Educational Resilience in Primary School Children

in South Australia:

An Investigation

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ABSTRACT

Introduction

The field of resilience research has evolved considerably in the last forty years, although most research in this area has been done in the United States and may not reflect the Australian experience. Educational resilience has become an increasingly well-researched area in recent times. The Kumon Method of mathematics education draws on many factors linked to educational resilience. While international research has demonstrated the effectiveness of Kumon in improving academic achievement, no information exists on whether the program promotes educational resilience amongst Kumon students. This study had two aims: to improve understanding of the factors and processes affecting educational resilience in young people in Australia; and to determine whether the Kumon method has an influence on educational resilience.

Method

Participants were 164 primary school students (49% male), recruited from Kumon education centres (Kumon group), or State Primary schools (Control group), in metropolitan Adelaide. Data were collected using a battery of tests, including the Woodcock-Johnson III BIA (2001), Locus of Control Scale for Children (from Nowicki & Strickland, 1973), Resiliency Module of the California Healthy Kids Survey (WestEd, 2005), Kumon Diagnostic Test (Kumon, 1994), Family Inventory of Life Events (McCubbin & Patterson, 1991) and the Child Experience of Adverse Events Scale. A brief qualitative interview was also conducted. Educational resilience over time was measured using participants' successive Literacy and Numeracy (LAN) test results.

Results

Kumon study was associated with higher academic achievement: the Kumon group scored a higher mean LAN2 score than the Control group. The initial LAN

score, Cognitive Ability, Locus of Control, Months of Kumon study and Cultural background were significant predictors of LAN2 score. The overall model explained 68% of the variance in LAN2 scores.

When multiple regression was used to predict factors associated with educational resilience, a significant model emerged, with Internal Locus of control and Months of Kumon study emerging as significant predictors. The overall model explained 23% of the variance in educationally resilient outcomes. Likewise, multiple regression found the following factors were associated with a non-resilient educational response in a significant model: External Locus of Control and Total siblings. The overall model explained 17% of the variance in educationally non-resilient outcomes.

Qualitative analysis of parents and children's opinions about resilience demonstrated both similarities and differences regarding aspects of a child's life that could be considered *characteristic* of resilience, and those that *contributed* to the development of resilience. The results supported the hypothesis that parents rated Education as more important than children.

Discussion

Compared to many populations whose educational resilience has been investigated, the present sample of Australian school children were relatively privileged with regard to protective factors such as high parental income, support from unrelated adults and connection to their schools; and relatively protected from risk factors such as family violence, parental alcohol/drug use, parental mental health issues, bullying and parental separation or divorce. This may have been an artefact of the sample under study, which came from a comparatively affluent area. Had the sample been selected from suburbs with a lower socio-economic index, the sample may have demonstrated greater exposure to risk factors.

The impact of Kumon study on academic improvement was clearly demonstrated, with the multiple regression model demonstrating that Kumon study was associated with an improvement in LAN results. Locus of Control, Cognitive Ability, and Cultural Background also had an influence on LAN scores. Length of Kumon study was also linked to resilient patterns of educational attainment, as was internal Locus of Control.

Conclusion

The present study made three key contributions: results replicated international findings that Kumon enhances academic achievement and indicated that Kumon may enhance educational resilience; the study measured risk and protective factors operating within the lives of mainstream Australian children; and the research considered the perspectives of child participants in the study outcomes. Incorporating children's understandings of resilience was important for understanding aspects of the quantitative results. Limitations of the current research included: the lack of comparisons with other forms of tutoring on resilience outcomes; and an inability to test the impact of Kumon study on a variety of different adversities. Future research should address these limitations through the execution of large scale, longitudinal studies (such as the Longitudinal Study of Australian Children), or through replications, extensions and generalisations of previous research to validate and confirm previous findings.

THESIS DECLARATION

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution to Jordan Bell and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

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Jordan Bell

Signed..   Date: 23 / 12 / 2010

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SECTION A

INTRODUCTION AND METHOD

Overview and Rationale

The concept of resilience was first described in the 1970s (and indeed, in some modern-day prevention research; Garmezy, 1971; Garmezy & Neuchterlien, 1972), and has since become an important area of research within the field of child development. The discovery that some children recover from the serious social and developmental stressors that lead others to maladaptive outcomes encouraged researchers to investigate the factors that might promote increased resilience to these stressors (Werner, 1989). Factors such as temperament, family structure and supportiveness, success at school, cognitive ability, social skills and locus of control are known to affect children's ability to overcome difficult life circumstances and reach a productive and functional adulthood (Newman, 2002). Bronfenbrenner's (1979b) bioecological framework has been used widely within the field of resilience research to investigate the ways that these factors influence developmental outcomes in the context of adversity.

In more recent years, the field of resilience research has expanded significantly (S. Goldstein & Brooks, 2006) and evolved into a range of specialist areas, as psychologists have recognised that children may demonstrate resilience in one aspect of their lives, while experiencing poor outcomes in other areas – for example, a child may succeed at developing and maintaining healthy and supportive peer relationships, while failing at school (Harvey & Delfabbro, 2004; Zimmerman & Arunkumar, 1994). Educational resilience – a child's ability to maintain appropriate functioning in an academic context, despite the presence of stressful events, environmental conditions or personal vulnerabilities that are known to place children at risk of academic failure – has become an increasingly well-researched area in the last 15 years (Waxman, Gray, & Padron, 2003). A child's school performance has

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been found to be correlated with adult success (Baird, 1985; Christenson, Sinclair, Lehr, & Hurley, 2000; Schoon, 2006), and so the relevance of educational resilience to later-life achievement is clear. However, the majority of the research done in this field relates to urban populations from the United States. Little work has been done regarding the incidence of academic resilience in Australia, or the factors that might promote it in Australian children, as outlined by Martin and Marsh (2008). Given the importance of cultural context in both research and education, it is appropriate for local investigators to build local knowledge through investigations of Australian children. Findings from related domains, such as education, have indicated that Australian replications of North American research often result in different findings (Center & Ward, 1986), and thus it is important to determine whether factors leading to educational resilience operate in a related manner in Australian and North American school children.

One technique that may promote educational resilience is the Kumon Method of mathematics education (T. Kumon, 1996), which is in use in Australia, the United States, Japan and 45 other countries (Kumon, 2009). Several components of the instruction method used in Kumon align closely with factors known to promote resilience in children. The Kumon Method is founded on an approach which aims to develop self-discipline, self-confidence and academic success, factors which have been linked to the development of resilience to adversity (Bernard, 2000; Newman, 2002; Werner, 1989). While previous research has demonstrated the effectiveness of Kumon in improving academic achievement (McKenna, Hollingsworth, & Barnes, 2005; Oakley, Lawrence, Burt, Boxley, & Kobus, 2003; Oakley, et al., 2005), no information exists on whether the program has an impact on the educational resilience of students who study using the method. The Kumon method of education, which is currently being delivered to approximately 4.15 million children worldwide, with 34,000 in Australia (Kumon, 2009), is characterised by factors that have been shown to improve children's resilience in other contexts. Given the apparent links

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between the programme and resilience factors, it is important to test whether study using the Kumon Method can provide more than purely academic benefits.

Unanswered research questions proceeding from the findings listed above include:

- Which factors specifically influence educational resilience in children in Australia?

- What do children themselves think about the factors leading to resilience, and how is this different to the opinions of their parents?

- Is educational resilience increased in children who study under the Kumon method of education?

The aims of this study were two-fold: to gain a better understanding of the factors and processes affecting the resilience and educational resilience of young people in Australia; and to determine whether the Kumon method of mathematics instruction has an influence on the educational resilience of these children, thereby contributing to the international body of knowledge on resilience in children. To address these aims, the following three hypotheses were developed:

- H1:   Parents and children will have different understandings of the meaning of children's resilience

- H2:   Parents and children will have different priorities for education – parents will rate education as more important than children.

- H3:   Kumon children will demonstrate greater educational resilience than Control group children, when factors that are also known to affect resilience are controlled for (including: sex, intelligence, locus of control, and life challenges).

Hypotheses H1 and H2 related to the first aim of the study, and Hypothesis H3 related to the second aim.

Structure of Introduction and Method Chapters

Chapter 1 establishes the key concepts discussed in the thesis, and provides an overview of the literature relating to:

- developmental psychology

- positive adaptation

- academic achievement

- adversity, and

- risk and protective factors;

within the context of Bronfenbrenner's (Bronfenbrenner, 1979b) bioecological framework. Chapter 2 deals specifically with the literature relating to resilience, educational resilience, and Kumon, and outlines the rationale for the focus of the research undertaken in this study. A guide to the structure of the thesis is presented at the end of Chapter 2. Chapter 3 describes the research program, including the study design, materials used and key characteristics of study participants.

Later sections present the results of the research program and discussion of key findings, and integrate these findings with the wider literature to provide conclusions and suggestions for future research.

1. BACKGROUND AND CONCEPTUAL ISSUES

1.1. Review of Literature

This chapter will outline the main conceptual issues critical to an understanding of the field of resilience, and orient the reader to the theoretical rationale underlying the study program. An understanding of developmental psychology is critical to study in this field, since resilience reflects the unfolding of human potential over time. Bronfenbrenner's (Bronfenbrenner, 1979b, 1995) bioecological framework is the preferred rationale for human development within the context of resilience, as it addresses the multi-level interactions that make resilience so challenging to measure and study. Further challenges in studying resilience come from the lack of agreement on how to measure, define and discuss concepts such as positive adaptation, adversity, risk factors and protective factors; a summary of the literature dealing with these concepts is presented. An overview of the literature relating to academic achievement is also presented, as this area underpins later discussions of resilience in the educational context.

1.1.1. Developmental Psychology

Citizens of the 21st century are often surprised to learn that the distinct developmental category of "child" was unacknowledged for great periods of time in Western society (Postman, 1994). During medieval times, humans between the ages of 7 and 17 were thought of as "small-sized adults" and were held to standards of dress, behaviour and experience that reflected this view (Aries, 1973). It was not until after the Renaissance, with the rise of adult literacy, prolonged education and changes to societal mores, that the category of "childhood" was widely recognised as a distinct developmental stage, with important needs and critical influences (Postman, 1994). Developmental psychology as a distinct science began to evolve in the late 19th Century, and since the beginning of the 20th Century, a range of theorists have propounded views on the developmental psychology of human beings,

from Freud (1961) to Piaget (1969) and Bandura (1977). In more recent periods, the role of developmental systems has been explicitly recognised, leading to a "greater emphasis on the role of relationships and systems beyond the family and attempts to consider and integrate biological, social, and cultural processes" (Wright & Masten, 2006, p. 25) into the study of development.

One of the most thorough and widely-used explanations of child development is provided by Bronfenbrenner's (1979b, 1995) bioecological framework, which takes into account the developmental processes occurring within the child, as well as the bi-directional and reciprocal influences on development provided by the family environment, and the structures of neighbourhood, school, workplace, cultural and political circumstances within which the family exists. Table 1.1 describes the levels of the bioecological framework[1]. This approach to child developmental psychology considers the systems within which a child develops to be critical to an understanding of that development, and recognises that these social systems, each embedded within the next, influence each other in complex ways:

> When elements in one system change, elements in other systems react and interact. Children, located at the centre of these nested systems, are continuously affected, one way or another, by changes that occur in the environments that surround them . . . In each child's case, different patterns of action, interaction and reaction will pertain, even when stressors such as parental unemployment are the same. (S. Howard & Johnson, 2000, p. 323)

In this view, development is seen as a process of transactional construction, in which the self develops through a series of reciprocal interactions with the individuals and contexts within which development occurs (Sameroff, 2008), rather than as an "inevitable unfolding of predetermined characteristics" (Blum, McNeely, &

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[1] The bioecological framework is similar in many ways to the ecological-transactional approach; it provides for the inclusion of biological factors where relevant, and is the more recent usage.

Nonnemaker, 2002, p. 29). Children are actively involved in organising their experiences, engaging in bi-directional, mutual interactions with others involved in their care and support (S. Goldstein & Brooks, 2006). If development is ultimately "a question of linkages that happen within... a person and also in the environment in which [they] live" (Rutter, as cited in Pines, 1984, p. 62), then the linkages between children and parents, children and peers, and children and the wider system, as well as the linkages between levels of the environment, must be recognised as crucial to this process.

Table 1.1

Bronfenbrenner's Bioecological framework (Bronfenbrenner, 2005)

Setting	Level of environment
Individual child	Biological predispositions; innate tendencies.
Microsystem	Child in their immediate environment: home, parents, siblings; school, teachers, peers; neighbourhood. Interactions between members of a microsystem can also influence child development.
Mesosystem	Connections between the child's immediate settings – home and school; school and neighbourhood.
Exosystem	Social settings that affect but do not contain the child: parental workplaces; community health and welfare settings; parents' social networks.
Macrosystem	The values, laws and customs of a child's culture that affect events at lower levels of the framework: childcare laws; level of government funding for health and education; laws regarding equality of opportunity. Includes socio-economic status; ethnicity.
Chronosystem	The evolution of the system over time, both in respect to the child's experience of development and transitional events, and to important sociohistorical circumstances.

Linkages between levels (*cross-level effects*) happen in three main ways. Top-down effects occur when higher-level systems influence lower levels systems – for example, when governments pass laws enacting access to paid maternity leave for every family (macrosystem change), this has a direct effect on the amount of time some mothers can afford to spend with their newborn children (microsystem result). Bottom-up effects allow lower levels of the environment to influence higher levels, as when a child's chronic illness (microsystem change) causes a parent to reduce their hours of work (exosystem result), or when a group of parents in a neighbourhood (mesosystem change) lobby their elected representatives for better state-supported childcare options (macrosystem result). Interactive effects also occur interdependently across multiple levels of the system, as when a parent's problems with unreasonable employment demands affect their work performance (exosystem), time spent participating in the Parent-Teacher Association (mesosystem), and their relationship with partner and child (microsystem).

Within-level interactions can also influence development, because the relationship between any dyad at a given level can be influenced by third parties. For example, within the microsystem of the home, a mother who encourages and supports her partner to participate fully in the raising of their child (feeding, bathing, changing, etc.) will facilitate development of a stronger relationship between father and child. Similarly, at the mesosystem level, a parent who speaks disrespectfully about a child's teacher will not encourage the promotion of an effective relationship between child and teacher.

As well as outlining the ecological framework, Bronfenbrenner proposed a method of "ecological experiment", an attempt to:

> investigate the progressive accommodation between the growing
> human organism and its environment through a systematic
> contrast between two or more environmental systems or their
> structural components, with a careful attempt to control other

sources of influence either by random assignment (planned experiment) or by matching (natural experiment).

(Bronfenbrenner, 1979b, p. 36)

This, he believed, was the best method for investigating the interdependencies between the nested systems – by deliberately structuring ecological experiments to occur within an interactive ecology of development, rather than through trying to reproduce single aspects of the developmental process in a laboratory setting. Rather than testing hypotheses, Bronfenbrenner initially sought to understand the existing relationships between individuals and their environments as a basis for understanding development. The benefit of this approach to researchers and practitioners is that:

a better understanding of the forces and experiences shaping human development allows us to bridge the gap between empirical research and the application of knowledge. Based on research evidence, guiding principles for the design and implementation of specific, developmentally appropriate interventions can be obtained for improving the well-being and development of human beings by influencing the conditions of their lives. (Schoon, 2006, p. 20)

His approach has been widely adopted in studying processes of developmental psychology over the last 20 years.

Recent work investigating the genetic and evolutionary basis of child development aligns closely with the bioecological framework. This frame of reference moves beyond the binary "nature-nurture" or "biology-psychology" perspective, and the bioecological framework allows for "tackling difficult problems at multiple levels of analysis, each of which has something to contribute and none of which is sufficient in and of itself" (Geary, 2006, p. 113). The bioecological framework thus provides a powerful and flexible method for describing and understanding the complex set of

nested social systems within which development occurs. The relevance of this framework to resilience research is clear: factors that influence resilience exist and interact at all levels of the environment, providing both potential threats to development and opportunities to support resilient development in all children.

1.1.2. Resilience Research within the Bioecological Framework

While the broader resilience literature is discussed at length in Chapter 2, this section presents an overview of resilience research with reference to the bioecological framework. This framework has been flexibly applied to the field of resilience in a large number of studies over the last decade. For clarity, the studies are categorised according to the level of the ecological framework with which they were most closely linked.

"Within child" factors.

Studies that have taken a bioecological perspective and yet identified "within child" factors as significant in resilience have usually also identified factors at the microsystem and mesosystem level as relevant in their analyses. For example, Gutman, Sameroff and Cole (2003) found that while child factors such as cognitive ability have a protective influence on resilience, this outcome occurs only for children classified as "low-risk"; children for whom the micro- and meso-level negative influences are sufficient to warrant a classification of "high-risk" do not appear to benefit from the protective influence of higher IQ. Similarly, Spencer, Noll and Cassidy (2005) found that monetary incentives for academic achievement were differentially effective in a sample of low socio-economic status adolescents, depending on the students' self-perceptions. Sacker and Schoon (2007) found that while academic achievement, personal confidence and aspirations for education all affected the likelihood of reintegration into education after leaving school at 16 years of age, the impact of family expectations and support also played a critical role. These studies therefore support the idea that development occurs as an interaction

between the personal qualities of the child, and the environment within which they are raised.

Microsystem

The majority of studies using the bioecological model have focussed on the microsystem level, investigating the manner in which a child's immediate environment, be it home, school or childcare, influences the development of the child. Krishnakumar and Black (2002) determined that family factors had negative influences on the life outcomes of African American children, including: family economic hardship, maternal alcohol abuse, maternal depression and quality of the home environment. Kurdek and Sinclair (2000) noted that child, family and peer influences (such as cognitive self-control, parental involvement in schooling and peer academic performance) affect academic outcomes in primary school children. Academic outcomes for children from disadvantaged backgrounds were also influenced by exposure to good quality childcare before school age (Campbell, Pungello, Miller-Johnson, Burnchinal, & Ramey, 2001), and participation in after-school care programs (Mahoney, Lord, & Carryl, 2005). Similarly, academic performance was increased in students who attended schools with good academic records (B. Johnson & Howard, 2007), and who believed that their teachers had high expectations of them (B. E. Becker & Luthar, 2002). The broader resilience of children in the alternative care system was strongly influenced by their level of success in education (Jackson & Martin, 1998). Finally, although resilience can vary between domains (Harvey & Delfabbro, 2004; Schoon, 2006), within domains it appears strongly consistent over time. For example, Howard and Johnson (1999) followed students for one year who were identified by their teachers as displaying "resilient" or "non-resilient" behaviours. Fifty-two out of the 55 children assessed, consistently displayed the same behaviours as demonstrated in the initial interview, within the school context.

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Mesosystem

The mesosystem, with its focus on the connections between child settings, is the obvious level of interest for studies that assess synergies or dissonances between home and school to determine influences on their development. Perry and Weinstein (1998) found that early school adjustment was dependent on academic functioning, social functioning and behavioural functioning; however, these were all affected by home environment prior to schooling, as well as school factors. Schulting, Malone and Dodge (2005, p. 861) noted that adjustment during the first year of formal schooling required "fostering positive relationships among the home, school, community, and peer group to support the child throughout the transition". Similarly, both Rutter, Maughan, Mortimore and Ouston (1979) and Burchinal, Peisner-Feinberg, Pianta and Howes (2002) found that positive school experiences and relationships can act to ameliorate the effects of a negative home environment.

