.230	3.419	.006	.132
	Within Groups	42.446	.360			
Provision of private tutoring	Between Groups	4.004	.801	.912	.475	.037
	Within Groups	103.570	.878			
Children's perceptions	Between Groups	4.060	.812	2.844	.018	.108
	Within Groups	33.694	.286			

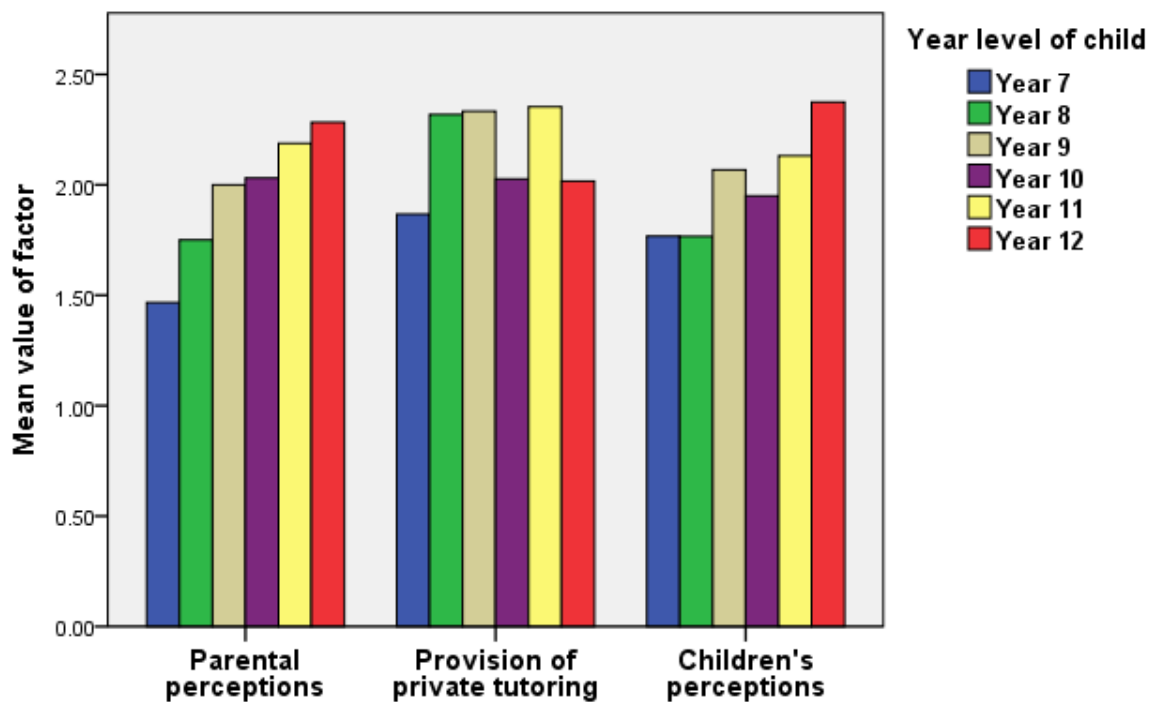


Figure E.12. Graphical representation of parental perceptions, provision of private tutoring, and children's perceptions among year levels.

Similarly, multiple comparisons found that the differences in parental perceptions were between Year 7 ($M = 1.47$, $SD = .45$) and Year 11 ($M = 2.19$, $SD = .68$) and Year 7 and Year 12 ($M = 2.28$, $SD = .56$). The difference in children's perceptions was found between Year 7 ($M = 1.77$, $SD = .36$) and Year 12 ($M = 2.38$, $SD = .53$).