Exosystem and macrosystem

Consistent with the tendency for human perception to show a bias towards proximal (intra-individual or intra-family) explanations for behaviour and outcomes (Bronfenbrenner & Evans, 2000; Capella & Weinstein, 2001; B. Johnson, Howard, Dryden, & Johnson, 1997; Melhuish, et al., 2008), fewer studies appear to focus on the influence of the exosystem and the macrosystem on children's development. Hoover-Dempsey and Sandler (1997) noted that parent employment and extended family support influenced the degree to which parents become involved in their children's education. Hill, Waldfogel, Brooks-Gunn and Han (2005) used data from the National Longitudinal Survey of Youth study to analyse outcomes for 6114 children, reporting that maternal employment in the first year of life had a small but significant negative impact on later cognitive development compared to maternal employment after the first year, across all family income levels. Similarly macrosystem influences on development were described by Engle, Castle and

Menon (1996) who reported that children's psychosocial development in Third World countries was vulnerable to comparatively recent changes in the environment, including "urbanisation, political violence, changing family forms, and...decreased supplies of adequate food" (p. 621), whereas the introduction of laws banning child labour or requiring compulsory education in these countries may have had positive impacts on children's psychosocial development. Likewise, Schoon (2006, p. 3) notes that "developmental processes should be viewed not only in relation to individually lived time, but also in relation to the socio-historical context in which they take place".

Cross-level research

It has been said that to examine individual levels within the ecological systems framework is, to some extent, "highly contrived, because characteristics of children are heavily influenced by environmental factors; in turn, children shape family, peer, and community contexts through reciprocal and transactional influences" (Haskett, Nears, Sabourin Ward, & McPherson, 2006, p. 800). Therefore, many researchers have identified multiple, overlapping domains that directly and indirectly affect development (Capella & Weinstein, 2001). This approach requires that cross-level influences on resilience and achievement are taken into account in explaining the relationships between individuals, environments and development.

Gutman and Midgeley (2000) noted that child psychological, family and school factors all influence academic achievement in poor African American students. Haskett, Nears, Ward and McPherson (2006) found that factors that protect children who experience maltreatment exist at child level, family level, and extra-family and community level. Kumpfer and Bluth (2004) noted influences on children's resilience across three major domains – child characteristics, family context and features of the community.

Luthar and Cicchetti (2000) recommended that interventions aimed at improving resilience should target developmental processes that occur across multiple levels of influence. The multi-level Families And Schools Together (FAST) program, for enhancing academic performance and engagement in at-risk children, was analysed by Kratochwill, McDonald, Levin, Bear-Tibbets and Demaray (2004) and Soydan, Nye, Chacon-Moscosco, Sanchez-Meca and Almeida (2005). They found that interventions aimed at integrating: child development; parent self-help and empowerment training; family systems; social support; parenting techniques; and links to school and community; resulted in improvements to children's academic performance, and reductions in the impacts of stress, isolation and poverty on families. A similar school-based program, Resilient Families, has aimed to promote adolescent health and wellbeing through interventions focussed on multiple levels, including: the adolescent's emotional, communication and problem-solving skills; the parents' creative parenting skills; and developing a community of parents within a school (Shortt, Toumbourou, Chapman, & Power, 2006).

Reviews

A number of review papers have assessed the field of resilience from a bioecological perspective. The limitations of a linear view of development were noted in a review of the field of resilience research by Luthar and Zigler (1991), who instead advocated a transactional, ecological approach. Howard, Dryden and Johnson's (1999) review of the field concluded that future research in resilience "should adopt a theoretical and practical ecological framework" (p. 307). A critical evaluation of the field of resilience research (Luthar, Cicchetti, & Becker, 2000), observed that ecological-transactional approaches comprise "the conceptual bases for resilience research" (p. 552). A review of school leaders' perspectives on resiliency concluded that the legitimacy of using schools to promote resilience is predicated on the acceptance of a contextual, ecological model (Bosworth & Earthman, 2002). Harvey

and Delfabbro (2004), in a review of resilience in disadvantaged youth, found that Bronfenbrenner's (1979b) "conceptual framework provides little guidance concerning the role and functions of [the] very broadly described ecological systems [and that]...simpler models [may] come closer to understanding the actual processes involved in the development of resilience at an individual level" (Harvey & Delfabbro, 2004, p. 9), but noted that the model "encourages cross-disciplinary approaches and perspectives" (p. 9) and provides a high-level theoretical framework for research. J.L. Johnson and Wiechelt (2004, p. 662) noted that the study of resilience requires "dynamic variables, with multiple mechanisms and processes within ecological and transactional models".

The bioecological approach can thus be seen as an appropriate framework within which to explore aspects of resilience, because it takes into account factors that influence resilience at the level of the child, the family, the school and the society. Therefore this model was chosen to underpin the research undertaken in the present study. As outlined in this section, many researchers agree that the bioecological framework is an appropriate perspective for analysing resilience outcomes. However, there are many other important concepts in resilience that are less widely agreed.

1.1.3. What Comprises Positive Adaptation?

One concept about which researchers have not yet reached agreement is the assessment of positive adaptation. Broadly, the outcomes of development for young people lie across a spectrum from positive life outcomes to negative life outcomes – positive outcomes are judged on a range of criteria from absence of pathology to the experience of subjective well-being (Wright & Masten, 2006). The absence of physical and mental illness, or other negative outcomes, was considered "successful" in the early days of resilience research; (and indeed, in some modern-day prevention research; Luthar, Cicchetti , & Becker, 2000), while more recent research has tended

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to focus on the achievement of competent development: the achievement of "age-salient developmental tasks" (Masten & Obradovic, 2006, p. 15). In general, competent development can be summarised as possession of "average or better academic outcome, conduct, and social histories...[based on] psychosocial resources, including better intellectual functioning, parents of good mental health, parental availability, and more positive self-concept" (S. Goldstein & Brooks, 2006, p. 10). As such, adaptation is "inherently multi-level" (Masten, 2007, p. 925), meaning that individuals require the effective inter-operation of processes at all levels of the bioecological framework to reach competence. These processes range in scale from intra-individual molecular/genetic/biological processes all the way through to macrosystemic societal/political/global interactions; but changes at any level may influence individual development outcomes.

Individuals are generally judged to be competent in their development if they have met, "and continue to meet, the expectations explicitly or implicitly set in the society for children as they grow up" (Wright & Masten, 2006)[2]. Success in earlier developmental stages predicts success in future age-salient tasks, across all developmental domains (Masten & Obradovic, 2006). Individuals who have had a troubled adolescence are not necessarily consigned to failed adaptation for their entire lives. However, the events and experiences of the first decade in life have a significant effect on future life outcomes (Masten, 2007; Rutter, 2006; Werner, 2006).

In most cultures there are expectations around the approximate life stages at which individuals should begin to walk, talk, begin formal education, take responsibility for their possessions, prepare their own food, manage their own finances, marry and reproduce. The expectations around these activities may differ in timing and type, or between genders, across different societies (Masten & Obradovic,

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[2] Judgements about the achievement of competence are often discussed in the literature as if they relate solely to childhood, adolescence and early adulthood, but in truth, the possibility for individuals to become "responsible partners, parents and citizens in their communities" (Werner, 2006, p. 97) remains alive well into middle and even late adulthood, given the right opportunities (Rutter, 2006).

2006), but individuals who do not learn to perform these tasks, or perform them at times that are wildly at variance with the general expectations of their societies, are judged to have more negative life outcomes than their peers. If young people can meet the expectations of their cultures throughout development, they are considered competent according to the standards of that culture.

Not only the standards of competence but also the methods used by young people to achieve competence vary across cultures. Ungar and colleagues (2007) conducted an international study across 11 countries which demonstrated that young people used culturally-specific techniques to resolve developmental challenges. In defining successful development therefore, the question of "who...defines the criteria for judging good adaptation?" (Masten & Obradovic, 2006, p. 20) is critical. It is crucial that Western[3] researchers do not simply adopt their own cultural assumptions about what constitutes "success" and apply these assumptions to marginalised groups or individuals from different cultural and ethnic backgrounds, who may have different perspectives on what constitutes success (Wright & Masten, 2006). For example, Bartelt (1994, cited in Kaplan, 2006), notes that in Hispanic families under financial pressure, expectations that teenaged children will leave school and seek employment to assist in supporting their families financially can be seen as adaptive amongst that cultural group, even though the Western perspective on "dropping out" of high school is uniformly one of failure. The differential value of academic achievement between the two cultures means that a judgment of success or failure in this instance is highly culturally dependent.

Academic achievement is so highly valued in Western society that it has become one of the few "central and crucial task[s]" (Baker, Akiba, LeTendre, & Wiseman, 2001, p. 3) allowing young people to transition to adulthood. Where previously initiation ceremonies, leaving the parental home or marriage marked the

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[3] In line with common usage, within this paper, "Western" is used to indicate cultures based in Australia, New Zealand, North America, and Europe.

status transition from childhood to adulthood (Arnett, 1998; Barry & Schlegel, 1980; Shanahan, 2000), increasingly in modern Western society young people are required to proceed through the educational system in order to achieve adult status (Baker, et al., 2001). The premature end of a young person's school career has such significant negative impacts at both an individual and a societal level that a great deal of research has been conducted to determine the factors which promote successful performance at school and the outcomes which are likely to flow from achieving such a level of performance.

1.1.4. Academic Achievement

The relation between academic achievement and ongoing economic, career and social outcomes for individuals in Western society has been well established (Baird, 1985; Card, 1999; Christenson, et al., 2000; W. Johnson, McGue, & Iacono, 2006; Long, 2010; Pope, 2001; Ross & Mirowsky, 1999; Rumberger, 1995; Rumberger & Lamb, 2003; Schoon, 2006; Seligman, 1995; Werner, 2006). In fact, "in almost all Western cultures, academic attainment has been established as the most consistent childhood predictor of adult achievement in the world of work, family life and health" (Schoon, 2006, p. 27). Students who achieve above-average marks at school are likely to advance to well-paid professional positions that provide both financial and personal development benefits, while those who score at the lower end of the spectrum for literacy and numeracy skills often progress to jobs with lower rates of pay and less satisfying responsibilities, or fail to gain employment at all (Teese, 2000). Achievement at school is associated with:

> lower rates of negative outcomes such as teen pregnancy,
> welfare dependency, and criminal behavior, as well as higher
> levels of positive outcomes that include employment stability and
> lifetime income. (Bronfenbrenner, McClelland, Wethington, Moen,
> & Ceci, 1996, in W. Johnson, et al., 2006, p. 514)

Significantly, academic achievement is cumulative: success in acquiring basic skills lays the foundation for learning at high school; achievement in high school is critical to entry into tertiary studies. It is therefore necessary to investigate the factors that contribute to academic achievement from the earliest stages of schooling (W. Johnson, et al., 2006).

Academic achievement in the bioecological framework

Academic achievement has been linked with factors at all levels of the ecological framework (Bronfenbrenner, 1979b), from within-child and within-family factors, to socio-economic characteristics of family and school (see Table 1.2), through to broader political and educational trends. For example, Greenwald, Hedges and Laine, (1996) found large positive correlations between the quantity of financial resources allocated to a school, and academic achievement, suggesting that "moderate increases in spending may be associated with significant increases in achievement" (p. 361). Likewise, the change in classroom organisation from streaming (where students of similar ability are taught in the same classroom), to mixed-ability classrooms, is thought to have lead to a decline in the academic achievement of the highest and lowest ability children in these classes (Gregory, 1984). However, these political and educational factors are largely outside the control of people who are most concerned with a child's educational achievement and resilience, be they parents, teachers or social workers. As Table 1.2 makes clear, the vast majority of factors, the impact of which on academic achievement have been investigated, fall within the realms of child, family and school factors, or the micro- and mesosystemic influences. Early exposure to risk factors can lead to adverse effects on the academic trajectories of children during their entire schooling careers (Sameroff & Rosenblum, 2006).

Table 1.2

Factors thought to influence levels of academic achievement, categorised by domain of action and direction of effect.

Within-Child	Within-Family	Within-School
Psychological factors	**Parent Demographic factors**	**Teacher level factors**
Positive influence	Negative influence	Complex influence
Self-acceptance (Sharma, 1971)	Parental unemployment (Madge, 1983)	Classroom reward structure (Slavin, 1977)
Perceived control (Stipek & Weisz, 1981)	Parental absence (Marino & McCowan, 1976)	Teacher characteristics, and teaching
Intelligence (Brody, 1992)	Maternal employment (Hill, et al., 2005;	behavior (Centra & Potter, 1980)
Self-concept (Leviton, 1975)	Hoffman, 1980)	Classroom management, discipline and
Locus of control (Findley, 1983; Lynch,	Single parent families and the experience of	pupil conditions (Rutter, 1983)
Hurford, & Cole, 2002)	divorce (Wodarski, 1982)	Pupil participation and responsibility
Negative influence	Complex influence	(Rutter, 1983)
Aggression (D. C. Smith & Furlong, 1994)	Parental education, income, and occupation	Match between learner's preferences and
Complex influence	(Jimerson, Egeland, & Teo, 1999; Pandey,	instructional setting (Fallon, 2007;
Big Five Personality factors (Entwhistle, 1972)	1984)	MacAulay, 1990)
(De Raad & Schouwenburg, 1996)		
Cognitive orientation (Shade, 1982)		

Within-Child	Within-Family	Within-School
Child Behaviour factors	**Parents' behaviour and expectations**	**School level factors**
Positive influence	Positive influence	Positive influence
Out-of-school tuition (McKenna, et al., 2005; Oakley, et al., 2003; Oakley, et al., 2005)	Parental participation (Pandey, 1984)	High school order (Gaddy, 1988)
Behavioural self-control (Workman & Hector, 1978)	Parent's educational expectations (Portes & Fernández-Kelly, 2008; Seginer, 1983)	Academic emphasis (Rutter, 1983)
Negative influence	Parental involvement in child's education (Jimerson, et al., 1999)	Complex influence
Delinquency (Gagné, 1977)		School resources (Rutter, 1983)
Behavioural problems (Jimerson, et al., 1999; Ruhl & Berlinghoff, 1992)	Structure for learning, home affective environment, discipline, and parent involvement (Christenson, Rounds, & Gorney, 1992)	Within-school conditions (Centra & Potter, 1980)
Complex influence		Organisational structure (Rutter, 1983)
Classroom behaviour (Hoge & Luce, 1979)		Staff organization (Rutter, 1983)
Child Demographic factors	Negative influence	School or school district conditions, (Centra & Potter, 1980)
Negative influence	Harsh parenting: constraint, isolation, physical punishment, family conflict (Pandey, 1984)	Student body composition (Rutter, 1983)
Bilingualism (Gezi, 1974)		School and class size (Odden, 1990; Rutter, 1983)
Complex influence	Complex influence	
Sex (Reis, 1991)	Parents' attributions (Christenson, et al., 1992)	

Within-Child	Within-Family	Within-School
Child experiences	Permissive parental behaviour and parental	**Resources and environment**
Negative influence	support (Pandey, 1984)	Negative influence
Bereavement (Fleming & Balmer, 1996)	Home educational environment (Pandey,	Classroom lighting (Dunn, Krimsky,
Child's number of years in special education	1984)	Murray, & Quinn, 1985)
(Jimerson, et al., 1999)		Environmental noise (DeJoy, 1983)
Disease and Impairment	**Other family factors**	Complex influence
Negative influence	Negative influence	Allocation of school resources – financial,
Impairments: Attention (DuPaul & Eckert,	Child abuse and neglect (Heilig, 1987)	educational, and student (Spady,
1998); Language (Schachter, 1996);	Growing up in poor neighbourhood (Mayer &	1973)The physical environment of the
Sensory (Goetzinger & Proud, 1975)	Jencks, 1989)	classroom - seating position,
Chronic disease (Rovet, Ehrlich, Czuchta, &	Family mobility (Turner & McClatchey, 1978)	classroom design, density, privacy,
Akler, 1993)	Complex influence	noise, the presence of windows
Acute disease (Brown & Madan-Swain, 1993)	Quality of the home environment (Jimerson, et	(Weinstein, 1979)
Head injury (F. C. Goldstein & Levin, 1985)	al., 1999)	
Pre-natal drug exposure (Shriver & Piersel,	Sibling numbers and birth order (Steelman,	
1994)	1985)	

Benefits of academic achievement

However, as noted earlier, academic achievement is not commonly an end in itself, but is valued to the extent that it predicts or permits a student's achievement of key developmental goals (including development of a positive self-image) and take up a valued role in society upon reaching adulthood. Thus, it is not the causes of academic achievement that are most interesting, but the consequences. In this regard, reviews have demonstrated that academic achievement has a low to moderate positive relation with occupational accomplishment (Baird, 1985), with lifetime earnings and with career stability (Bronfenbrenner, McClelland, Wethington, Moen, & Ceci, 1996; E. Smith, 2005).

Similarly, a large body of work has found correlations between academic achievement and high self-esteem (Borman & Overman, 2004; Marsh, 1990; Seligman, 1995). Perhaps this is hardly surprising given that the school environment is the place where "young people have their first encounter with a structured social arena within which to experience the 'sense of industry', the consequences of social and academic competence, competition and power relationships" (Schoon, 2006, p. 32). However, while earlier investigators attempted to raise children's self-esteem in order to improve their school grades, the current view is that self-esteem is a consequence of achieving success at school, rather than a pre-requisite for it (Borman & Overman, 2004; Seligman, 1995). Positive self-assessment is therefore intimately linked with achievement, and it is at least very difficult to foster the former in the absence of the latter. As Dryden, Johnson, Howard and McGuire (1998, p. 31) put it:

> ...the broad implication for teachers who wish to foster childhood
> resiliency and student achievement is that their efforts should be
> directed at helping children do well in a variety of areas at school.

Children's experience at school shapes three critical areas of development: sense of self as an academic performer; understanding and internalising of the rules of "achievement" that drive success in society; and experience in "getting along" with peers, acquaintances and superiors (Schoon, 2006). It is for these reasons that disruptions to academic achievement, or under-achievement in the academic realm, are viewed with such concern (Baker, et al., 2001).

Influences on academic achievement

The multiplicity of influences on academic achievement tend to cluster, so that children who live in a low-socioeconomic status (SES) neighbourhood are also more likely to have a deprived home educational environment, and attend schools with lower than optimal resourcing (Condly, 2006; Mayer & Jencks, 1989). Resilience research has demonstrated that children who are living with many negative influences on their academic achievement can still maintain a better-than-expected standard of educational attainment with the provision of appropriate supports at school and at home (Jimerson, et al., 1999). Children with difficult home situations are likely to do better if they attend a school with attentive, caring teachers as well as a strong academic focus (Rutter, et al., 1979). Young people from single parent families generally do better if there is a supportive extended family involved (Runyan, et al., 1998; P.A. Wyman, et al., 1999). Children in under-resourced schools do better if their parents have high academic expectations and are supportive (Nettles, Mucherah, & Jones, 2000) or if they feel a sense of connection to the school (Gonzalez & Padilla, 1997; Reyes & Jason, 1993). So the factors influencing academic achievement are themselves subject to influence by other variables in the mesosystem, and outcomes, even for children in difficult circumstances, can be influenced and improved.