E.3 Parental control

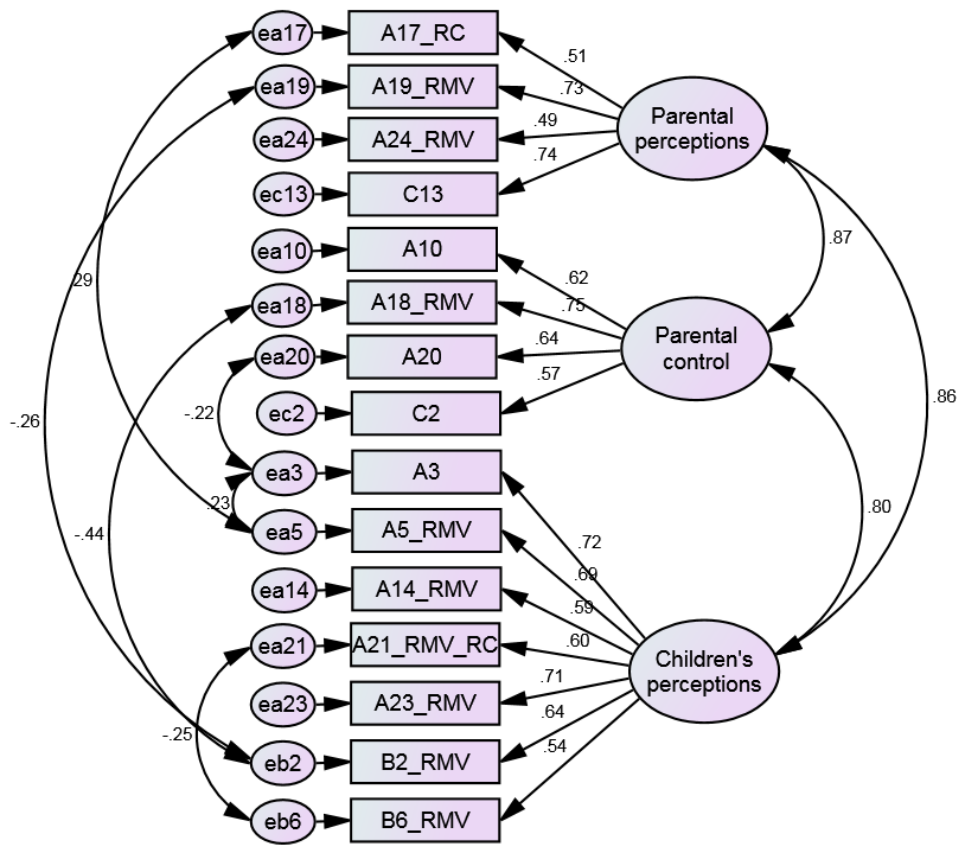


Figure E.13. CFA model with parental motivation.
Note: RMV – Replaced Missing Values, RC – Reverse Coded

E.3.1 Correlations among factors

Table E.13

Correlations Among Parental Perceptions, Parental Control, and Children's Perceptions

	<i>M</i>	<i>SD</i>	Parental perceptions	Parental control	Student outcomes
Parental perceptions	2.028	.586	-		
Parental control	2.548	.708	.622**	-	
Children's perceptions	2.218	.605	.675**	.614**	-

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

E.3.2 Comparisons between ethnic groups

Table E.14

Comparison of Ethnic Group Differences in Parental Control

	European–Australian (<i>n</i> = 33)		Asian– Australian (<i>n</i> = 91)		<i>t</i> (122)	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Parental perceptions	2.043	.611	2.017	.570	.216	.829	<.001
Parental control	2.758	.657	2.466	.695	2.095	.038	.050
Children’s perceptions	2.427	.648	2.151	.556	2.337	.021	.062

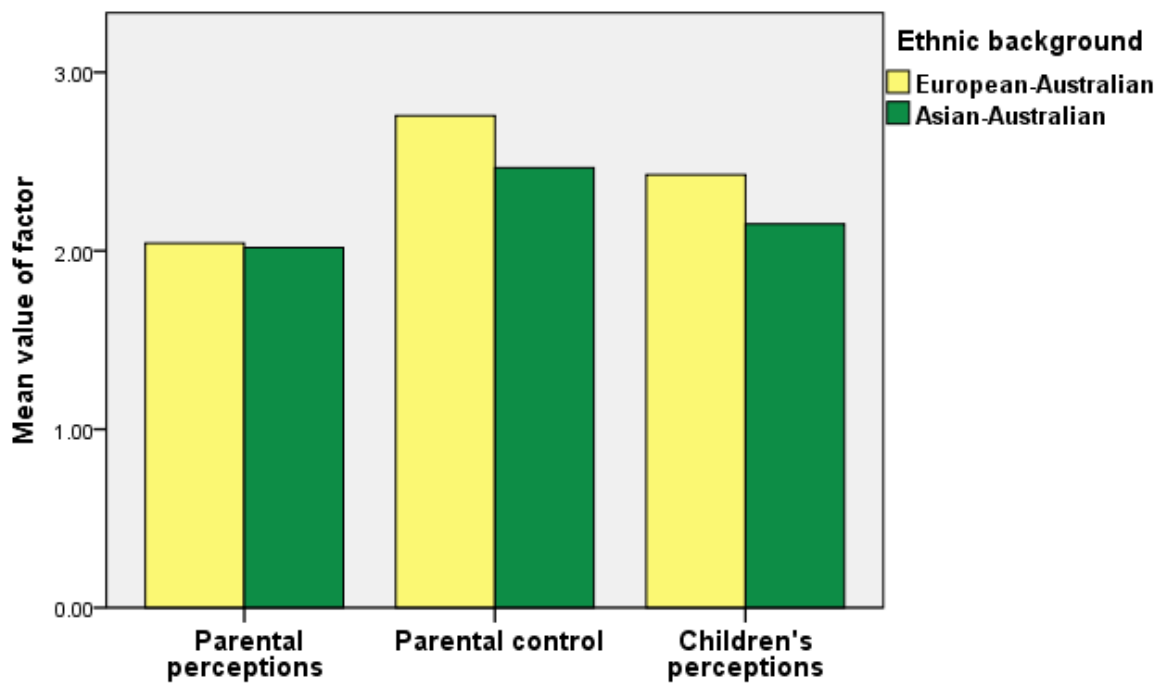


Figure E.14. Graphical representation of parental perceptions, parental control, and children’s perceptions between the two ethnic groups.

E.3.3 Comparisons between male and female children

Table E.15

Comparison of Gender Differences in Parental Control

	Male		Female				
	<i>(n = 57)</i>		<i>(n = 67)</i>				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i> (122)	<i>p</i>	η^2
Parental perceptions	2.061	.589	1.993	.572	.657	.513	.005
Parental control	2.406	.628	2.660	.732	-2.060	.042	.049
Children's perceptions	2.246	.566	2.206	.617	.372	.711	.002

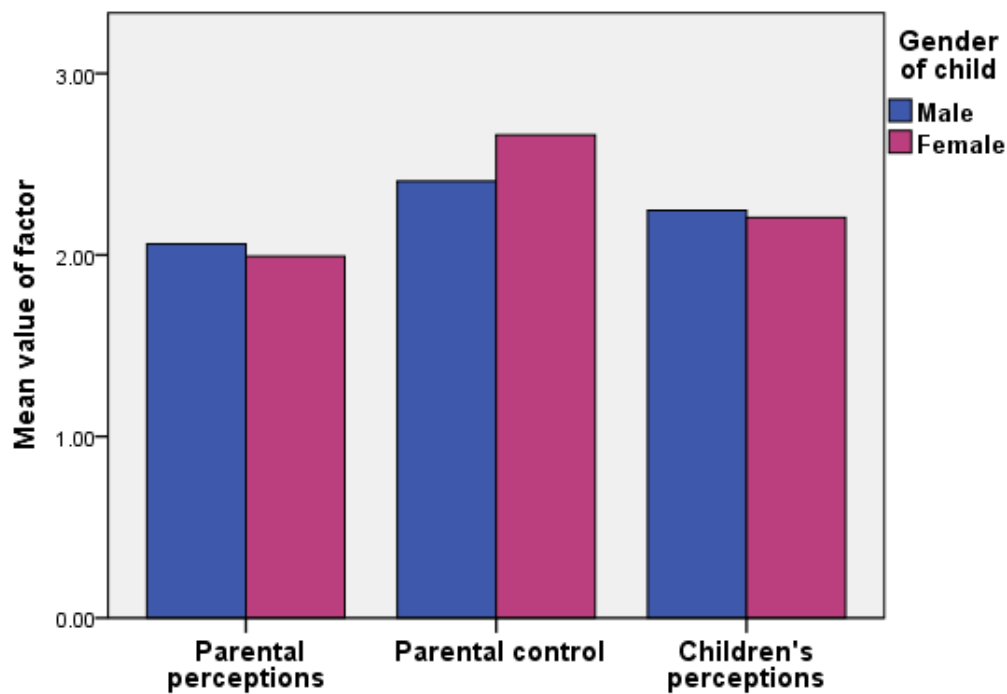


Figure E.15. Graphical representation of parental perceptions, parental control, and children's perceptions between the two genders.