Academic achievement is a gateway to positive self-perception (Seligman, 1995), as well as wider options in adult life (Baird, 1985), and a child for whom this

gateway closes prematurely may have circumscribed future life earnings, career opportunities and job satisfaction, as well as setting a path that leads to lowered self-esteem. Initial achievement gaps between children tend to become magnified throughout the schooling process, gradually widening over time through reciprocal interactions and feedback loops (Kwok, Hughes, & Luo, 2007; Schoon, 2006), so that it is important to remediate performance issues as soon as they are noticed, if possible. One aim of researchers currently working in the field of educational resilience is to determine what supports can be provided to children experiencing life difficulties, so that their level of academic achievement remains as high as possible.

1.1.5. Adversity in Children's Lives

A human's journey from birth to death is affected by many factors, but a great deal of research has focussed on the lifelong impact of those factors that operate during childhood; particularly those factors that are seen to have an adverse effect on the developmental flourishing of those individuals who experience them (e.g., Felitti, et al., 1998; Flaherty, et al., 2006; Furstenberg, Cook, Eccles, Elder, & Sameroff, 1999; Grant, et al., 2003; Kessler, Davis, & Kendler, 1997; Zolotor, et al., 1999). While the experience of challenge in life is universal, and the experience of overcoming challenges is one of the engines driving the development process, when the quantity, severity or scope of these challenges become too severe, normal developmental processes break down (Baldwin, et al., 1993).

Adversity in childhood occurs when the relationship between a child and her environment threatens the satisfaction of basic needs or goals, or impedes the age-appropriate accomplishment of development tasks (Sandler, 2001, in Winslow, Sandler, & Wolchik, 2006). These adversities may exist in the individual domain, within the family, or at a community/organisational level (Condly, 2006; Sheridan, Eagle, & Dowd, 2006; Winslow, et al., 2006), and act cumulatively with an impact that often continues far beyond childhood and into adult life (Felitti, et al., 1998; Flaherty,

et al., 2006; Furstenberg, et al., 1999; Masten, 2007; Sameroff & Rosenblum, 2006).

Table 1.3 outlines examples in each of the domains of adversity.

Table 1.3

Domains of childhood adversity, with examples

Individual	Family	Community/Organisational
Serious illness or injury	Changes in family structure (divorce, death)	Community characteristics (e.g., poverty, disorganisation)
Experience of abuse	Conflict or violence within the family	Characteristics of schools (e.g., violence, lack of funding)
Social problems (e.g., bullying)	Parental alcoholism or mental illness	Large scale changes to environment (e.g., economic depression, war)

Note: Row highlighting was used to enhance readability of the table

The experience of multiple adversities during childhood often results in a classification of "high risk" for a child (Werner, 1996). In this context, "high risk" may refer to a child who is at a greater risk of: developing physical or mental health issues as an adult (Felitti, et al., 1998; Flaherty, et al., 2006; Furstenberg, et al., 1999; Grant, et al., 2003; Kessler, et al., 1997); academic failure or learning problems (Werner, 1996; Zolotor, et al., 1999); behaviour problems, delinquency or teenaged pregnancy (Werner, 1996); or other negative life outcomes. Table 1.4 summarises factors likely to lead to adversity, and outcomes of these adversities (with Odds Ratios [OR] where available).

Table 1.4

Areas of Child Adversity and potential outcomes, with correlations or Odds Ratios where available

Note: Row highlighting was used to enhance readability of the table

Factor	Source	Outcomes and Statistics
Born into Poverty	Werner (1996)	66% have serious learning/behaviour problems by age 10; delinquency records, MH** problems or teenage pregnancies by 18 years.
Family poverty	Grant, et al. (2003)	Poverty predicts negative parenting ($r = 0.31$)
Low maternal age	Zolotor, et al. (1999)	Inverse relation to school performance
Pre-term birth	Zolotor, et al. (1999)	Inverse relation to school performance
Peri-natal stress	Werner (1996)	Serious learning/behaviour problems by age 10; delinquency records, MH problems or teenage pregnancies by 18 years.
Unemployed mother	Zolotor, et al. (1999)	Inverse relation to school performance
Death of Mother	Kessler, et al. (1997)	OR** of causing MH outcome: 0.90 (not signif)
Death of Father	Kessler, et al. (1997)	OR of causing MH outcome: 0.78*
Parental absence of 6+ months	Kessler, et al. (1997)	OR of causing MH outcome: 1.28*
Absent biological father	Zolotor, et al. (1999)	Inverse relation to school performance

Factor	Source	Outcomes and Statistics
Discord in family environment	Werner (1996)	66% have serious learning/behaviour problems by age 10; delinquency records, MH problems or teenage pregnancies by 18 years.
Witnessing domestic violence	Felitti, et al. (1998)	Negative physical health outcomes in adulthood
Domestic violence in the home	Flaherty, et al. (2006)	Poor health, or illness requiring professional care, in childhood
Divorce	Werner (1996)	66% have serious learning/behaviour problems by age 10; delinquency records, MH problems or teenage pregnancies by 18 years.
Parental separation or divorce	Kessler, et al. (1997)	OR of causing MH outcome: 1.19*
Psychological abuse	Felitti, et al. (1998)	Negative physical health outcomes in adulthood
Psychological maltreatment	Flaherty, et al. (2006)	Poor health, or illness requiring professional care, in childhood
Mother verbal aggression to child	Kessler, et al. (1997)	OR of causing MH outcome: 1.20*
Father verbal aggression to child	Kessler, et al. (1997)	OR of causing MH outcome: 1.32*
Negative parenting style	Grant, et al. (2003)	Negative parenting predicts externalising symptoms (0.32) and internalising symptoms (0.36)
Physical abuse	Felitti, et al. (1998)	Negative physical health outcomes in adulthood
	Flaherty, et al. (2006)	Poor health, or illness requiring professional care, in childhood

Factor	Source	Outcomes and Statistics
Substantiated maltreatment history	Zolotor, et al. (1999)	Inverse relation to school performance
Sexual abuse	Felitti, et al. (1998)	Negative physical health outcomes in adulthood
	Flaherty, et al. (2006)	Poor health, or illness requiring professional care, in childhood
Repeated sexual molestation	Kessler, et al. (1997)	OR of causing MH outcome: 1.93*
Parental alcoholism	Werner (1996)	66% have serious learning/behaviour problems by age 10; delinquency records, MH problems or teenage pregnancies by 18 years.
Parental alcoholism/drug abuse	Felitti, et al. (1998)	Negative physical health outcomes in adulthood
Father alcohol/drug abuse	Kessler, et al. (1997)	OR of causing MH outcome: 1.25*
Caregiver problem drinking	Flaherty, et al. (2006)	Poor health, or illness requiring professional care, in childhood
Parental mental illness	Felitti, et al. (1998)	Negative physical health outcomes in adulthood
	Werner (1996)	66% have serious learning/behaviour problems by age 10; delinquency records, MH problems or teenage pregnancies by 18 years.
Caregiver depression	Flaherty, et al. (2006)	Poor health, or illness requiring professional care, in childhood
Mother major depression	Kessler, et al. (1997)	OR of causing MH outcome: 1.32*
Father major depression	Kessler, et al. (1997)	OR of causing MH outcome: 1.25*

Factor	Source	Outcomes and Statistics
Mother GAD**	Kessler, et al. (1997)	OR of causing MH outcome: 1.61*
Father GAD	Kessler, et al. (1997)	OR of causing MH outcome: 1.22*
Child anxiety	Martin & Marsh (2006)	Predicts academic resilience -0.63
	Zolotor, et al. (1999)	Inverse relation to school performance
Child depression	Zolotor, et al. (1999)	Inverse relation to school performance
Criminal behaviour in the home	Felitti, et al. (1998)	Negative physical health outcomes in adulthood
	Flaherty, et al. (2006)	Poor health, or illness requiring professional care, in childhood
Being in a life threatening accident	Kessler, et al. (1997)	OR of causing MH outcome: 0.71*
Being in a natural/manmade disaster	Kessler, et al. (1997)	OR of causing MH outcome: 0.79*
Mugged/kidnapped	Kessler, et al. (1997)	OR of causing MH outcome: 1.47*

* Significant at the 0.05 level

**MH – Mental Health; OR – Odds Ratio; GAD – Generalised Anxiety Disorder

There is a strong positive correlation between the extent of exposure to adversity and the severity of adult outcomes (Felitti, et al., 1998; Flaherty, et al., 2006; Furstenberg, et al., 1999; Sameroff & Rosenblum, 2006; Werner, 1996). In addition, Kessler and colleagues (1997) found that different types of adversities showed little predictive specificity – that a difficult life predisposed children to negative mental health (MH) outcomes, but specific adversities were not linked to particular mental illnesses. This research suggests that it is the quantity and severity of adversities experienced by a child, rather than the nature of those adversities, that most usefully predicts their expected life outcome in the absence of protective factors.

1.1.6. Risk and Protective Factors

While there exists substantial research agreement about the factors which comprise adversity in development (Werner, 2006), there is a lack of consensus on the relation between adversity and risk, on the relation between risk factors and outcomes, and on the nature of protective factors. Nor is there agreement on the manner in which risk and protective factors jeopardise or enhance resilient development. This is a problem for resilience researchers because it is impossible to define resilience without addressing these concepts.

Defining risk and protective factors

Defining risk factors and protective factors is not a trivial matter (S. Goldstein & Brooks, 2006). Wright and Masten (2006) have developed a set of definitions of key concepts in this area which have received support from other researchers; selected definitions are presented in Table 1.5. Conceptually, developing such definitions is challenging because there are no clear criteria governing the assignment of variables to the categories of "risk", "protective" or "other", and all judgements about risk and protective factors are by definition, *post hoc* (Kaplan, 2006). Furthermore, comparisons between different risk and protective factors are

difficult, since it is not clear whether different events have the same adverse or protective effects when they affect different individuals (S. Goldstein & Brooks, 2006).

Table 1.5

Definitions of Key Concepts (from Wright & Masten, 2006)

Concept	Definition
Adversity	Environmental conditions that interfere with or threaten the accomplishment of age appropriate developmental tasks
Risk	An elevated probability of an undesirable outcome
Risk factor	A measurable characteristic in a group of individuals or their situation that predicts negative outcome on specific criteria
Developmental asset	A measurable characteristic in a group of individuals or their situation that predicts general or specific positive outcomes
Protective factor	Quality of a person or context or their interaction that predicts better outcomes, *particularly in situations of risk or adversity*
Adaptive systems	Fundamental, universal human adaptational systems that exist to keep development on course and to facilitate recovery from adversity when more normative conditions are restored

Researchers recognise a wide range of adversities that increase the risk of negative life outcomes, as described in Table 1.4. Goldstein and Brooks (2006) provide a brief review of current statistics outlining risk exposure in children and adolescents, ranging across suicide, depression, alcohol and drug use, risk-taking behaviours, poverty, exposure to violence, abuse and neglect, bullying, teenage pregnancy and sexually transmitted diseases, demonstrating that many young people experience negative life experiences. However, the relation between adversity and risk is not 1:1, and likewise, many factors that are markers for risk are not the key causes of negative outcomes (Cicchetti & Garmezy, 1993; Kraemer, et al., 1997). As described by Wright and Masten (2006, p. 20):

risk most basically signifies an elevated probability of a negative

outcome…a risk factor does not identify which individual or

individuals within a group considered at risk will eventually display

adaptational difficulties, but rather that the group of people with

this risk factor is less likely overall to do well in some regard.

Put another way, risk is probabilistic, and a risk indicator is not a guarantee of

negative outcome. Those who are classified as "at-risk" based on demographic or

group factors may not experience the adversities typical of the group (Capella &

Weinstein, 2001).

Just as risk factors can be distinguished from adversity, protective factors

must be distinguished from developmental assets, or general promotive factors,

which support child development in both high and low risk groups (Werner, 2006).

Protective factors are assets which operate to "moderate the impact of adversity on

adaptation" (Wright & Masten, 2006, p. 22), reducing the negative consequences to

the individual following exposure to an adverse experience or situation – in other

words, they are assets which have particular relevance when risk or adversity are

high. It is to be noted that protective factors operate specifically – that is, a particular

experience or characteristic operates to neutralise the negative impacts of a

particular risk factor (Rutter, 1999). Developmental assets, on the other hand,

underlie adaptive systems that serve to support normative development as well as

encourage recovery from adversity. These systems include:

the development of attachment relationships, moral and ethical

development, self-regulatory systems for modulating emotion,

arousal, and behavior, mastery and motivational systems, and

neurobehavioral and information-processing systems. Other

systems involve the broader cultural context and consist of

extended family networks, religious organizations, and other

social systems in the society that offer adaptive advantages.

These systems are very versatile and responsive to a wide range

of challenges, both normative and nonnormative. (Wright &

Masten, 2006, p. 26)

Development can proceed despite minor compromises to the adaptive

systems, but where children's development is derailed by adversities that affect the

functioning of these protective systems, children's ability to recover is limited until the

systems are restored. When there are multiple compromises to these systems as a

result of interacting adversities, the capacity for recovery becomes less likely (Masten

& Obradovic, 2006; Wright & Masten, 2006). In the absence of cohesive underlying

adaptive systems, or significant environmental adversities, individual protective

factors cannot gain traction to support normal development (Sameroff & Rosenblum,

2006).

The impact of risk and protective factors

Multiply compromised adaptive systems are problematic for many children,

since risk factors are unlikely to occur in isolation; children considered "at risk" are so

categorised because they are exposed to multiple adversities over time (Luthar,

Sawyer, & Brown, 2006; Rutter, 1999; Rutter, 2006; Wright & Masten, 2006). In most

cases, it is the cumulation of risk factors that derails normal developmental

trajectories to create negative outcomes (Felitti, et al., 1998; Flaherty, et al., 2006;

Furstenberg, et al., 1999; Sameroff & Rosenblum, 2006; Werner, 1996). In cases of

exposure to catastrophic and global adversities, such as war or torture, normal

development is not possible until a safer and more normative environment is restored

(Wright & Masten, 2006). It is also important to recognise that there are experiences

of adversity so overwhelming that they are impossible to recover from; in these

instances it is not appropriate to hold the victim responsible for a failed adaptation

(Masten & Obradovic, 2006). Likewise, protective factors do not occur independently – they tend to co-occur and reinforce each other in both individual situations and across the lifespan (Werner, 2006). Both adversities and assets tend to cluster and inter-relate in long-term "chain effects" (Rutter, 1999, p. 129), or "developmental cascades" (Masten, 2001) that lead to trajectories of resilient or non-resilient outcomes. For example, the benefits of competent, caring parenting has flow-on effects on children's ability to access formal and informal sources of support in times of trouble, for the rest of their lives (Werner, 2006).

While it is tempting to identify risk and protective factors as binary opposites (Kaplan, 2006) – for example, presence or absence of a father – many of the factors that affect resilient development are continuously distributed variables which operate in many ways and in many domains – such as cognitive ability and locus of control (Wright & Masten, 2006). Furthermore, factors that appear to be bipolar – such as high vs low maternal closeness – may not confer equivalent levels of protection and risk at high and low levels; researchers need to investigate such factors closely to determine whether the factors have stronger effects at the positive or negative pole rather than assuming both ends are equally relevant to development (Luthar, et al., 2006). Likewise, risk may be found at both extremes of a factor, with very high or very low levels predisposing an individual to negative life outcomes, while a moderate level confers protection (Luthar, et al., 2006). Risk and protective factors are interactive, not only with one another but also with the length of exposure, developmental timing of exposure and exposure to previous risk and protective factors; additionally, qualities within the child will affect the impact and availability of environmental supports (S. Goldstein & Brooks, 2006; Wright & Masten, 2006). Furthermore, some protective factors are only beneficial in a context of stressful life events but confer no benefits to children whose lives are stable (Luthar, et al., 2006; Rutter, 2006; Werner, 2006). Ultimately, "it is likely that there is a complex, multidimensional interaction between risk factors, biological functioning,

environmental issues, and protective factors that combines to predict outcome" (S. Goldstein & Brooks, 2006, p. 6).

Recent work suggests that it may be possible to leverage this complexity to "reprogram" damaged adaptive systems to operate more normally, through the provision of better caregiving, or explicit training (Masten, 2007). Even in later life, opportunities such as a return to formal education, involvement in military service or active participation in community groups can affect an individual's life course, supporting positive adaptation in adulthood through the beneficial effects of a secure attachment, positive role models, social controls and increased expectations of the individual (Rutter, 2006). As Morales (2008) notes, the study of life outcomes is time-bound, and individuals may experience a turning point into successful adaptation at any point in their lifetime. However, interventions that occur to reduce risks and increase assets from the start of the life course have the greatest chance of success, as demonstrated by Olds and colleagues (1998), who examined the effect of a home visitation program to reduce maternal substance use, improve the effectiveness of caregiving and reduce welfare dependence and further unplanned pregnancies in a group of young mothers. In a follow up, they found that children in the home visitation program had far lower levels of anti-social behaviour and conduct disorder at age 15. The reduction in risk factors and the increase in developmental assets that occurred as a result of the home visitation program had a significant effect on the children in the study, changing the context within which they developed.

Risk and protective factors in context

Most researchers now agree that context also plays an important role in determining the impact of risk and protective factors (Feinstein & Peck, 2008; S. Goldstein & Brooks, 2006; B. Johnson & Howard, 2007; Werner, 2006; Wright & Masten, 2006) – an event or process that has a substantial impact on one child in one set of circumstances may have a different, smaller, or no, impact on another

child. For example, consider the differential impact of parental divorce on two children. The first child's situation is such that one parent abruptly abandons their partner and child to a new relationship, with a resultant lack of income that causes a significant decline in the child's standard of living. The custodial parent quickly begins a new relationship with a partner who treats the child poorly, and there is ongoing friction between the child's biological parents. The second child has parents who take a decision to separate after receiving both marital counselling and separation counselling, and both parents remain active in their child's life following the divorce, striving to master their frustrations with each other in a mature fashion to avoid exposing the child to developmentally inappropriate situations. The two children have both experienced "parental divorce", but the context in each situation predicts quite different outcomes for each child.

The context-dependent outcomes of these similar situations further exemplify findings by Rutter (1999) that positive and negative experiences do not occur independently but exist within developmental trajectories. These trajectories, however, can be interrupted by so-called "turning points", processes or events which: have a lasting impact on a child's self-concept and interactions with others; alter the availability of opportunities for further change; or permanently change the child's environment (Rutter, 1994; Rutter, 2006). These chain effects and turning points may have their starting points in neutral, random, or even accidental events (B. Johnson & Howard, 2007) and can operate at or between any levels of the bio-ecological model. For example, psychological changes within the individual, experiences of interactions with others during critical developmental stages, family dynamics and structural changes, issues with schools and teachers, challenges with parental employment or involvement with the legal system, and even large-scale changes to government policy that change the availability of services and opportunities for the child, family or school.

As a result of the new conceptualisations of risk and protective factors that have emerged in the last decade, researchers are challenged to refine further their definitions of "risk", "adversity", "assets" and "protective factors": can they recognise not just what, but how, risks operate in the lives of children? how do they account for variability in risk exposure and the significant differences between statistical risk and actual risk? how long must a cohort be followed to determine the ultimate impact of risks and protective factors? what is the impact of plurality of meaning – do children defined as "at risk" experience themselves as "at risk"? The impact of these findings will have relevance for the study of successful adaptation and development outcomes in the context of risk and protective factors: resilience.

1.2. Summary

This Chapter has provided an overview of the literature that provides a conceptual and theoretical underpinning to the understanding of resilience that is used within this study. Risk and protective factors, adversity, achievement, and positive adaptation, were considered within the context of the bioecological framework (Bronfenbrenner, 1979b). This perspective allows for a multi-level, multi-factor understanding of the relationships and interactions between individuals, families and the wider society that support resilience in development. Chapter 2 deals in detail with the literature relating to the field of resilience, and educational resilience within that wider field. It also addresses research relating to the Kumon method of mathematics education, and outlines the focus of the current study.

2. RESILIENCE AND KUMON

This Chapter provides a thorough introduction to the field of resilience research as it has developed over the past 40 years, and introduces the Kumon method of mathematics education. Issues in defining and applying the resilience concept are reviewed, factors which are known to promote resilience are analysed, and critiques of the field are examined. Within the resilience literature, the discipline of educational resilience has concentrated on the effects of risk and protective factors on academic outcomes, and current research, definitions and critiques of this area are likewise provided. The area of mathematics education is briefly summarised, and the specific qualities of the Kumon method that make it a candidate for educational resilience research are reviewed. Finally, the focus of the current study is outlined and an overview of the structure of the thesis is provided.

2.1. Resilience

Resilience was originally a term from the materials sciences which related to the ability of a material to return to its original shape after being compressed, stretched or deformed (S. Goldstein & Brooks, 2006). The study of psychological resilience addresses, by analogy, the capacity of human beings to maintain a normal developmental trajectory in the face of circumstances that tend to distort development. It is part of a broader evolution within psychology over the last 35 years (Antonovsky, 1979; Schoon, 2006), shifting the perspective from a deficit model of human development to a sufficiency model: changing the question from "what causes negative outcomes in human development?" to "what factors are necessary and sufficient for positive outcomes to occur?" (Bronfenbrenner, 1979a). Resilience research in the last three decades has occurred in three major "waves" (Masten, 2007; Masten & Obradovic, 2006; Richardson, 2002):

The first wave of work yielded good descriptions of resilience phenomena, along with basic concepts and methodologies, and

focused on the individual. The second wave yielded a more dynamic accounting of resilience, adopting a developmental-systems approach to theory and research on positive adaptation in the context of adversity or risk, and focused on the transactions among individuals and the many systems in which their development is embedded. The third wave...is focused on creating resilience by preventive interventions, directed at changing developmental pathways. (Wright & Masten, 2006, p. 18)

The fourth wave of resilience research, now taking shape, addresses multi-level, cross-disciplinary research into resilience, aiming to integrate the genetic and biological bases of resilience with an understanding of the psychosocial and environmental processes already known to affect it (Masten, 2007). The fourth wave will assimilate findings from the previous three waves as it develops an integrated, multi-disciplinary science of resilience and intervention (Masten & Obradovic, 2006). Ungar and colleagues (2007) have also identified the fourth wave as comprising an increasing tendency for resilience research to take into account cultural influences on development and resilience that differentiate between Western and non-Western cultures, and between indigenous and non-indigenous people.

The foundation for the current conceptualisation of resilience in the field of psychology was laid by Garmezy and colleagues (Garmezy, 1971; Garmezy & Neuchterlien, 1972) in their study of developmental psychopathology. Research into specific populations of resilient children followed – one of the largest studies undertaken was Werner's prospective longitudinal study of 698 children born in Kauai, Hawaii (1971, 1977, 1986, from Werner, 1989). Werner followed the cohort from the prenatal period to adulthood and recorded health, social, family relationship, and life event data for each member. Long term outcomes in the areas of social,

emotional, educational, financial and health adjustment, were correlated with factors occurring in the perinatal period and throughout development. Werner found that there were a number of risk factors associated with poor long-term outlook, but that approximately one-third of high-risk children exposed to stressors like poverty, parental alcoholism or mental illness, maltreatment, birth complications, and others became "competent, confident and caring adults" (Zimmerman & Arunkumar, 1994, p3). Rutter's (1979, 1985) work with the children of mentally ill parents and Garmezy's "Project Competence" (Garmezy & Devine, 1985) likewise identified children who were able to 'beat the odds' and avoid outcomes such as maladaptive or antisocial behaviours, psychopathology, imprisonment or premature death, typical to their environmental, psychological and social context.

These longitudinal studies characterised the first wave of resilience research (Wright & Masten, 2006) and made major contributions to the field, by identifying protective factors that predicted resilient development and beginning the process of understanding how these factors operated to promote positive adaptation (S. Goldstein & Brooks, 2006). Many of these original longitudinal studies are still collecting data today, and many new studies have joined them. In Australia, the Longitudinal Study of Australian Children (LSAC), which commenced in 2004, has recently released its first wave of data, examining multiple aspects of children's health and development, including "physical health, social, cognitive and emotional development" (Gray & Smart, 2008, p. 6), with reference to many of the factors thought to underlie resilient development. Werner (2006) has identified 10 large-scale longitudinal studies of resilience based in the United States, and a further nine studies internationally, all following children throughout the lifespan to report on those factors that tend to promote, or undermine, the achievement of positive life outcomes in the face of adversity.

Initially characterised as "invulnerability" (Garmezy & Neuchterlien, 1972) or "hardiness" (Kobasa, 1979), children who overcame hardship were "thought to be

impervious to stress because of their inner fortitude or character armor" (Wright &
Masten, 2006, p. 18). This ability to overcome profound difficulties in life was later re-
conceptualised as "resilience", in recognition of the fact that resilient children still
underwent distress as a result of their experiences, but were able to "bounce back"
from adversity and manage the stress without being debilitated by it (Zimmerman &
Arunkumar, 1994). Several broad categories of outcome have been recognised
within the resilience framework:

> (a) developing well in the context of high cumulative risk for
> developmental problems (beating the odds, better than predicted
> development), (b) functioning well under currently adverse
> conditions (stress-resistance, coping), and (c) recovery to normal
> functioning after catastrophic adversity (bouncing back, self-
> righting) or severe deprivation (normalization). Recently, there
> has been renewed attention to the possibility of positive
> transformation following adversity, particularly in the context of
> traumatic experiences that may yield a positive reorganization of
> systems, such that adaptive functioning is actually better than it
> was before the experience. (Masten, 2007, p. 923)

This "steeling" function of resilience provides a later benefit of increased
resistance to stress, but has as a pre-requisite that the individual's resources are
equal to the adversity, so that they cope successfully with the inherent challenge.
Where coping resources are overwhelmed by multiple risk factors, the necessary
adaptation, habituation, improvements to self-efficacy, learning of effective strategies
and/or cognitive re-framing of the incident are unlikely to occur (Rutter, 2006).

Masten and Obradovic (2006) note that the concept of resilience has been
applied to a variety of functional systems, including individuals, families, classrooms,
schools and communities. In practice, the concept of resilience has been most
frequently used in the context of children "at risk" of negative outcomes due to their

developmental context. Children demonstrating non-resilient outcomes are easy to identify as typical "problem children": they may be aggressive; depressed; perform poorly at school; become involved in risk-taking, unhelpful relationships or criminal behaviour; use alcohol and drugs to excess; and in extreme cases, die, either at their own hands or at those of others. The children who manage to break the risk cycle and stay on track to a relatively normal adulthood are considered "resilient". Early research sought to identify the exceptional characteristics of these resilient children, although more recent perspectives suggest that the processes of resilience reflect the unfolding of underlying systems, which exist in all children, that serve to keep human development on course and support recovery from adversity (Masten, 2001; Wright & Masten, 2006).

The field of resilience research has expanded significantly in the last 20 years; as the number of youth facing adversity, and the number of adversities to be faced, increase, there has been a concomitant increase in efforts by researchers to distil resilience findings into interventions appropriate for both at-risk children and general populations, to create a "resilient mindset" in all young people. It is predicted that the resilient mindset will support children to cope more effectively with everyday challenges, disappointments, adversity and trauma, and follow a positive developmental trajectory (S. Goldstein & Brooks, 2006).

2.1.1. Defining and Applying the Resilience Construct

Researchers in the field of resilience rapidly recognise that there are multiple contextual and definitional issues involved in the analysis and application of the resilience construct. There is no single agreed definition of resilience; Kaplan (2006, p. 39) notes that this "deceptively simple construct...is in fact rife with hidden complexities, contradictions, and ambiguities". The meaning of the word has varied considerably across different studies and times, although almost all modern

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researchers agree that resilience is "first and foremost...a biopsychosocial process" (S. Goldstein & Brooks, 2006, p. 4).

The definition of resilience that will be used in this study comes from Luthar and colleagues (2000), who propose that resilience is "a dynamic process encompassing positive adaptation within the context of significant adversity…the achievement of positive adaptation despite major assaults on the developmental process" (Luthar, Cicchetti, et al., 2000, p 543). This definition has a practical application for practitioners. It means that

> some children who are exposed to chronic or severe stress will turn out competent. These children will successfully adapt over time. These children will need tremendous biological, psychological, and environmental resources in order to do this. These children cannot do it themselves. They need love, care, and support not only from their parents, but from educational personnel and other community adults as well. (Rouse, Longo, & Trickett, 1999a, p. 1)

As this definition implies, resilience is not a simple construct because it changes over time (Luthar & Zigler, 1991), varies across contexts and involves an interplay between the person and their environment (Deater-Deckard, Ivy, & Smith, 2006; S. Goldstein & Brooks, 2006; Harvey & Delfabbro, 2004; Rouse, Longo, & Trickett, 1999b; Rutter, 2006; Sameroff & Rosenblum, 2006). Rather than a "single, dichotomous variable...resilience is better perceived as a label that defines the interaction of a child with trauma or a toxic environment in which success, as judged by societal norms, is achieved by virtue of the child's abilities, motivations and support systems" (Condly, 2006, p. 213). This means that a child may demonstrate resilience in one aspect of their lives but not in another – for example, developing and maintaining healthy and supportive relationships, while being unable to perform

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academically at an expected level (Harvey & Delfabbro, 2004; Wright & Masten, 2006; Zimmerman & Arunkumar, 1994). Likewise, resilience and non-resilience are not permanent states, but are the product of the interplay between an individual and their surroundings, and thus will change as "risk and protective factors increase or diminish in the social environment" (B. Johnson & Howard, 2007, p. 3).

Further complicating the definition are the concepts of *equifinality* – meaning that children can reach the same outcomes through different pathways – and *multifinality* – meaning that children with apparently similar situations can achieve different outcomes (Cicchetti & Rogosch, 1996; Deater-Deckard, et al., 2006). Another complication is that the factors that have been found to promote resilience are, in many cases, not independent entities but rather components of interacting systems, processes, personal qualities and life circumstances (Schoon, 2006; Werner, 2006). A greater ability to master life's ordinary challenges (making friends, learning to read, getting along with siblings) was predictive of resilience to extraordinary life challenges (e.g. maltreatment, divorce and parental mental illness; Sameroff & Rosenblum, 2006).

Key aspects of the resilience construct

Underlying all of these descriptions of resilience are a number of assumptions. The first is that resilience is a multi-dimensional, dynamic process, rather than a trait inherent to the child (Egeland, Carlson, & Sroufe, 1993; Zimmerman & Arunkumar, 1994). Resilience is based on two judgements: that there is a background of significant risk or adversity, but that despite this, the individual is "doing OK" (S. Goldstein & Brooks, 2006; Masten & Obradovic, 2006; Rutter, 2006; Schoon, 2006; Wright & Masten, 2006). A child would never need to demonstrate resilience if she was fortunate enough not to experience a traumatic or adverse event, regardless of the number of protective factors that were present in her life. It is important to understand that as a result, resilience is never directly measured – it is

only inferred from the existence of positive adaptation in the presence of known adversities (Masten & Obradovic, 2006; Rutter, 2006). Rutter (2006, p. 4) suggests that it is "fallacious" to suggest that resilience can ever be measured directly as an observed trait, since it is not a single quality but varies across time, contexts and outcomes. Therefore, it is also important to assess multiple domains when considering resilience, otherwise only a partial understanding of adaptation is gained (Schoon, 2006).

Secondly, the study of resilience assumes that people will evince different adaptations to stressful situations, with resilient individuals representing

> extreme positive residuals from [an informal] prediction equation
> where adaptations are predicted from a linear combination of
> risks and assets. In other words, determination of resilience
> depends on a) judgments about outcomes and b) assumptions
> about the causes of adaptations that may not have been explicitly
> described or consciously examined. (Schoon, 2006, p. 8)

Therefore researchers must examine and make explicit the criteria by which "doing OK" is judged, as positive adjustment is context dependent and the definition chosen has implications for who is judged resilient. The likelihood that values of middle-class Western civilisation will be arbitrarily imposed as "success" in a global system means that it is incumbent on researchers to "make clear the values and context-dependency of criteria underlying the identification of successful or unsuccessful outcomes" (Schoon, 2006, p. 16) and ensure that chosen definitions of success are relevant and significant to the participants in the research.

Researchers have questioned whether resilient children in difficult circumstances can ever duplicate the effective developmental paths of children whose development is untroubled by such events, or whether a reduction in functioning is unavoidable (Luthar & Zigler, 1991). Similarly, it has been asked whether, rather than demonstrating resilience, so-called "resilient" children are simply

internalisers, more prone to depression and anxiety than anti-social behaviour, and thus displaying an illusion of competence compared to their more visibly troubled peers (Luthar, 1991). However, there seems to be a consensus that, given the right supports in an otherwise difficult environment, children can and do follow developmental paths to a better than expected outcome (Harvey & Delfabbro, 2004). However, resilience can also be specific to a particular environment, and it can be overwhelmed if the demands are too high (Luthar & Zigler, 1991).

The biology of resilience

Recently, resilience has also been considered from a biological perspective, with researchers investigating the contribution of neural plasticity, neuroendocrine function and genetics to resilience in children (Curtis & Cicchetti, 2003; Kim-Cohen, Moffitt, Caspi, & Taylor, 2004; Suomi, 2006). Genetic heritability has also been implicated in resilience-related factors such as activity level, sociability, negative affectivity, effortful control, adaptability, coping, optimism, psychopathology, social competence, anti-social behaviour and cognitive reappraisal (Deater-Deckard, et al., 2006; Feder, Nestler, & Charney, 2009; Rutter, 2006). However, none of these biological influences is so strong that environment has no effect (W. Johnson, et al., 2006; Sameroff & Rosenblum, 2006) – recent developmental bioecological approaches conceptualise resilience as *epigenetic*, meaning that both genetic and environmental influences contribute to the reciprocal, dynamic processes of the development of resilience (S. Goldstein & Brooks, 2006; Schoon, 2006):

> The question is no longer whether and to what degree genes or environments matter, but how genes and environments work together to produce resilient children and adults. (Deater-Deckard, et al., 2006, p. 49)

In each of the gene-environment interactions studied, the outcome was specific to a particular negative life outcome, further underlining Rutter's (2006) suggestion that a single universal resilience trait can never exist.

As discussed in Chapter 1, the combination of multiple, interacting processes operating across domains, leading to an outcome that is expressed differently in different environments, or may not be expressed at all, identifies resilience as a concept that is best studied within a bioecological framework (Bronfenbrenner, 1979b), which considers the systems within which the child develops to be critical to an understanding of that development.

2.1.2. Factors that Promote Resilience

While some researchers define the factors that promote resilience in children exclusively or predominantly in environmental and social terms (e.g. Benard, 1993; Sameroff & Rosenblum, 2006), there is general consensus that contributors to resilience can be organised in a triarchic structure, encompassing variables existing within the child, variables existing within the family, and variables existing within the wider socio-cultural environment (S. Howard, et al., 1999; Luthar & Zigler, 1991; Newman, 2002; Werner, 1989).

Masten (2001, p. 234) concluded that there exists "a relatively small set of global factors associated with resilience. These include connections to competent and caring adults in the family and community, cognitive and self-regulation skills, positive views of self, and motivation to be effective in the environment". Various researchers (B. Johnson & Howard, 2007; Newman, 2002; Werner, 2006; Wright & Masten, 2006) have drawn together findings from a number of prospective studies (see Table 2.1), and concluded that these factors play a significant role in the emergence of resilience.

Table 2.1

Factors linked with resilience in children (from B. Johnson & Howard, 2007; Newman, 2002; Werner, 2006; Wright & Masten, 2006)

The Child	The Family	The Community/Society
An easy temperament; social and adaptable; active and good-natured	Authoritative parenting – high on warmth, structure and expectations	High neighbourhood quality – safe, clean, affordable housing
Age – depending on nature of adversity	Close bond with primary caregiver	Close relationship with unrelated mentor
Gender – female prior to, and male during, adolescence	A valued social role in the household – household chores, helping with siblings	Valued social role in the community – job, volunteer role or helping neighbours
Average to above-average intelligence	A smaller family (<4 children)	Competent peers/friends
Able to regulate own emotions and behaviours	Parental harmony	Connections to pro-social peers
Good social skills with peers and adults	A close relationship with one parent, where there is parental disharmony	Prosocial extra-curricular activities
Internal locus of control		Effective schools
Personal awareness of strengths and limitations	Maternal competence	Employment opportunities for parents and teenagers
	Positive sibling relationships	
Problem-solving skills	Parents involved in child's education	Successful school experiences
Empathy for others	Supportive extended family	Access to emergency services

The Child	The Family	The Community/Society
Positive view of self / outlook on life	Socioeconomically advantaged	Government policies to protect children
Mastery of basic literacy and numeracy skills	Post-secondary education of parent	(welfare, health and labour laws)
Valued characteristics: a sense of humour;	Membership of religious or faith	Government funds public health care and
ability in a particular domain; attractiveness to	community	schools at an appropriate level
others		No political violence or oppression
A sense of meaning in life		
Independence and autonomy		
Goal setting and motivation to achieve		

Masten (2001) calls this set of factors "the short list", and argues that they reflect "fundamental adaptive systems supporting human development" (Wright & Masten, 2006, p. 24). In particular, a child's experiences of competent parenting in early childhood seem to have cumulative strong and long-lasting effects on lifetime resilience outcomes (Feinstein & Peck, 2008; Rutter, 2006; Werner, 2006). Together, these factors are "psychosocial resources that support or promote adaptive development. Individuals who can draw on many, or high levels of personal and social resources are more effective in coping with adversity that individuals with fewer (or lower level) resources" (Schoon, 2006, p. 15).

These factors relate to "the self-regulatory capacity of the human brain as it learns and develops, and the social regulatory capacity embedded in human relationships and ties to cultural traditions" (Masten & Obradovic, 2006, pp. 21-22). The fact that many of the factors across the three domains (individual, family, community) relate to the existence of high-quality relationships does much to support Luthar and Brown's (2007) contention that relationships comprise the foundation of resilient development.

2.1.3. Measuring Resilience

Different studies have found varying levels of resilience in different populations and at different times. For example, Werner (1989) found that approximately 10% of children in her longitudinal study (of 201 at risk children and 400 children not considered at-risk) could be considered resilient, about one-third of all at-risk children studied. By the time these children had reached adulthood, Werner and Smith (1992) reported that most of the high-risk young people they had studied achieved competent adulthood, with only one-sixth of high-risk adolescents developing into a troubled adult. McGloin and Widom (2001) reported than 22% of over 650 abused and neglected children met the criteria for resilience in adulthood, while Collishaw and colleagues' (2007) study of 378 adults from the Isle of Wight

found that 44.5% could be classified as resilient following a history of child physical or sexual abuse. DuMont, Widon and Czaja (2007) reported that between one-third and one-half of abused children attained resilience, depending on the timeframe chosen for follow-up.