E.3.4 Comparisons across year levels

Table E.16

One-way ANOVA for Parental Control Among Year Levels

		<i>Sum of Squares</i>	<i>Mean Square</i>	<i>F(5, 118)</i>	<i>p</i>	η^2
Parental perceptions	Between Groups	5.095	1.019	3.332	.008	.124
	Within Groups	36.088	.306			
Parental control	Between Groups	11.812	2.362	5.857	.000	.199
	Within Groups	47.593	.403			
Children's perceptions	Between Groups	5.379	1.076	3.365	.007	.125
	Within Groups	37.719	.320			

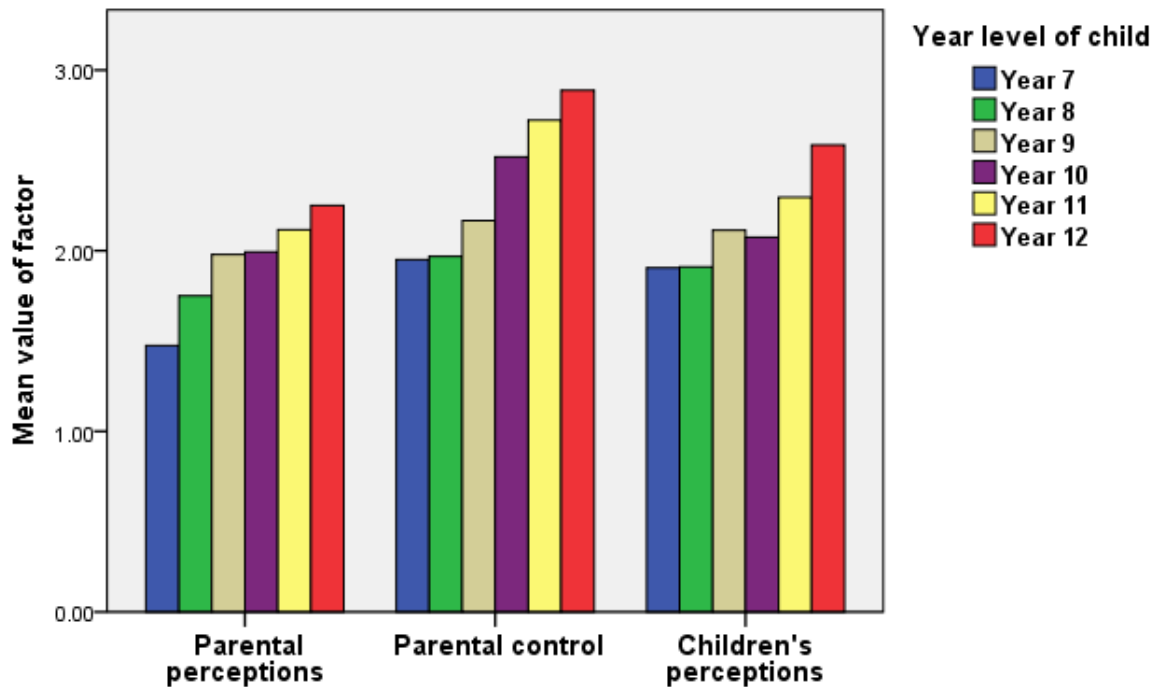


Figure E.16. Graphical representation of parental perceptions, parental control, and children's perceptions among year levels.

Post-hoc comparisons indicated a significant difference in parental perceptions between mean scores for Year 7 ($M = 1.48$, $SD = .42$) and Year 11 ($M = 2.12$, $SD = .63$) and Year 7 and Year 12 ($M = 2.25$, $SD = .53$). Parental control showed significant differences between Year 7 ($M = 1.95$, $SD = .42$) and Year 11 ($M = 2.72$, $SD = .66$), Year 7 and Year 12 ($M = 2.89$, $SD = .64$), Year 8 ($M = 1.97$, $SD = .53$) and Year 11, Year 8 and Year 12, and Year 9 ($M = 2.17$, $SD = .44$) and Year 12. Children's perceptions were significantly different between Year 7 ($M = 1.91$, $SD = .41$) and Year 12 ($M = 2.59$, $SD = .56$) as well as Year 10 ($M = 2.07$, $SD = .54$) and Year 12.