Similarly, Rutter (1985) found that nearly half of the children he studied growing up in adverse circumstances could be considered resilient. When children have multiple protective factors operating, as well as risk factors, the numbers can be even higher – 57% in one study (Spencer, et al., 2005). At the upper end of the spectrum, Benard (2000) has suggested that up to 80% of children with multiple risk-factors can and do succeed, given time. Indeed, as Sameroff and Rosenblum (2006, p. 123) point out, the focus on preventing negative life outcomes for children at risk sometimes obscures the fact that "the majority of children in every social class and ethnic group are not failures. They get jobs, have successful social relations, and raise a new generation of children".

For many studies, however, estimates of population levels of resilience are hard to determine. Either researchers deliberately seek equal numbers of resilient and vulnerable children to participate in studies, to ensure sound analysis (e.g. P.A Wyman, Cowen, Work, & Parker, 1991), or they define resilience using statistical methods such as "the top quartile on a given scale", or "+1 standard deviation" (e.g. Luthar, 1991; Waxman, et al., 2003; P.A. Wyman, et al., 1999). The variation observed in the studies listed raises questions about the number of children in the general population who might be expected to demonstrate resilience in the face of adversity, but also highlights the variation within the field as to definitions of "risk factors", "adversity", "protective factors", "vulnerability" and "resilience" (Wright & Masten, 2006).

2.1.4. Critiques of Resilience

The lack of definitional consensus in the field of resilience has troubled many researchers (Luthar, et al., 2006; Masten, 2007; Rutter, 2006; Werner, 2006). As the field of resilience has matured, there have been a number of criticisms of the resilience construct. For example, Luthar, Cicchetti and Becker (2000) published a comprehensive critique of the field, citing issues such as:

- Lack of consensus around definitions, operationalisation and measurement of resilience constructs and key terms;

- Lack of consensus as to whether resilience is a personal characteristic or an active process;

- Difficulty matching sample cohorts on comparable levels of adversity when measuring resilience;

- The range of adaptation displayed by at-risk children, who exhibit competence in some fields and not in others, which leads some researchers to question the cohesiveness of the resilience construct;

- Instability of research findings over time;

- Instability of research findings due to the statistical error inherent in the study of extremes; and

- Broad lack of theoretical underpinnings across the field.

Likewise, Kaplan (2006), noted that there was little conceptual consistency across the breadth of the research literature on resilience, raising questions about how knowledge can be aggregated across studies and disciplines if criteria for defining resilience are so variable (Masten & Obradovic, 2006). A number of unresolved conceptual issues relating to the resilience construct still exist, including: whether resilience could be a property of groups and communities, as well as individuals; whether "resilience" could be considered to be identical to, overlapping

with, or orthogonal to terms such as invulnerability, hardiness and adaptation; whether resilience is the opposite of vulnerability; whether resilience is an outcome in itself or a quality that influences outcomes; whether resilience could exist in the absence of adversity, and if not, whether resilience is, in fact, caused by the adversity, or exists independently of it; and how resiliency, and its relation to risk and protective factors, can be defined (Kaplan, 2006). However, the suggestion that the resilience construct may have come to the end of its usefulness (Kaplan, 2006) is not widely accepted in the field.

Werner (Werner, 2006, p. 91) noted that despite the existence of several large-scale longitudinal studies of resilience, the majority of evidence in the field came from "cross-sectional studies, retrospective studies, short term longitudinal studies of only a few years duration (mostly in middle childhood), and studies with relatively small samples, without "low-risk" comparison groups". More work is needed in this area to develop high-quality, reliable evidence on which to base practice and interventions.

Further issues were identified by Schoon (Schoon, 2006, p. 15), who suggested that

> …concerns have been identified regarding the subjective and often unarticulated assumptions underlying the identification and operationalisation of resilience…A major limitation of the concept is that it is tied to the normative judgments of what constitutes positive or desirable outcomes.

Howard, Dryden and Johnson (1999) likewise commented that much research in resilience is characterised by "normative, middle-class values…[which] may well be irrelevant for children from different ethnic, racial, religious or social groups" (p. 317). This is an issue because of the wide variability in normative judgements across time and cultures (Kaplan, 2006). The broad application of results from data gathered in the United States may therefore be problematic in an Australian context. Likewise,

cultural assumptions about criteria for success must be incorporated when studying resilience, because there is a risk that majority opinions on which children are "successful" will not take into account cultural and ethnic perspectives on what constitutes success. Additionally, research in this field has shown little interest in the perspectives of children who form the subject groups, who may hold different views on risk and resilience (S. Howard, et al., 1999).

Research into child resilience is that it has primarily focussed on an adult view of what it means for children to demonstrate resilience (B. Johnson, et al., 1997; Luthar, et al., 2006), assuming that children's perspectives on resilience mimic those of adults. This is likely to be a naive viewpoint, given that children's views have been demonstrated to differ from those of adults in a number of relevant ways, in fields ranging from moral development, to perspective taking, to understandings of death (Kohlberg, Levine, & Hewer, 1983; Selman & Byrne, 1974; Vianello & Martin, 1989). In addition, the trend to recognising children as social actors, and including their perspectives as agents, in situations affecting them has been occurring in fields as diverse as research psychology and law (McIntosh, 2007; Seymour & McNamee, 2008). It is likely that if children do possess a fundamentally different interpretation of resilience concepts, it will affect their responses to adult attempts to modify "risk" and "resilience" factors. Howard, Dryden and Johnson (S. Howard, et al., 1999) argue that it is important to determine whether children comprehend the concept of resilience, and the factors that influence it, in similar ways to adults, or whether systematic differences in their perceptions exist. The impact of events on children is mediated in part through their "perception and interpretation of [their] own experiences" (Wright & Masten, 2006, p. 26), as well as through their attributions regarding others' intentions, and their ability to evaluate alternative response options (Deater-Deckard, et al., 2006). Ensuring that future research captures an understanding of these subjective, self-directed influences on resilience is critical It is likely that if children do possess a fundamentally different interpretation of resilience

concepts, it will affect their responses to adult attempts to modify "risk" and "resilience" factors.

It is also necessary to avoid treating resilience as a list of the features of successful children, or a trait, or personality characteristic (Wright & Masten, 2006). Such conceptualisations run the risk of implying that children whose coping resources are overwhelmed by the adversity surrounding them are 'just not trying hard enough'; of blaming those who are not able to demonstrate resilient responses to difficult life situations as personally responsible for their problems, rather than understanding the interactions of personal qualities and environmental conditions that allow some children to succeed despite adversity. In addition, these characterisations do not encourage a research approach that seeks to investigate and remove barriers to success for children experiencing adversity. The adjective "resilient" should therefore be conceptualised as applying to "profiles of person-environment interaction" (Schoon, 2006, p. 16), rather than to individuals.

Other researchers have echoed many of these issues, noting that the "lack of an integrative conceptual scheme and consistent terminology has fostered confusion in the field" (Small & Memmo, 2004, p. 3). There is a requirement to take the study of resilience to a deeper level – now that there is a general consensus on the factors that lead to resilience, it is necessary to determine the mechanism of operation – not just "what works", but "how and why" (Cowen, Wyman, & Work, 1996; Schoon, 2006).

Despite these conceptual problems, progress towards a deeper understanding of resilience should be sustained. Learning more about the factors and processes that allow children to overcome adversity may inform the growth and development of other children who are at risk, and enable them to achieve a better developmental outcome, while an ongoing focus on assets, strengths and adaptation can illuminate the design of preventative and treatment programs (Schoon, 2006). However, the conceptual issues outlined above should be addressed. Suggestions

for improving the study of this area include: the development of consensus regarding key definitions and concepts; integration of approaches in a multidisciplinary context, including biological models; greater awareness of the multidimensional nature of the resilience construct; improving the clarity of theoretical approach; increased focus on the processes underlying the acknowledged risk and protective factors; and a greater interaction between research and intervention (Luthar, Cicchetti, et al., 2000; Small & Memmo, 2004).

2.2. Educational Resilience

While a supportive school environment has long been identified as a factor that can assist in the development of resilience, educational resilience – a child's ability to maintain academic performance in the face of life stressors – has emerged as a specific area of investigation. It has since become an independent area of research, with investigations from both psychological and educational perspectives seeking to determine the factors that contribute to the emergence of resilience in the educational domain (Benard, 2000; Floyd, 1997; Gonzalez & Padilla, 1997; Padron, Waxman, & Huang, 1999; Reyes & Jason, 1993; Spencer, et al., 2005; Waxman, et al., 2003). Also known as academic resilience, this concept has been most widely studied in the United States, where the incidence of failure to complete high school was similar to that in Australia throughout the 1990s – around 29% (Australian Bureau of Statistics, 1998; Green, 2001) – and a significant influence of socio-economic and racial background on academic achievement exists (Feinstein & Peck, 2008; Gonzalez & Padilla, 1997; Green, 2001; Reyes & Jason, 1993).

Students who are educationally resilient display a number of characteristics, and school environments that promote the emergence of educational resilience have also been characterised; however, this work is still in its early stages. A preliminary list of factors that have been linked with the emergence of educational resilience is provided in Table 2.2.

Table 2.2

Factors linked with demonstrations of educational resilience

The Child	The Family	The Environment
Socially Competent	Two-parent family	Teacher feedback
Good problem-solving and planning skills	Parents have high expectations of child	External support systems available and used by family
Strong reasoning and reading skills	Immigrated from a non-Western country	Classroom learning environment – facilities, technology exposure
Internal locus of control; sense of self-efficacy	Family cohesion and warmth	Positive and high expectations from teachers
Sense of autonomy and identity	Family support for education	Social support from teachers
Sense of purpose; goal-direction; goal-setting	Higher parental education level	Support from other non-parental adults
Perseverant and persistent		Peer support
Self-esteem		Payment of a monthly stipend contingent upon maintenance of good grades
Female		Opportunities to participate and contribute to the life of the school
Educationally aspirant; learning orientation		
Optimistic		
In a higher grade at school		
Close relationship with parents		

The Child	The Family	The Environment
Satisfied/engaged at school; enjoys school		Classroom instructional practices
Low levels of stress and anxiety		
Good interactions with teacher		
Some education in a non-Western school system		

(Sources: Benard, 1993; Benard, 2000; Floyd, 1997; Gonzalez & Padilla, 1997; Luthar, 1991; Masten & Coatsworth, 1998; Nettles, et al., 2000; Padron, et al., 1999; Reyes & Jason, 1993; Spencer, et al., 2005; Waxman, et al., 2003; Waxman & Padron, 2004; Waxman, Padron, Shin, & Rivera, 2008; Werner, 1989)

As can be seen in Table 2.2, a number of the factors linked with educational resilience are similar to those described in Table 2.1 as related to the emergence of general resilience, including: internal locus of control; good social skills; a warm and supportive family environment; and access to an external support system. However, the links to the school environment are stronger and more relevant for the development of educational resilience, because factors such as teacher support, enjoyment of school, participation in the school environment and strong academic skills are also important. Rutter's work emphasises the importance of the school milieu, as children from at-risk backgrounds are more likely to demonstrate resilient characteristics if the school they attend has a strong academic focus as well as caring, supportive teachers (Rutter, et al., 1979). Factors are also context-sensitive, with some factors being better associated with preventing bad outcomes (e.g., dropping out of high school) while others are linked to promoting high achievement (e.g. success in tertiary education; Thiessen, 2008).

When examining how these factors interact to encourage the emergence of educational resilience in students, researchers are somewhat hampered by the current lack of data regarding the proportion of children who are educationally resilient. Gonzalez and Padilla (1997) place the figure at approximately 6% among Hispanic minority students, while Spencer (2005) found that 57% of high academic achievers could be considered educationally resilient. Clearly there is significant variation across different populations, and no single figure has emerged as a population average across the United States or Australia.

2.2.1. Defining Educational Resilience

Educational resilience seems a relatively intuitive concept but is difficult to operationalise – various approaches have been taken in measuring academic resilience, but many of them conflate resilience with achievement – i.e., high scores on standardised academic tests (Waxman, et al., 2003), qualification for college

entrance (Floyd, 1997), or good grades (Gonzalez & Padilla, 1997; Nettles, et al., 2000; Reyes & Jason, 1993; Spencer, et al., 2005), which means that the student's IQ or ability may be a confounding variable. In effect, most of these studies use high academic achievement as a *de facto* equivalent for educational resilience. There has also been some work done using teacher ratings of resilience (Padron, et al., 1999; Waxman, et al., 2008; Werner, 1989) to define resilient children in research. This is considered a more balanced appraisal of resilience, although it is potentially vulnerable to subjective distortions and lack of inter-rater reliability, and has the potential for negative impacts on the teacher's later attitude towards the student, once a label of "non-resilient" has been applied.

A more sophisticated method of describing resilience on a statistical basis has recently been developed by Kim-Cohen and colleagues (2004). This method relies upon measuring a population at two or more points in time. By measuring the deviation of standardised residuals from a linear regression on the results, it is possible to identify children who have done particularly better or particularly worse than predicted based on prior performance (as represented by the regression line), and are thus classified as resilient or vulnerable on the basis of their actual change compared with their expected change, rather than by their scores on a standardised test.

Based on this methodology, and the criticisms of previous definitions of educational resilience presented earlier in the chapter, the definition of educational resilience used in this study is:

> *Achieving better than expected educational outcomes despite the presence of stressful events, environmental conditions or personal vulnerabilities that are known to place students at risk of doing poorly at school.*

2.2.2. Educational "Buoyancy"

Although educational resilience as a concept addresses outcomes for children experiencing significant adversity, Martin and Marsh (2008) proposed a related but distinct category of "academic buoyancy". This buoyancy relates to students' ability to "successfully deal with academic setbacks and challenges that are typical of the ordinary course of school life (e.g., poor grades, competing deadlines, exam pressure, difficult schoolwork)" (Martin & Marsh, 2008, p. 53). Just as Sameroff and Rosenblum (2006) noted that an ability to deal with ordinary life challenges was predictive of resilience to extraordinary life challenges, Martin and Marsh (2008) argue that although educational resilience constructions refer to the minority of students who experience severe adversity (poverty, gang violence, chronic underachieving, disability), most students are faced with less extreme, but nonetheless problematic, everyday challenges, and some students master these challenges more successfully than others. The buoyancy concept is seen to align more closely with a positive psychology framework that investigates the psychological outcomes of the healthy majority rather than those at the extreme, problematic end of the spectrum (Martin & Marsh, 2008). Degree of student anxiety accounted for the majority of the variance in academic buoyancy (with high anxiety related to low buoyancy, and vice versa), although locus of control, self-efficacy, academic engagement and teacher-student relationships were also predictive. Martin and Marsh (2008) proposed academic buoyancy as a necessary but insufficient condition for educational resilience in students experiencing severe adverse life challenges, but also recognised its utility in explaining the ability for students from less challenged backgrounds to deal with daily stressors.

2.2.3. Current Status of Research on Educational Resilience

A major review of educational resilience was conducted by Waxman, Gray and Padron (2003). Their review focused on research relating to the educational

resilience of North American elementary, middle and high-school students. In addition, Condly (2006) undertook a review of resilience more generally, with a specific focus on the implications for education. The majority of the research on high-school students has dealt with students of Latino or African American background (e.g., Floyd, 1997; Gonzalez & Padilla, 1997; Krishnakumar & Black, 2002; Morales, 2008; Perez, Espinoza, Ramos, Coronado, & Cortes, 2009; Reyes & Jason, 1993), because these students have been considered more vulnerable to academic failure. In general, studies have been structured such that aspects of the lives of high-achieving students from these groups were compared with those of lower-achieving students, in order to determine what factors were related to the students' successes.

Factors such as a supportive home environment, involvement of committed educators, a sense of belonging at school, and the students' own perseverance and optimism were found to be key factors in promoting educational resilience among minority students in high school (Floyd, 1997; Gonzalez & Padilla, 1997; Krishnakumar & Black, 2002), although monetary incentives for maintaining high grades have also been shown to be effective in an ethnically diverse group of high achieving secondary school students (Spencer, et al., 2005). Peck, Roeser, Zarret and Eccles (2008) found that some, but not all, patterns of extracurricular activity predicted educational resilience for high school students from high-risk, low-asset backgrounds, with multiple extracurricular activities increasing the likelihood of tertiary education enrolment. Downey (2008) noted the importance of teachers' daily classroom practices in fostering educational resilience, and collated a set of practices that promoted educational resilience in students in both primary and secondary school, as outlined in Table 2.3.

Table 2.3

Classroom factors that promote educational resilience (Downey, 2008)

Classroom Factors by category

Teacher-student rapport

- Develop healthy interpersonal relationships with students

- Communicate high, realistic expectations for academic performance

- Build on students' strengths to promote academic self-esteem

Classroom climate

- Emphasise personal responsibility for success

- Develop a classroom community characterised by trust, encouragement and caring

- Provide opportunities for participation in school systems

- Communicate consistent expectations for student behaviour

Instructional strategies

- Use group-based learning strategies

- Encourage students to tutor one another

Student Skills

- Teach transferable life skills – assertiveness, conflict resolution, problem solving and critical thinking

- Encourage participation in extracurricular activities

- Emphasise success in literacy skills

Research regarding younger school students was more likely to focus on aspects of the classroom learning environment, instructional contexts and student study behaviours. Teacher support and feedback have been consistently identified as important (Benard, 2000; Nettles, et al., 2000; Waxman, et al., 2003), and structured classroom observations have demonstrated that resilient students receive more attention and praise from teachers than non-resilient students (Waxman, Huang and Wang, 1997, in Waxman, et al., 2003). Student characteristics of academic self-concept, task orientation and achievement motivation were consistently higher for educationally resilient students than non-resilient students (Waxman and Huang, 1996, in Waxman, et al., 2003), as were favourable perceptions of the classroom environment, teacher feedback and teacher expectations (Waxman, Huang and Wang, 1997, in Waxman, et al., 2003; Waxman, et al., 2008). Classroom observation has demonstrated that the behaviour of resilient students is both qualitatively and quantitatively different to that of non-resilient students, with resilient students spending more time on-task, appearing more persistent, energetic and attentive, and frequently volunteering answers (Waxman, Huang and Wang, 1997, in Waxman, et al., 2003; Rivera & Waxman, 2007, in Waxman et al., 2008).

A longitudinal analysis of educational resilience conducted as part of the Chicago Longitudinal Study (Ou & Reynolds, 2008) concluded that the strongest predictors of educational attainment in children from disadvantaged backgrounds were the young people's educational expectations, maternal educational attainment, school attendance, not being held back a grade, and not changing schools, although together these factors predicted only one-third of the variance in outcomes amongst these students. Borman and Overman (2004) noted that low-SES students were exposed to greater risks, and fewer resilience-promoting conditions, than their higher SES peers. They found that low-SES students who achieved resilient mathematics outcomes had stronger academic engagement, an internal locus of control,

efficaciousness in mathematics, a positive outlook towards schooling, and positive self-esteem.

2.2.4. Critiques of Educational Resilience

Research done in the field of educational resilience has been predominantly conducted in the North American school system, although this concept has also been applied in other Western countries, including Australia (S. Howard, et al., 1999). While the factors which promote resilience generally have been broadly agreed (Newman, 2002), the factors that are related to educational resilience are less well known. The majority of current scholarship in educational resilience has focused on "ethnic-minority groups and extreme under-achievers" (Martin & Marsh, 2006, p. 267), with relatively little research addressing the adversity experiences of the student majority. In addition, there has been little work comparing the effectiveness of programs designed to improve the educational resilience of students – can it be done effectively, and if so, what are the interventions that are most likely to succeed?

It is possible that students who are at risk of academic failure or low academic achievement may benefit from interventions to increase their educational resilience, although few experimental data currently exist to support or refute this notion (Waxman, et al., 2003). If students' educational resilience can be reliably increased through explicit intervention, then children identified as "at risk" of academic failure could be helped to maintain an appropriate level of performance and engagement with the school environment. While programs to enhance educational resilience face the twin difficulties of achieving funding support and inspiring commitment in educators and students, an increase in educational resilience for even a minority of students would be of benefit (Condly, 2006). In order to achieve this, however, the factors that promote the emergence of educational resilience must be more clearly delineated.

Waxman, Gray and Padron's (2003) review also identified a significant gap in the research literature, noting the existence of few experimental studies in this area. Condly's (2006) review noted that a thorough understanding of resilience is required to support policy and programs that attempt to alleviate the impacts of traumatic life events and difficult environmental circumstances on children's academic achievement and social and behavioural adjustment. However, he suggested that even the best resilience-enhancing programs will be limited in their effectiveness by the seeming primacy of IQ and temperament in predisposing a child to resilience.

2.2.5. *Educational Resilience in Australia*

Research on resilience conducted in the United States is likely to contain culturally specific assumptions and biases that decrease its relevance to the Australian context, due to the differences in the impact of socio-economic disadvantage between the two cultures (S. Howard, et al., 1999). Rumberger and Lamb (2003) found that failure to complete high school in Australia had fewer negative long term consequences on the likelihood of further education, than failure to graduate from high school in the United States – so it is likely that some of the factors influencing educational resilience in Australia may be different to those at play in the USA. Some of the factors known to affect educational resilience outcomes in the United States are less prevalent in an Australian context, although membership of some socio-economic or racial minority groups is also a risk factor for low academic achievement in Australia (Department of Education Employment and Training - Research and Statistics Branch, 1987; Marjoribanks, 2001; Ritchie & Edwards, 1996). The importance of research into the educational resilience of Australian school-children, which takes into account the social, educational and political milieu within which the children develop, cannot be underestimated.

One of the few investigations of educational resilience in the Australian context was conducted by Martin and Marsh (2006). They investigated educational

and psychological correlates of educational resilience in Australian high-school students, and found five predictors and three outcome correlates. Higher levels of self-efficacy, planning, persistence and control, along with low anxiety, were related to educational resilience, while students who demonstrated educationally resilient qualities also tended to participate in class, report an enjoyment of school, and possess higher self-esteem (Martin & Marsh, 2006).

The study of educational resilience has relevance to the design and implementation of school-related policies and programs. Research in this area has taken initial steps to describe and classify the relations between predictor and outcome correlates of educational resilience, but no definitive treatment has yet been published. Further work on educational resilience as it applies in Australia is critical to the development of policy and programs that will be effective in supporting Australian students.

2.3. Mathematics Competence and Tuition

2.3.1. Mathematics Competence

Basic mathematical competence is a necessary skill for everyday life. Applied mathematics skills are needed for independent functioning at home and in the community, and most jobs require some level of mathematical proficiency (Codding, et al., 2007). While educators agree on the importance of parental involvement in children's education (Fuller, 1991), children are expected to learn adequate levels of mathematics competence at school (Evans & Mansell, 2009), and the Australian government currently requires numeracy testing of all children in Year 3, Year 5, Year 7 and Year 9 to ensure a basic level of skill in mathematics. In 2008, the number of Year 5 students in Australian primary schools who did not meet national benchmarks was 7.3% (National Assessment Program, 2009). These students evidently require remedial maths assistance to achieve basic competency. However, a significant number of students also experience difficulty with, or aversion towards,

mathematics, and "the average parent feels at a disadvantage in trying to support mathematics learning" (Evans & Mansell, 2009; Fuller, 1991, p. 17).

Feelings about mathematics have been shown to affect mathematics achievement significantly (Shields, 1991; Tocci & Engelhard, 1991), and mathematics anxiety is negatively correlated with mathematics achievement (Cates & Rhymer, 2003; Ma, 1999; Thijsse, 2002). Up to 60% of undergraduate university students (Thilmany, 2009) experience mathematics anxiety; and 46.5% of upper primary school students were classed as "high anxiety" in a study by Newstead (1998). Levels of mathematics anxiety amongst primary school students have been found to be lower than those of high school students (Wigfield & Meece, 1988), but there appears to be a critical period for the development of feelings and attitudes towards mathematics around the ages 9-11 (McLeod, 1993). Furthermore, once mathematics anxiety arises, it tends to remain consistent as the student matures, unless external intervention occurs (Ma, 1999), making the upper primary years a key period for developing lifelong confidence in mathematics. In many cases, anxiety leads to negative attitudes towards maths, as well as maths avoidance (Thijsse, 2002), and lack of interest in mathematical or scientific careers (Chipman, Krantz, & Silver, 1992). Improving mathematical skills has been demonstrated to reduce maths anxiety (Ma, 1999).

Because mathematics is a hierarchical discipline, in which success in the lower levels is required to master more complex material (Fuchs & Fuchs, 2005), challenges at primary school level can disqualify students from participation in the higher level mathematics classes that are a pre-requisite for careers in science, medicine and engineering. Coupled with a trend for parents to become more involved in their children's education (Davies & Aurini, 2006), this leads some families, wishing to safe-guard their child's future choice of a career that may require a sound knowledge of mathematics, to decide to enrol their child in extra-curricular mathematical study.

There are a variety of options currently on the market for families who wish to provide their child with mathematics-focussed academic support. These range from purchasing mathematics "workbooks", which contain practice sums for children to work through; use of computer programs that aim to teach maths skills and provide practice in applying them; a range of formal tuition centres, usually franchised businesses, where children learn in a small group setting (so-called "learning centres"; Davies & Aurini, 2006); and engaging a private tutor for one-on-one assistance with schoolwork and test preparation (so-called "shadow education"; Baker, et al., 2001). No studies have conclusively demonstrated that additional tuition increases school achievement for all students (Davies & Aurini, 2006); and a review of the literature found no studies that explicitly compared these methods of additional mathematics instruction. Nevertheless, several studies have attempted to analyse the individual methods, and these are summarised in the sections that follow.

2.3.2. *Private Tuition*

Participation in private tuition (also known as *shadow education*) varies widely between countries; however, incomplete availability of data comparing prevalence of uptake of private tuition, as well as concerns about the reliability of the data provided, makes it difficult to determine the total amount of tutoring undertaken during a given period (Ireson & Rushforth, 2004). However, it is clear that internationally, the prevalence of private tuition has increased in both industrialised and developing countries (Education Support Program, 2006). During 1994 and 1995, the Third International Mathematics and Science Study (TIMSS) assessed participation in private mathematics tuition, and results indicated that amongst the 41 participating countries, Australia was in the bottom third with regards to uptake of regular additional mathematics tuition, at around 20% (Baker, et al., 2001). Mathematics was the most common subject area for private tuition in the UK, with approximately 10% of students indicating that they were currently undertaking tutoring in mathematics,

and 27% indicating they had received mathematics tutoring at some point (Ireson, 2005). Baker and colleagues (2001) calculated that, on average, 39.6% of Year 7 and Year 8 students of students internationally regularly participated in shadow education activities relating to mathematics education, such as additional tutoring or cram school. They also found substantial variation in shadow education between different countries, with over three-quarters of students from Japan participating in private tutoring once a week, compared to less than one-fifth of students from Australia (Baker, et al., 2001). In Australia, Watson (2008) concluded that spending on private tuition had increased nearly 20% between 1999 and 2004, and currently comprises 5% of the total average spending on children's education, so it is clear that Australian access to private tuition, while low compared to some countries, is on the rise.

Increasing levels of private tuition seem to imply that parents perceive additional tuition to be helpful to their children's education. Baker and colleagues (2001) suggested that the rise in private tuition was the result of the development, internationally, of a

> ...widespread and institutionalized *remedial strategy*. The notion
> here is that schooling and one's ability to move through it with at
> least a minimal level of academic success has become such a
> central and crucial task for such a wide portion of the youth
> population, that prematurely ending a school career has taken on
> extremely severe social consequences for both the individual and
> society as a whole. Over the past century, the widespread use of
> mass, compulsory schooling ... has made schooling the central,
> formal institution connecting children and youth to adult status
> (e.g., Fuller& Rubinson, 1992). The central message of schooling
> is that ... all must participate and at least minimally advance and
> achieve when and where they can. (Baker, et al., 2001, p. 3)

As a result, students who struggle to achieve in mainstream school classes are often directed to private tuition in order to complete the required processes of education leading to adulthood (Baker, et al., 2001).

The use of shadow education appears to be effective in maintaining students in formal education. Private tutoring in mathematics has been demonstrated to raise school-leaving scores by half a grade (Ireson, 2005), although effectiveness varies based on the quality of the tutor (Ireson & Rushforth, 2004). The majority of private tuition tends to follow the school curriculum closely, with "pace and content dictated by school deadlines" (Davies & Aurini, 2006, p. 124); this is in line with the findings of Baker and colleagues that the majority of shadow education was remedial in nature, focussed on supporting struggling students to meet the requirements of national curricula.

2.3.3. Learning Centres

Claiming to build a skill-base rather than provide a "band-aid" solution, and generally relying on their own curriculum and materials, learning centres usually offer a wider range of services than a private tutor (Davies & Aurini, 2006). No studies have been found that explicitly test the effectiveness of branded after-school maths tuition centres using the after-school format. However, a meta-analysis of studies of the effects of out-of-school hours programs on improving mathematics achievement found that academically focussed after-school programs had a significant, if modest effect, on mathematics achievement, and that study completed in groups was more effective than one-on-one tutoring in this context (Lauer, et al., 2006).

2.3.4. Computer-aided Maths Instruction

Computer-aided mathematics instruction has been shown to be of some assistance in improving the skills of learning disabled students (Seo & Bryant, 2009), but appropriate computer use has been shown to enhance the rates of mathematical learning in kindergarten students (Weiss, Kramarski, & Talis, 2006).

All of the education methods listed have research support demonstrating that they can improve academic performance in children. However, it is unclear at this stage whether any of these tuition methods have an impact on educational resilience.

2.4. The Kumon Method

The Kumon Method of after-school tuition, developed in Japan in the 1950's, is an intervention aimed at improving children's academic results as well as their independence and self-discipline. Expanding to the United States in the 1970s and reaching Australia in 1984, the Kumon Method provides both remedial and extension tuition in mathematics, English and Japanese. The mathematics programme is Kumon's best-known feature in Australia. As early as 1991, Fuller noted that the "literature about Kumon is sparse" (1991, p. 6), and in the ensuing two decades, few formal studies of the Kumon method have been published. An exemplar of the "guided method" of education, where students are introduced to a progression of tasks that gradually increase in complexity (Department of Education Employment and Training - Research and Statistics Branch, 1987; Ukai, 1994), Kumon introduces children, working at their own pace, to the skills required to solve senior high school mathematics problems in small steps. The fine-grained instructional materials reflect in some ways the "programmed learning" methods of the 1960s (Fuller, 1991). The principles of: daily practice using a calibrated series of worksheets; self-correction of errors; repetition until a very high standard of speed and accuracy is achieved; focus on correct process as a gateway to correct answers; together with an insight-based method of self-learning are fundamental to the program.

2.4.1. Key Elements of the Kumon Method

Under the Kumon method, the ability to complete maths problems accurately is prioritised over deep understanding of the underlying concepts – "Kumon assumes that facility *necessarily* precedes concepts" (Fuller, 1991, p. 10), and that conceptual

understanding will emerge through completion of a sufficient volume of problems. Analogies with sports practice or music practice abound – cricket players are not expected to explicitly understand the Newtonian physics of the bat/ball system; they need only to embody this understanding to direct the ball as they hit it, and few would argue that regular daily practice of hitting the ball is not essential to building up this embodied skill (Hollinsgworth, 2001). Likewise, the building of mathematics "muscle memory" (Fuller, 1991, p. 32), or rapid, automatic, accurate responding is seen by Kumon instructors as critical to the ability to develop strong mathematical thinking and mathematical creativity (T. Kumon, 1996).

As mathematics is a highly sequential discipline, with each step building on the ones before it (Fuchs & Fuchs, 2005), this "mastery" approach – overlearning to the point of automaticity (Russell, 1996) – allows children to develop strong basic skills and then apply those skills in learned strategies to solving mathematical problems of increasing complexity. In line with Haring and Eaton's (1978) four-stage instructional hierarchy, accuracy alone is insufficient to demonstrate mastery within the Kumon system – the student must be able to perform the calculations to a high standard of accuracy, in a reasonable time, and use their skills in novel applications as well as in previously learned contexts. By ensuring mastery of the preceding steps, when new learning arises, the student is free to devote all his/her resources to the new information, without the "processing overhead of despised fractions, buggy multiplication and distracting factoring" (Fuller, 1991, p. 49).

The Kumon Mathematics programme is a sequential series of 460 steps (H. Kumon, 2002), based on seven organising principles (see Table 2.4). Beginning students sit a Diagnostic Test to assess their current skill level and are started on the appropriate step in the program (Shiba, 1986). Each step is a set of 10 worksheets, gradually increasing in difficulty. If a student cannot complete the set of worksheets in the required time, or to the required level of accuracy, the student repeats the set until the criteria are achieved. Sets of worksheets are grouped into levels of 20 sets

(a total of 200 worksheets). Each set in the level must be passed before the student completes an Achievement Test, demonstrating that they can achieve all the requirements of that level. A student may complete a set once, or repeat it many times, with the average student completing 60 sets (three attempts at each worksheet) to qualify to sit the Achievement Test for a given level (Russell, 1996).

Table 2.4

Organising principles of the Kumon Method (after Fuller, 1991; Izumi, 2001)

Articulated learning (fine-grained instruction) leading directly to calculus
Individualised learning at the level and pace that suits the student
Independent learning
Entry to the learning program at a comfortable starting point for the student
Natural and universal ability to calculate quickly and accurately
Aim to achieve mastery of the material
Study without strain or pressure
Repeated practice
Home study (including parental support, oversight, and correction)
Immediate feedback and correction of errors

The Achievement Tests are calibrated such that a child who can complete each worksheet in the level to the required time and accuracy, will score very well on the test. The levels of the Kumon Mathematics program are described in Table 2.5 – the worksheets comprising the levels are comprehensively adjusted and revised on a rolling basis by the Kumon organisation, as part of Kumon's corporate learning, as feedback from Kumon instructors indicates what methods are most successful with student learning (Fuller, 1991).

Table 2.5

Table of Learning materials (Kumon Australia and New Zealand, 2007)

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│                NOTE:                  │
│  This table is included on pages 76-77│
│  of the print copy of the thesis held │
│   in the University of Adelaide       │
│   Library.                            │
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Kumon instructors select the worksheets for students to complete, based on time and accuracy ratings of previous work. They aim to provide children with worksheets at the "just right" level, where "the act of calculating is effortless and rhythmic. Concentration is intense, and...the pencil appears to...fly down the page" (Russell, 1996, p. 256). Students working at this level are working at the forward edge of their understanding, with each new concept requiring only a small leap in insight to master. If the instructor gauges the child's progress incorrectly and provides work that is too challenging, it is reflected immediately in reduced accuracy and increased time scores, leading to more repetition, or even a review of earlier work (Ukai, 1994). The instructor's job is to facilitate the child's ability as a self-learner by offering feedback, praise and hints, rather than by explicitly teaching processes or methods (Russell, 1996). Competition within the program is against the time and accuracy standards and the student's own personal bests – there is little focus on competition within the class.

2.4.2. Outcomes of the Kumon Method

The ability to calculate with little conscious effort has been shown to reduce anxiety in mathematics performance (Wittman, Marcinkiewicz, & Hamodey-Douglas, 1998), and Kumon's focus on speed and accuracy assists in the development of students' test-taking skills (Oakley, et al., 2003), because both speed of completion and percentage accuracy are considered before students can advance. The criteria for advancement are discussed with each student on a bi-weekly basis during "feedback" – a regular, brief one-on-one conversation between the student and the Kumon instructor – with the aim of teaching students how to assess the quality of their own work. A fundamental element of the Kumon Method is the belief that any child – not just the gifted few – can become a high achiever in maths (Fuller, 1991; Russell, 1996). This is in line with Bloom's (1974) view that with adequate time, suitable instruction and corrective feedback, 95% of students can learn what only the

top 20% were thought to be capable of. Furthermore, the aim of the Kumon method is to nurture an "attitude of self-learning" (H. Kumon, 2002, pp., p 39) in students, because Toru Kumon believed that "there is a limit to how much one can teach, but there is no limit to how high one can advance through self-learning" (T. Kumon, 1996, p. 63).

The Kumon method has been criticised for an excessive focus on computation and insight-directed learning, and the volume of repetition (Russell, 1996). However, concerns that Kumon stifles the creativity and intuition necessary for higher-order mathematical thinking have been rejected by many in the mathematical field (Fuller, 1991), and individual examples are available to refute the claims (e.g. a Queensland Kumon student whose unexpected potential for success in maths and physics was discovered through her Kumon studies, who is now doing a PhD in nanotechnology; Kumon, 2007b). Kumon's approach is that sound calculation ability allows creativity to flourish (T. Kumon, 1996); however, the lack of long-term longitudinal studies in this area limit either side's ability to claim victory on this disagreement. Student outcomes are also vulnerable to the degree of instructor quality and parental involvement, with higher levels predicting better outcomes for students (Ukai, 1994). Further, the current concern about parents "overscheduling their children's out-of-school time with adult-directed activities such as sport, music, dance and academic lessons (Levey, 2009) is amplified when considering Kumon, due to the daily nature of study required.

While stories of "exceptional children" – 3-year olds who can complete calculus equations, and 10-year olds who have finished university level mathematics after studying with Kumon – exist (Fuller, 1991; Kumon, 2007b), they are seen by many as peculiarities rather than as a model for all students. Furthermore, given the self-selecting nature of parents interested to permit or encourage their young children to achieve results like these, the validity of the results may be questionable.

However, it seems clear that sustained Kumon study has an effect on academic outcomes, and, potentially, on fundamental academic ability.

2.4.3. Current Research on the Kumon Method

Studies analysing the impact of Kumon on the academic results of children from disadvantaged backgrounds have demonstrated medium to large effect sizes. The earliest known formal study (Medina, 1989) was conducted in an inner-city junior high school in Montebello, California, where 103 low-achieving Hispanic students were given Kumon instruction for eight months in place of regular mathematics instruction. Pre-and post-intervention testing on the "Math Computation" and "Math Concept & Application" components of the California Achievement Test showed average increases from the 4th to the 10th percentile amongst Grade 7 students, and maintenance of percentile rankings amongst Grade 8 students (this maintenance was considered notable because percentile rankings in mathematically challenged students usually fall over time).