Appendix F – Comparisons of gender differences of parents

Table F.1

Comparison of Gender Differences in Parental Encouragement

	Male (n = 33)		Female (n = 49)		<i>t</i> (80)	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Parental perceptions	1.856	.484	1.918	.491	-.567	.572	.004
Parental encouragement	1.869	.612	1.930	.584	-.456	.649	.003
Children's perceptions	2.061	.586	2.016	.503	.368	.714	.002

Table F.2

Comparison of Gender Differences in Home Discussion

	Male (n = 33)		Female (n = 49)		<i>t</i> (80)	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Parental perceptions	1.856	.484	1.918	.491	-.567	.572	.004
Home discussion	1.894	.518	1.776	.526	1.011	.315	.013
Children's perceptions	1.977	.597	2.051	.572	-.564	.574	.004

Table F.3

Comparison of Gender Differences in Homework Involvement

	Male (n = 33)		Female (n = 49)		<i>t</i> (80)	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Parental perceptions	1.762	.431	1.821	.454	-.590	.557	.004
Homework involvement	2.227	.663	2.214	.589	.093	.926	<.001
Children's perceptions	1.833	.578	1.947	.533	-.918	.362	.010

Table F.4

Comparison of Gender Differences in the Provision of Private Tutoring

	Male (n = 33)		Female (n = 49)		<i>t</i> (80)	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Parental perceptions	1.871	.472	1.924	.493	-.479	.633	.003
Provision of private tutoring	2.189	.940	2.447	.845	-1.295	.199	.021
Children's perceptions	1.982	.571	2.041	.521	-.485	.629	.003

Table F.5

Comparison of Gender Differences in Parental Control

	Male (n = 33)		Female (n = 49)		<i>t</i> (80)	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Parental perceptions	1.871	.472	1.924	.493	-.479	.633	.003
Parental control	2.273	.606	2.359	.537	-.677	.500	.006
Children's perceptions	1.982	.571	2.041	.521	-.485	.629	.003

Appendix G – More findings, cross-tabulation, and other graphs

Table G.1

Parents' Reasons for Having a Tutor

Your child has a tutor to provide extra support in mathematics because...	Count
you are too busy to help him/her.	7
you cannot remember your mathematics.	13
it is difficult to teach one's own child.	13
you want your child to do well in class.	23
your child has to compete with students who have tutors.	4
learning from school is not enough to achieve good results.	27
your child requested you to provide services of a tutor.	9

Table G.2

Children's Reasons for Having a Tutor

You have a tutor to provide extra support in mathematics because...	Count
your parents are too busy to help you.	8
your parents cannot remember their mathematics.	15
your parents find it difficult to teach you.	13
your parents want you to do well in class.	43
you have to compete with students who have tutors.	15
learning from school is not enough to achieve good results.	40
you requested your parents to provide services of a tutor.	28

Table G.3

Parents' Reasons for Not Having a Tutor

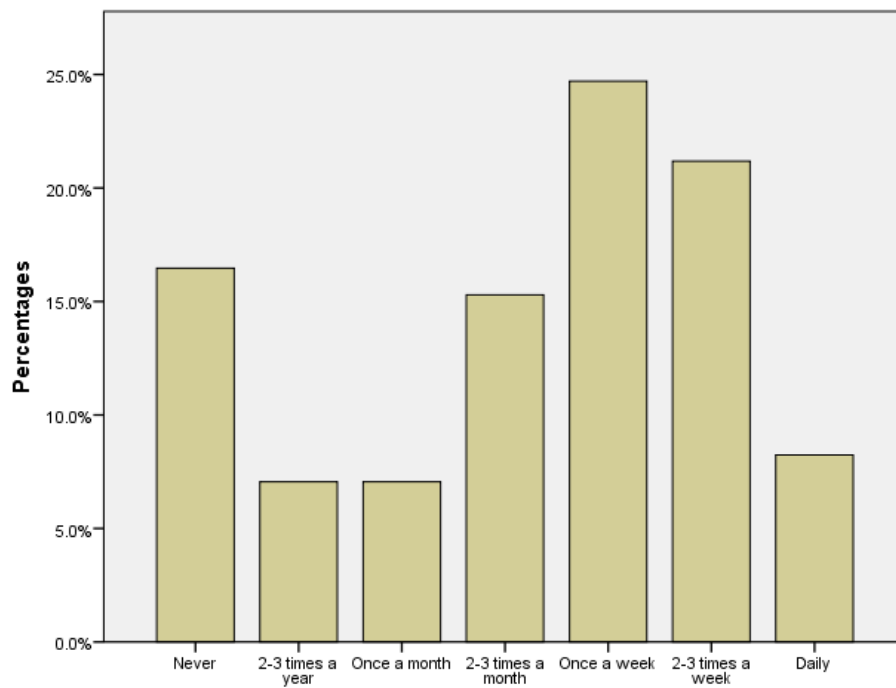
Your child hasn't a tutor to provide extra support in mathematics because...	Count
your child is doing well and doesn't need a tutor.	18
you can help your child without a tutor.	23
your child prefers to learn from you.	6
you cannot afford to pay a tutor.	10
your child refuses to have a tutor.	5
your child doesn't like mathematics.	1
learning from school is enough for a child.	10