Some years later, Oakley and colleagues implemented a programme of Kumon study at four out of 13 elementary schools in the Pontiac school district in Michigan, USA (Oakley, et al., 2003). Schools in this district achieved among the lowest scores on the Michigan Educational Assessment Program (MEAP) in 2000, before the implementation of the programme, with only half the State average of students obtaining a passing grade (Oakley, et al., 2003). By 2004, 34.7% of students from the Pontiac district exceeded state standards on the MEAP, compared to the state average of 28% (Oakley, et al., 2005). In addition to these gains in mathematics scores, an increase in rankings on all subjects was noted, and attributed by the school principal to the students' improved levels of concentration from studying Kumon (Fuller, 1991). Similarly, McKenna, Hollingsworth and Barnes (2005) added Kumon mathematics to the curriculum at an inner-city elementary school with a high proportion of economically disadvantaged students, and found that

students who studied Kumon maths in addition to the regular classroom mathematics program made significantly greater gains in maths skills than those students who studied only the regular classroom maths program. Results of Stanford Achievement Tests and Iowa Tests of Basic Skills, administered one year and two years after the conclusion of the program respectively, indicated that the learning gains were maintained over time, with moderately large to large effect sizes (Glass' Δ between 0.75 and 1.95). Other similar results have been reported in several different schools (Fuller, 1991; Thijsse, 2002). Furthermore, Kumon study has been shown to reduce mathematics anxiety as well as increase maths achievement for students in Grade 8, in a pilot study from South Africa (Thijsse, 2002). However, the United States Department of Education's "What Works Clearinghouse" (WWC) has noted that no studies of the effectiveness of Kumon Maths currently fall within the WWC evidence standards, and thus no meta-analytic work assessing the effectiveness of the Kumon method has yet been completed (U.S. Department of Education, 2009).

One reason that findings of individual studies cannot be generalised to broader population outcomes is that studies investigating the effectiveness of Kumon, usually modify the standard method of Kumon instruction and incorporate Kumon study into school lessons, rather than using the traditional format of after-school instruction (e.g. McKenna, et al., 2005; Medina, 1989; Oakley, et al., 2003). As a result, while the studies cited found that children who studied Kumon experienced significant academic gains, the results of the studies may not be applicable to students working under the program's typical administration.

Despite these criticisms, there is evidence that, in some situations, Kumon instruction has had a powerful effect on mathematics achievement in schools. However, no work to date has been done to discover whether the Kumon Method affects educational resilience – improving children's ability to maintain their level of performance under stressful or adverse conditions.

2.4.4. Kumon and Educational Resilience

Several components of the Kumon Method of instruction align closely with factors known to promote resilience in children (see Table 2.6). Parents generally nominate the desire to help their children achieve success in their current study, and develop skills for the future, as their motivation for participating in the Kumon programme (Levey, 2009). However, it is possible that additional benefits are conferred by Kumon study. The self-discipline engendered through daily study, the confidence and self-efficacy instilled by successfully competing challenging work, a close relationship with a teacher, the experience of academic success that results from sustained study, and the development of an internal locus of control as the students learn that their efforts bring results, are each factors that have been linked to the development of resilience to adversity (Benard, 2000; Newman, 2002; Werner, 1989). The experience of Kumon study may even act as a "turning point" (Rutter, 1999; Wright & Masten, 2006) for children, breaking a negative causal chain relating to school achievement and setting students on a new, positive trajectory: Kumon study leading to the initial experience of academic success leading to a desire to continue with study leading to further academic achievement and resulting in access to a different life path. Coupled with the protective factors that the Kumon organisation promotes as the result of Kumon study: self-reliance, the habit of persistence, the strategy of seeking assistance when necessary, and the ability to set long-term goals (B. Johnson & Howard, 2007; H. Kumon, 2002; T. Kumon, 1996), families' investment in the program may be rewarded by a permanent change in their child's ability to cope with the vicissitudes of life.

Table 2.6

Aspects of the ideal application of the Kumon method, which have been linked in

other educational contexts to the development of educational resilience

Self-efficacy	Students learn work to mastery level and experience a high level of success in completing worksheets.
Family support for education	Parents mark Kumon work at home, demonstrating their involvement with child's education.
Perseverance and persistence	The Kumon method promotes a strong work ethic (if you work hard, you will succeed). Kumon emphasises consistent effort – homework is checked each class. Students repeat worksheets until a high level of accuracy is achieved.
Educational aspiration	The Kumon method prizes knowledge and academic achievement and promotes educational achievement as a valued goal.
Goal direction, goal setting	Kumon students have brief bi-weekly discussions with their supervisor about their short term and long term goals within the program; competition is primarily with oneself.
Internal locus of control	The Kumon method ensures children receive praise and feedback which outlines how the student's abilities and characteristics contributed to their success
Positive and high expectations from teachers; good interactions with teachers	Kumon supervisors have high expectations for all their students, which are communicated in a warm and caring manner; Kumon supervisors generally work with a child over two or more years.

2.5. Focus of the Current Study

The concept of resilience has been thoroughly researched across a range of contexts and specialisations within the field are beginning to emerge. Educational resilience, as discussed, has particular relevance to the ability of children to maintain academic achievement in the face of adversity. Although educational resilience has been studied in the USA, with particular regard to issues of race and aspects of the classroom learning environment, little work has yet addressed the questions of:

- Which factors specifically influence educational resilience in children in Australia?

- What do children themselves think about the factors leading to resilience, and how is this different to the opinions of their parents?

- Is educational resilience increased in children who study under the Kumon method of education?

The Kumon program of education, which is currently serving ~4.15 million children worldwide, with 34,000 in Australia (Kumon, 2009), is characterised by factors that have been shown to improve children's resilience in other contexts: self-efficacy; family support for education; encouraging perseverance, persistence, educational aspiration, goal direction and goal setting; developing internal locus of control; positive and high expectations from teachers; and good interactions with teachers. Research in this area has been limited to analysing the benefits of the Kumon programme to children's mathematical ability. Given the aforementioned links between the programme and resilience factors, it is important to test whether study using the Kumon Method can provide benefits beyond improved mathematical achievement to Australian children.

The aims of this study are therefore two-fold: to gain a better understanding of the factors and processes affecting the resilience and educational resilience of young people in Australia; and to determine whether the Kumon method of mathematics

instruction influences the development of educational resilience in these children. To address these aims, the following three hypotheses were developed for use within the study:

- H1: Parents and children will have different understandings of the meaning of children's resilience

- H2: Parents and children will have different priorities for education – parents will rate education as more important than children.

- H3: Kumon children will demonstrate greater educational resilience than Control group children, when factors that are also known to affect resilience are controlled for (including: sex, intelligence, locus of control, and life challenges).

Hypotheses H1 and H2 relate to the first aim of the study, and Hypothesis H3 related to the second aim.

2.6. Thesis Structure

The opening chapters have provided a review of the literature to date, highlighting key research that has provided the theoretical and methodological foundation for this study. Chapter 3 outlines the study design, and summarises the materials used and key characteristics of the participants. A detailed summary of the results obtained are provided in Chapters 4, 5, 7 and 8. A discussion of the results in each chapter follows in Chapters 6 and 9. Chapter 10 provides an integration of the findings of the research program, addresses the implications of the results with reference to previous work in this field, and highlights the strengths and weaknesses of the research undertaken. Chapter 11 draws conclusions from the findings, and makes suggestions for future research.

3. METHOD

As outlined in Chapter 2, the aims of this study are to gain a better understanding of the factors and processes affecting the educational resilience of young people in Australia, and to determine whether the Kumon method influences educational resilience in Australian children. To address these aims, this study has assessed a sample of children in South Australia against many of the factors associated with educational resilience; the majority of these factors addressed individual child, microsystem, or mesosystem variables. The study also compares maintenance of educational outcomes over time between Kumon and Control group students, and uses multiple regression techniques to test whether Kumon study is a predictor of educational resilience. This chapter describes the methodological structure of the study conducted. A summary of the participant eligibility criteria and of the recruitment methods is provided, and characteristics of the participants are summarised. The measures used in the study are described, including test backgrounds, reliability and validity. The design of the study and the procedure for data collection are detailed, and information about the statistical analysis is outlined. A rationale for certain methodological choices is provided and key terms used in the study are defined at the end of this chapter.

3.1. Participants

Children were eligible to participate in the study under the following conditions:

- They were in Year 4, Year 5, Year 6 or Year 7 in 2008 or 2009

- They were enrolled either in one of the two Department of Education and Children's Services (DECS) schools participating in the study, or in a participating Kumon centre

- They did not participate in any additional out-of-school tuition at the time of the study (apart from Kumon).

In addition, children in the Kumon group were accepted into the study only where they had completed at least 6 months of continuous study in the Kumon Mathematics program.

Children were excluded from participation in the study under the following circumstances:

- They had not completed scheduled Literacy and Numeracy (LAN) tests

It was initially intended to exclude children who had undertaken additional tuition apart from Kumon, from the study. However, a small number of children who had experienced additional tuition in the past participated in the study (see Section 5.3). The impact of additional tuition in both academic subjects (e.g., English tuition) and non-academic subjects (e.g., dance, musical instruments) was statistically assessed during the preliminary analyses (see Appendix G) and appeared to cause no significant difference in the outcomes. Therefore, these participants were not excluded from the study.

3.1.1. *Participant Recruitment Methods*

Kumon students were recruited through the 33 Kumon centres in metropolitan Adelaide. Centres are located across the breadth of Adelaide, encompassing a mix of high and low socio-economic areas. A letter was sent to managers at each Kumon centre introducing them to the study and requesting their assistance with identification of children eligible to participate in the study. Information Sheets were distributed by the Kumon managers to eligible families within each centre that responded to the recruitment letter (see Appendix A). All Kumon centres had students who met the criteria for participation in the study, but not all Kumon managers wished to provide information to parents regarding the study. Recruitment was highly variable between centres, with the majority of respondents coming from

the centres in the following suburbs: Adelaide, Blackwood, Brighton, Christies Beach, Henley Beach, Lockleys, Magill, Norwood, Reynella and Stirling. Some participants were also currently or previously enrolled in the Kumon English programme but it was not possible to get reliable data about their Kumon English enrolment.

These centres represented 35% of the total Kumon centres operating in the Adelaide metropolitan area at the time of recruitment. Families were offered the results of their child's IQ test in return for participation in the study. Interested families contacted the researcher to agree a time for the child assessment and parent interview that comprised data collection for this study. Formal consent to participate in the study was recorded at the start of the data collection interview (see Appendix A). Participating families gave their permission to be contacted in future for follow-up data collection. Follow-up data (most recent LAN results) were collected by telephone. Testing was conducted between December 2006 and December 2008. Follow-up data were collected between January 2007 and September 2009.

Control group participants were recruited through two government schools in the Adelaide Metropolitan area, with the permission of DECS. Criteria for selecting the participating school were as follows:

- to ensure a comparable sample could be obtained, schools had to be located in a suburb with socio-economic indicators likely to match the mix of Kumon students recruited.

- for ease of access, because the researcher had to make multiple visits to the school over several weeks, the schools had to be located within a 15 minute drive from the city centre.

Several government schools that met these criteria were contacted to request participation, and two Principals agreed to allow enrolled families to be contacted. Letters were sent home to the families of children in Years 4, 5, 6 and 7, and interested parents returned preliminary consent forms. Once these consent forms

were returned, the child was added to the roster for testing and interview. Rostered testing sessions were conducted on days agreed with the school, on school premises, in mid-2008. Once the interviews were completed, a consent form and questionnaire pack was sent to the parents (see Appendix A), containing the Child Experience of Adverse Events, the Adult Demographics questionnaire, the Family Inventory of Life Events, and a reply paid envelope. In 25 cases where the child/ren had participated in testing but their parents had not responded to the questionnaire packs sent home, families were followed-up, and data were collected from them by reply-post (9) or telephone interview (12) to maximise the sample size. Four families were unable to be contacted.

Participating schools were designated School 1 and School 2 in order to protect participant confidentiality.

3.1.2. Participant Follow-up

Families and schools were contacted again by telephone to source most current LAN test data between January 2007 and September 2009.

3.1.3. Consent

Of 174 total interviews conducted (Kumon group plus Control sample), 9 parents failed to provide consent for their child to participate and one family rescinded consent for their child's participation in the study. Analysis of the non-respondents on the few data points available (child age, sex) indicated no significant differences in the non-responding sample from the participating sample. Data received from schools suggested that many non-responding families had changed schools, and contact details provided at the start of the investigation were no longer valid, so follow-up contact was not possible. The 10 datasets for which no consent was obtained were removed from the study, leaving 164 datasets.

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3.1.4. Characteristics of Respondents

One hundred and sixty-four students participated in the study; 62 Kumon students and 102 Control group students, of whom 47 were from School 1 and 55 from School 2. School grade, sex and cultural background characteristics of the sample are described in Table 3.1, Table 3.2 and Table 3.3. Chi-square analysis indicates that the distribution of participants by sex was not significantly different: χ^2 (2, N = 164) = 0.18, p = 0.92; likewise, the distribution of students between school grades was not significantly different: χ^2 (6, N = 164) = 4.03, p = 0.67).

Table 3.1

School grades of participants, by source

Grade	Kumon	School 1	School 2
4	22	16	14
5	15	14	16
6	17	11	13
7	7	6	12
8[4]	1	0	0
Total	62	47	55

Table 3.2

Sex of participants, by source

Sex	Kumon	School 1	School 2
Male	30	22	28
Female	32	25	27
Total	62	47	55

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[4] One participant was enrolled in the study despite being outside the desired age-range; data from this student are included in the descriptive statistics but excluded from analyses relating to the calculation of educational resilience.

Table 3.3

Cultural background of participants, by source

Cultural Background	Kumon	School 1	School 2
Aboriginal Australian	-	-	3
Anglo-Australian	20	34	32
Chinese	5	1	1
Greek	4	5	5
Italian	4	4	1
Vietnamese	-	-	1
Multiple cultural identities	1	-	3
Africa/Middle East	3	-	-
Germany	1	-	1
Holland	2	-	3
India	3	2	2
Sri Lanka	2	1	-
United Kingdom	3	-	-
Other European	7	-	2
Other Asian	7	-	1
Total	62	47	55

3.1.5. Participant Feedback

Feedback in the form of a short report, countersigned by a registered psychologist, was provided to parents regarding their child's results on the IQ component of the test.

3.2. Measures Used

3.2.1. Cognitive Ability – Woodcock-Johnson III – Brief Intelligence Assessment

The cognitive abilities of child participants were assessed using the Woodcock-Johnson III Tests of Cognitive Abilities (WJ-III) Brief Intelligence Assessment (BIA; Woodcock, McGrew, & Mather, 2001). The BIA is composed of three subtests, the Verbal Comprehension, Concept Formation and Visual Matching components; tests of vocabulary and language sense, logical reasoning ability and processing speed, respectively.

The BIA was used due to its speed of administration (~25 minutes). The BIA provides results that correlate highly ($r = .92$) with the full scale WJ-III in the 6 – 13 years age group (McGrew & Woodcock, 2001). The BIA has median reliabilities of .95 in the 5 – 19 age range, and is suggested for use in research by the authors "when a short and reliable measure of intelligence is needed" (Mather & Woodcock, 2001, p. 17).

The WJ-III BIA is a theoretically driven test, based on the Cattell-Horn-Caroll theory of cognitive abilities, and was normed on a stratified sample of over 8,500 participants (McGrew & Woodcock, 2001). It can be used on subjects from as young as 2 years old. An Australian norming of the WJ-III was underway throughout the course of the study, so in the absence of available Australian norms, norms from the United States were used in this study.

The current study used the overall BIA score, as well as subtest scores for Verbal Comprehension, Concept Formation and Visual Matching.

3.2.2. Locus of Control – Locus of Control Scale for Children

Nowicki and Strickland's Locus of Control Scale for Children (LOC-C) was used in this study (Nowicki & Strickland, 1973). The LOC-C is considered suitable for use with children from Grade 3 to Grade 12. The LOC-C was developed in the early 1970s and published in 1973, due to the perceived need to develop a "reliable,

methodologically precise measure of generalised locus of control reinforcement that could be group administered to a wide age range of children" (Nowicki & Strickland, 1973, p. 149). The LOC-C is grounded in social learning theory and relies heavily on Rotter's (1966) description of internal and external control of reinforcement. The LOC-C consists of 40 questions that require a "yes" or "no" response, and is administered as a paper-and-pencil test. Twenty-four items are scored in a positive direction (Yes = external locus of control) and the remainder scored in a negative direction (No = external locus of control). Higher scores are associated with a more external locus of control.

It is fundamental to the theoretical basis of the test that: a) children's scores will become more internal as they grow older; b) children with internal locus of control will score higher on tests of achievement than children with an external orientation; c) scores on the LOC-C are unrelated to cognitive ability and social desirability indices (Nowicki & Strickland, 1973).

Previous reliability and construct validity testing showed that as expected, children's locus of control orientation was: more internal in older children; unrelated to social desirability; and linked with higher levels of achievement, just as for the preliminary form of the test. These results have been supported in later studies, including an analysis by Piotrowski and Dunham (1983), which found that older children had more internal orientations.

Reported reliabilities for the LOC-C range from $r = .63$ to $r = .81$, depending on age of children tested (Halpin & Ottinger, 1983; Nowicki & Strickland, 1973); the reliability of the test is higher in older children, and those with stronger reading skills (Halpin & Ottinger, 1983) – this has clear implications for use of the test with younger children. To address this concern, each participant in the current study was offered the choice of reading the test themselves, or having the researcher read the questions to them; the offer of help with "difficult words" was also provided.

A study of 1391 Australian primary school children (Center & Ward, 1986) indicated that Australian children, especially girls, appear to score significantly higher (a more external LOC) than North American school children. Additionally, split-half reliabilities for Center and Ward's sample were somewhat lower than the reported measures for the LOC-C on North American children, and the expected trend of increasing internality with age was not seen. These potential weaknesses in reliability and generalisability with an Australian sample may be an issue in the use of this test with Australian populations.

A further challenge in the use of the test is that the LOC-C does not appear to have been re-normed since its development in 1976. It is unknown whether the lack of recent re-norming of the LOC-C is a concern, as there has been no investigation of whether a Flynn-type effect, of predictable changes to LOC-C scores over generations, operates on the locus of control concept as it has been demonstrated to occur with IQ scores (Flynn, 1987). It is outside the scope of the present study to determine whether LOC does show similar generational changes. However, even if these changes have occurred, the entire sample for the current study was tested using the same measure of LOC, so comparisons between groups will still maintain internal consistency. Despite these limitations, the LOC-C is a widely used and researched scale, and when used with knowledge of the test's limitations, can still provide useful results.

In the current study, only the total LOC-C result was used, and individual scale items were not available for analysis, making it impossible to calculate and report any reliability information for the current sample.

3.2.3. *Protective factors – California Healthy Kids Survey Module B: Resilience*

Aspects of protective factors available to children were assessed using the California Healthy Kids Survey Module B: Resilience (CHKS-B), also known as the Resiliency Youth Development Module (RYDM) (WestEd, 2005). Sponsored by the

California Department of Education (CDE) in response to requests from schools for "help in assessing student health-related behaviours, particularly in meeting the requirements of the federal Safe and Drug Free Schools and Communities Act (SDFSCA)....[as well as] CDE's commitment to promoting the well-being and positive development of all youth" (Austin & Duerr, 2005, p. i), the CHKS-B was created by WestEd, an educational research and development agency, in collaboration with Duerr Evaluation Resources. Philosophically, the test is founded in the understanding that health and behavioural risk factors must be understood and addressed in order to create supportive learning environments in which academic achievement can be raised (Austin & Duerr, 2005). The conceptual model underlying the CHKS-B proposes that:

> external assets help meet youths' basic developmental needs, which in turn promote the development of internal assets; these then contribute to healthy social and academic competence/outcomes. (Sharkey, You, & Schnoebelen, 2008, p. 408)

The test uses a process-centred approach to calculate the range of resources available to children, under the assumption that the greater the range of resources an individual has, the more likely the individual will be capable of mounting an adaptive response to any life crisis (Olsson, Bond, J.M., Vella-Brodrick, & Sawyer, 2003, p. 8).