Table G.4
Children's Reasons for Not Having a Tutor

Your child hasn't a tutor to provide extra support in mathematics because...	Count
you are doing well and don't need a tutor.	30
your parents can help you without a tutor.	17
you prefer to learn from your parents.	7
your parents cannot afford to pay a tutor.	2
you refuse to have a tutor.	13
you don't like mathematics.	3
learning from school is enough for you.	23

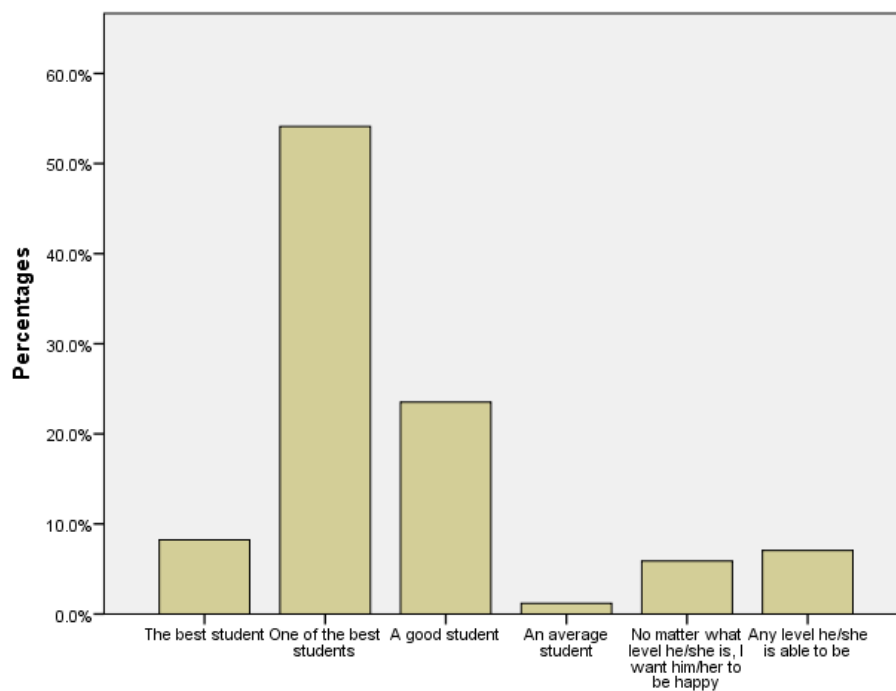
Table G.5
Average Marks Achieved by Students with/without a Tutor

Q1. What percentage of marks do you achieve on average in mathematics?		Q6. Do you get extra support from a tutor of mathematics?		Total
		Yes	No	
0 - 49	Count	0	1	1
	%	0.0%	1.7%	0.8%
50 - 59	Count	4	1	5
	%	6.0%	1.7%	4.0%
60 - 69	Count	8	4	12
	%	11.9%	6.8%	9.5%
70 - 79	Count	20	15	35
	%	29.9%	25.4%	27.8%
80 - 89	Count	27	16	43
	%	40.3%	27.1%	34.1%
90 - 100	Count	8	22	30
	%	11.9%	37.3%	23.8%
Total	Count	67	59	126
	%	100.0%	100.0%	100.0%



Q3. How often do you check your child's mathematics work?

Figure G.1. Frequency of checking mathematics work.



Q5. What level in class do you expect your child to be?

Figure G.2. Parental expectation of the child's level in class.

Table G.6

Parental Expectation of the Child's Level in Class between the Two Sets of Ethnic Groups

Q5. What level in class do you expect your child to be?		Q5. What is your ethnic background?		Total
		European– Australian	Asian– Australian	
The best student	Count	0	7	7
	%	0.0%	12.7%	8.2%
One of the best students	Count	8	38	46
	%	26.7%	69.1%	54.1%
A good student	Count	11	9	20
	%	36.7%	16.4%	23.5%
An average student	Count	1	0	1
	%	3.3%	0.0%	1.2%
No matter what level he/she is, I want him/her to be happy	Count	5	0	5
	%	16.7%	0.0%	5.9%
Any level he/she is able to be	Count	5	1	6
	%	16.7%	1.8%	7.1%
Total	Count	30	55	85
	%	100.0%	100.0%	100.0%

Table G.7

Frequency of Checking Mathematics Work between the Two Sets of Ethnic Groups

Q3. How often do you check your child's mathematics work?		Q5. What is your ethnic background?		Total
		European– Australian	Asian– Australian	
Never	Count	6	8	14
	%	20.0%	14.5%	16.5%
2-3 times a year	Count	3	3	6
	%	10.0%	5.5%	7.1%
Once a month	Count	4	2	6
	%	13.3%	3.6%	7.1%
2-3 times a month	Count	6	7	13
	%	20.0%	12.7%	15.3%
Once a week	Count	5	16	21
	%	16.7%	29.1%	24.7%

2-3 times a week	Count	5	13	18
	%	16.7%	23.6%	21.2%
Daily	Count	1	6	7
	%	3.3%	10.9%	8.2%
Total	Count	30	55	85
	%	100.0%	100.0%	100.0%

Table G.8

Provision of Tutoring between the Two Sets of Ethnic Groups

Q6. Does your child get extra support from a tutor of mathematics?		Q5. What is your ethnic background?		Total
		European–Australian	Asian–Australian	
Yes	Count	6	36	42
	%	20.0%	65.5%	49.4%
No	Count	24	19	43
	%	80.0%	34.5%	50.6%
Total	Count	30	55	85
	%	100.0%	100.0%	100.0%

Table G.9

Parental Expectation of the Child's Level in Class between the Gender Groups

Q5. What level in class do you expect your child to be?		Q4. What is the gender of your child?		Total
		Male	Female	
The best student	Count	2	5	7
	%	5.0%	11.1%	8.2%
One of the best students	Count	22	24	46
	%	55.0%	53.3%	54.1%
A good student	Count	11	9	20
	%	27.5%	20.0%	23.5%
An average student	Count	1	0	1
	%	2.5%	0.0%	1.2%
No matter what level he/she is, I want him/her to be happy	Count	2	3	5
	%	5.0%	6.7%	5.9%
Any level he/she is able to be	Count	2	4	6
	%	5.0%	8.9%	7.1%
Total	Count	40	45	85
	%	100.0%	100.0%	100.0%

Table G.10

Frequency of Checking Mathematics Work between the Two Gender Groups

Q3. How often do you check your child's mathematics work?		Q4. What is the gender of your child?		Total
		Male	Female	
Never	Count	7	7	14
	%	17.5%	15.6%	16.5%
2-3 times a year	Count	2	4	6
	%	5.0%	8.9%	7.1%
Once a month	Count	2	4	6
	%	5.0%	8.9%	7.1%
2-3 times a month	Count	5	8	13
	%	12.5%	17.8%	15.3%
Once a week	Count	11	10	21
	%	27.5%	22.2%	24.7%
2-3 times a week	Count	10	8	18
	%	25.0%	17.8%	21.2%
Daily	Count	3	4	7
	%	7.5%	8.9%	8.2%
Total	Count	40	45	85
	%	100.0%	100.0%	100.0%

Table G.11

Provision of Tutoring between the Two Sets of Gender Groups

Q6. Does your child get extra support from a tutor of mathematics?		Q4. What is the gender of your child?		Total
		Male	Female	
Yes	Count	20	22	42
	%	50.0%	48.9%	49.4%
No	Count	20	23	43
	%	50.0%	51.1%	50.6%
Total	Count	40	45	85
	%	100.0%	100.0%	100.0%