The CHKS-B measures both internal and external assets thought to promote resilient development within the categories of: school and family assets (external), internal resiliency (internal) and strength of student's bond with the school (external) (Bridget Johnson & Lazarus, 2008). The School and Family Assets (External Resiliency) subscales comprise 23 questions assessing external assets in three major domains: school, family and community. Most questions in this domain are answered against Likert response options from 1 = not at all true to 4 = very much true; School connectedness is measured on a 5-point Likert scale from 1 = Strongly

Disagree to 5 = Strongly Agree. The Internal Resiliency subscale comprises 18 items (addressing self-efficacy, empathy, problem solving, self-awareness, cooperation and goals/aspirations) with Likert response items anchored at 1 = not at all true and 4 = very much true (Hanson & Kim, 2007). Questions relating to peers and adults at home (pages 4 and 5 of the CHKS-B) were not used in this study. The test is constructed so that children who endorse more internal and external assets receive a higher score. The CHKS-B has recently been used in investigations of student resilience in the United States, Australia and Africa (Bridget Johnson & Lazarus, 2008; Sharkey, et al., 2008; Stewart, Sun, Patterson, Lemerle, & Hardie, 2004).

Sharkey, You and Schnoebelen (2008) noted that the CHKS-B is the only large-scale survey of school-aged children that systematically measures resilience. In an assessment of the psychometric properties of the CHKS-B, Hanson and Kim (2007) noted that the test provides balanced coverage of internal and external contributors to resilience, with good internal consistency among the subscales. They cautioned that it has low test-retest reliability, and moderate construct validity, but noted that the internal asset subscales were "adequate for general research purposes" (Hanson & Kim, 2007, p. 11). Sharkey, You and Schnoebelen (2008) further investigated the psychometric properties of the CHKS-B in an examination of student engagement. The student engagement scale of the CHKS-B has a reported internal consistency reliability of 0.79 (McNeely, Nonnemaker, & Blum, 2002). Internal consistency for external assets scales was reported as high (Cronbach's α = 0.92) by Sharkey and colleagues, who also tested WestEd's original factor structure of six items (Co-operation, Empathy, Problem-Solving, Self Efficacy, Self Awareness and Goals & Aspirations) and found a high internal consistency for this scale (Cronbach's α = 0.94). However, they also noted that a three-factor structure of internal resiliency was better supported by their own psychometric validation, and recommended Self-Concept, Interpersonal Skills and Goals & Aspirations as the dimensions of internal resiliency measured by the CHKS-B (Sharkey, et al., 2008).

For the current study, all 42 questions from the CHKS-B were used, but for the purposes of interpretation, the data have been organised into 6 categories: the original School & Family Assets, External Resiliency and Internal Resiliency subscales were used, as well as Sharkey's Self-Concept, Interpersonal Skills and Goals & Aspirations subfactors of the Internal Resiliency Scale. A "Total Assets" score was constructed by summing the School & Family Assets, External and Internal Resiliency subscales. The reliability of the scale as used in the present study was calculated, with a Cronbach's α of 0.904 reported, which is very close to the internal consistency reliability reported by Sharkey and colleagues (2008).

3.2.4. *Mathematical ability – Kumon Diagnostic Tests for Mathematics*

A diagnostic test was used to identify the participant's strengths and weaknesses in mathematics. Mathematical facility was assessed using the Kumon Diagnostic Tests for Mathematics, P3 to P6 (depending on the grade level of the students; Kumon, 1994). The Kumon Diagnostic Tests (DT) are a set of proprietary tests used within the Kumon organisation to assess students starting tuition at a Kumon Study Centre. In common with most diagnostic tests, the Kumon Diagnostic Tests focus on fundamental skills at the lower end of the achievement spectrum, and provide information about the participant's facility with these basic skills (Gall, Borg, & Gall, 1996). The tests are designed to assess a child's competence in various mathematical concepts, from simple addition, through subtraction, multiplication, division and fractions. A child's age and school grade are considered when selecting which test to use – for example, the P3 test is appropriate for an average child in Year 3. Tests are timed, and time and accuracy are weighted to determine the test score (high accuracy but very slow speed results in a low score, as does low accuracy at high speed). The test result corresponds to an assumed degree of mastery – the level of mathematics a child is assessed to have understood perfectly,

and on which foundation further tuition should begin. A description of the Kumon DTs are provided at Appendix B.

A similar approach to assessing mathematics achievement using the Kumon Diagnostic test was applied by Thissje (2002) in her investigation of Kumon's effect on mathematics anxiety and achievement in year 8 students. The DT face validity is very strong – the questions presented in the test are the kinds of fundamental mathematics problems required to demonstrate knowledge of the four mathematical operations (addition, subtraction, multiplication and division) as well as their application with decimals and fractions. No further information is currently available regarding validity or reliability of the tests.

Several measures were extracted from the DT results for use in the current study: time of completion, percentage accuracy, level of mastery and test ranking (an absolute comparison with children in that grade, on a seven-point scale).

3.2.5. *Family's Experience of Adverse Events – Family Inventory of Life Events*

The Family Inventory of Life Events (FILE) was developed in 1991 for use in research and clinical settings (McCubbin & Patterson, 1991). It consists of a listing of 71 stressful events that a family may have experienced, and distinguishes between recent (in the last 12 months) and past (before the last 12 months) experience of stressful events. The list is divided into nine categories: intra-family strains, marital strains, pregnancy and child-bearing strains, finance and business strains, work-family transitions and strains, illness and family care strains, losses, transitions 'in and out', and family legal violations. The authors recommend using the total FILE score in determining the level of stressful events within the family (L. S. Walker, Garber, & Greene, 1994). The FILE is completed by an adult family member on behalf of the whole family, and measures the accumulation of stressful life events experienced by all family members. Items reflect sufficient change to require adjustment in the regular pattern of family interaction (McCubbin & Patterson, 1991).

Limitations of the FILE include:

- It does not contain a section for the perceived impact of the life event – i.e., a death in the family can actually relieve family stress if an older family member has had a prolonged illness requiring sustained care.

- As a self-report measure, people may fail to indicate events they have experienced, if they perceive that they may be criticised – e.g., legal violations, mental illness.

- Similarly, the reporting family member may not have full knowledge of all the events that may have occurred to each family member.

In line with the authors' recommendations, the full scale FILE result was used in the current study (McCubbin & Patterson, 1991). In addition, information about family monetary stress from the FILE was used in constructing a "Financial hardship and poverty" measure.

An assessment of the reliability of the FILE as used in the present study was conducted and a Cronbach's α of 0.79 was reported.

3.2.6. Individual's Experience of Adverse Events – Child Experience of Adverse Events Scale

The Child Experience of Adverse Events scale (CEAE; see Appendix B) was developed for the study, and comprises a listing of additional adverse events that might have been experienced by a child in the previous two years, but which were not captured in the FILE. They tended to reflect more individual adversities than those described in the FILE, which were related to family-based adversities. The list of individual adversities on the CEAE was divided into several categories:

- Health issues – chronic and serious acute illness; physical and sensory disability

- Social issues – bullying and peer relations

- Education issues – learning disabilities, private tutoring, participation in non-mainstream schooling; parent's relationship with child's school.

- Kumon issues (completed by Kumon families only) – Length of study; reasons for enrolment; parent's relationship with Kumon.

The CEAE was designed to identify areas of difficulty in a child's life; the current study uses an overall "CEAE score" which comprises all experiences of adversity listed. A score of 1 point is given for each instance of an adverse event experienced, such that a child who suffered from asthma, had experienced bullying and had been diagnosed with dyslexia would receive a CEAE score of 3. This approach was based on the work of Kessler, Davis and Kendler (1997); Felitti and colleagues (1998); Furstenburg, Cook, Eccles, Elder and Sameroff (1999); and Flaherty and colleagues (2006), who found that individual adversities showed little specificity in their effects on children's lives; rather, it was the cumulative impact of several discrete adversities that was the best predictor of later life impact.

3.2.7. Total Life Challenge

The FILE and CEAE scales were combined into a single index of "Total Life Challenge", which provided an index of all measurements of adversity in participants' lives. This approach continued the recommendations outlined in the work of Kessler, Davis and Kendler (1997); Felitti and colleagues (1998); Furstenburg, Cook, Eccles, Elder and Sameroff (1999); and Flaherty and colleagues (2006), in measuring the cumulative impact of discrete adversities as the best predictor of later life impact. As both the FILE and the CEAE scales provide straightforward counts of adversity, and do not overlap in their areas of adversity, it was deemed appropriate to sum them into a single score.

3.2.8. Demographic Information for Child and Adult Respondents

Participants completed the demographic information form as a self-report measure – children in the Kumon group were asked to complete some questions with adult supervision, but were never sole reporters. Questions included: child's birthdate, sex, family structure, co-parenting arrangements (where relevant), cultural background, adult's working hours, and family income.

Family income was assessed against the "poverty line". The poverty line is often defined as an annual income at less than 50% of the median Australian income (Saunders, Hill, & Bradbury, 2008). In 2006, the last year for which national data were currently available, the Australian median household income was $53,404 (Australian Bureau of Statistics, 2006); when adjusted for inflation over three years, that figure became $58,905 (Reserve Bank of Australia, 2010). The poverty line for Australia in 2009 could therefore be estimated at $29,452. Other sources suggest a higher figure of $33,570 for a three-person household (two adults and one child; Melbourne Institute of Applied Economic and Social Research, 2009). In the present study, an intermediate figure of $30,999 has been selected as representing the poverty line, for ease of classification. As income data were collected in "bands", families endorsing household incomes below $31,000 were included in the "poverty" category. Both "absolute" poverty (weekly household income below the poverty line) and financial stress (as measured by the FILE) were taken into consideration.

3.2.9. Adult and Child Values in Life

All participants were asked to rank seven aspects of life (Education, Sport, Family Time, Unstructured play, Religion/Volunteering, Arts & Culture, and Happiness) in order of importance to them personally. Children were supervised by the investigator during this activity, but parents answered independently. As a result, the proportion of useable responses received from adults in the dataset was only

85.9%, due to apparent misunderstandings of the desired structure of the response to the question.

3.2.10. *Adult and Child Qualitative Interview*

A detailed description of the method used within the qualitative component of this study is provided at Chapter 4, but a brief overview is included in this section. The qualitative interview questions were designed to draw on two aspects of resilience: characteristics of child success and factors contributing to success or failure. The questions used were adapted from research undertaken by Johnson, Howard, Dryden and Johnson (1997), in which they sought to understand what factors distinguished children seen as resilient from those seen as non-resilient. Johnson, Howard, Dryden and Johnson (1997) used the concept of "doing OK", which was considered suitable and adopted for use in the present study. By gaining a deeper view of parents' and children's views on what constitutes positive or acceptable life outcomes in children, this aspect of the study sought to gain new answers to two "what" questions of resilience: "What life skills and personal qualities would children with a 'tough life' need to demonstrate in order to be considered resilient?" and "What characteristics of the child's environment could help or hinder a child in demonstrating these skills and qualities?".

In their original study, Johnson, Howard, Dryden and Johnson (1997) did not clearly define the rationale behind the selection of the phrase "doing OK" to describe child success when talking to families. This phrase was used in the current study for two reasons. Firstly, it was believed that the idea of "doing OK" was one that both parents and children would easily be able to understand. Anecdotally, it appears that this was the case, as only five child participants in the present study requested additional clarification about the concepts of "doing OK" or "not doing OK" in life. Secondly, it was hoped that by using a similar question structure to the Johnson, Howard, Dryden and Johnson (1997) study, comparisons between the two data sets

might be more effective. More information about the rationale behind the qualitative component of the study is provided in Chapter 4.

3.2.11. Literacy and Numeracy tests

Standardised Literacy and Numeracy (LAN) tests are intended to be administered to all children in South Australia in Years 3, 5 and 7 (and, since 2009, Year 9). The LAN test scores used in this study were taken from school and parent copies of the individual reports on LAN results provided to each child. Before 2008, LAN testing was done at a state level, with some schools using the South Australian Literacy and Numeracy test (SALAN), and some choosing to use the Western Australian Literacy and Numeracy Assessment (WALNA). From 2008 onwards, a National test was brought in across Australia – the National Assessment Program – Literacy and Numeracy (NAPLAN). Because data collection was conducted between 2006 and 2009, all three tests are represented in the data corpus used in this study.

All three LAN tests were designed to "broadly reflect aspects of literacy and numeracy within the curriculum ... [using] test questions and test formats ... [that were] familiar to teachers and students across Australia" (National Assessment Program, 2009). The tests were administered as part of the national testing program, at each student's school, under national administration guidelines. Students who were absent on the testing day (due to travel or illness) were not permitted to re-sit the test. A minority of students with very low educational achievement were excused from testing, at the recommendation of parents or teachers. This resulted in a number of children not completing a LAN test in any given testing period. Furthermore, no central repository of test results is maintained, with test results being held by the child's parents, and their current school. In principle, test results are supposed to follow the child if they change schools – in practice, it was found throughout the course of data collection that this did not always occur, and that many

children's results were missing, especially where they had changed schools more than once.

Student reports were generated by the national testing authority each year and a copy was provided by the testing authority to parents and to schools (see Appendix C for example copies of the reports). For this study, reports from two years (either Year 3 and Year 5, or Year 5 and Year 7) were required to measure the maintenance of school achievement. Copies of these reports were obtained from parents during the interview where possible. Where children had only completed one LAN test at the time of interview, permission to follow up and seek a copy of the second report at a later date was sought and gained. In cases where parents could not provide the information, permission to seek the LAN reports from the child's school was sought and gained. The process of obtaining records from schools was time consuming, and only partially successful. For students who had changed schools, it was rarely possible to follow up with their new school and obtain the desired reports. Thus, at the time of data collection, there were many participants (n= 58) for whom two sets of LAN reports could not be obtained.

Of the participants for whom full Literacy and Numeracy data were available, three different types of Literacy and Numeracy tests were administered over the period of data collection: the SALAN (South Australian LAN test); the WALNA (West Australian Numeracy and Literacy Assessment); and the NAPLAN (National Assessment Program - Literacy and Numeracy), an Australia-wide test. The results for each test were provided in bands, which are not directly comparable across different tests. The scoring bands for each test are outlined in Table 3.4.

So, for example, in completing the SALAN Yr 3 test, a child could receive a result of Band 1, 2, 3, 4 or 5; while in the Year 7 NAPLAN, a child could score in any Band from 4 to 9. In order to allow for comparisons between results on different tests, each Literacy and Numeracy result was converted to a percentage, dividing the band

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achieved by the highest possible band. See Figure 1 for an example of the

calculations.

Table 3.4

Literacy and Numeracy test result bands

Test type	Bands
SALAN Yr 3	1-5
SALAN Yr 5	1-6
SALAN Yr 7	1-7
WALNA	1-4
NAPLAN Yr 5	3-8
NAPLAN Yr 7	4-9

WALNA Score: Band 2	$2 \div 4 = 0.5$	Final score: 50%
SALAN Yr 5 Score: Band 5	$5 \div 6 = 0.833$	Final score: 83.3%
NAPLAN Yr 7 Score: Band 4	$4 \div 9 = 0.444$	Final score: 44.4%

Figure 1. Example calculations of Literacy and Numeracy test scores from Bands

While this method resulted in a fairly coarse-grained outcome, especially for

students using the WALNA, it did allow for comparisons between tests with disparate

scoring systems. Granted that, within each test, a child scoring in a higher band has

"done better" than a child scoring in a lower band; this form of comparison appears

justified to permit assessment of scoring similarity between tests. Likewise, since

some younger participants' Literacy and Numeracy test results were from Year 3 and

Year 5, and some older participants' results were from Year 5 and Year 7, this

method allowed for comparisons between different levels of the same test as well as

between different tests.

3.3. Rationale for Key Methodological Decisions

3.3.1. Rationale for Retrospective Research Approach

For obvious reasons, it is not possible to take a sample of children and experimentally impose an adverse experience on them to examine whether Kumon study had a protective effect. The ethical constraints imposed by the requirement that research ought not to have a harmful effect on participants (Rosenthal, 1994; Shrader-Frechette, 1994), mean that research into the effects of adversity must use either retrospective or longitudinal methodologies. Longitudinal research was considered infeasible in the context of a typical PhD programme of research. Retrospective research has previously been criticised because: people forget events from the past; the timing of events is misremembered; and people distort or re-invent the past to fit their current situations (Henry, Moffitt, Caspi, Langley, & Silva, 1994).

To address some of these challenges inherent in retrospective research, the current research used a structured list of potential adversities (with provision for the addition of "other" adversities not covered by the list) as a prompt to assist recall of events from the past. The division of timing for these adversities as "within the last 12 months" or "before 12 months ago" was an attempt to reduce the impact of misremembered timing.

3.3.2. Rationale for using Change Scores

Because this study investigates academic resilience, it was necessary to choose a variable that reflected maintenance of academic achievement over time (and in the face of adversity) in order to demonstrate academic resilience satisfactorily. Hence, a score was constructed, reflecting the change in each child's second LAN test compared to the first LAN test they sat. The percentage scores for each LAN test were calculated as described in the description of LAN tests provided above, and then the first LAN score was subtracted from the second LAN score to obtain the LAN Change score for each participant. The order of operations conducted

meant that students who had scored higher on their second LAN test received a positive LAN change score, while those who scored worse on their second LAN test than on their first, received a negative LAN change score.

An average change score across all subdomains (reading, writing, spelling, numeracy) was also taken, in order to assess the overall impact across both literacy and numeracy dimensions.

3.3.3. Rationale for using Multiple Regression

It was hypothesised that a range of variables would affect educational resilience (as per Table 2.2), and that in the "noise" of these variables it might be hard to determine the "signal" we were seeking. Masten and Obradovic (2006, p. 16) noted that "variable-focused models and analyses, using multivariate statistics ... [are] well-suited to testing hypotheses about the multidimensional nature of adaptation within and across time". Multiple regression, with its ability to account statistically for the variability caused by known factors, was seen as the most appropriate method to use.

3.3.4. Rationale for addressing Educational Resilience

In addressing the concept of educational resilience, two issues are clear: the researcher must measure the maintenance of academic achievement over time, and any model developed must take into account the experience of adversity on the outcomes. In analysing educational resilience in the present study, three approaches were planned. The first involved constructing a multiple regression prediction equation, with LAN2 as the dependent variable and independent variables including: LAN1 score (to account for academic ability); Length of time studying Kumon; a measure of adversity; and an interation term between Kumon status and adversity (to measure whether Kumon study was protective in the face of adversity). The model also incorporated several other known risk and protective factors. This model had the

benefit of also assessing Kumon's impact on academic achievement as well as educational resilience.

The second model adapted the technique described by Kim-Cohen and colleagues (2004). This method assessed educational achievement at two points in time to develop a measure of the maintenance of academic achievement. By measuring the deviation of standardised residuals from a linear regression on the results, it was possible to identify children who performed notably better or worse than predicted based on prior performance (with the group norm of maintenance represented by the regression line). Children whose residuals fell in the top and bottom 25% of the distribution were classified as resilient or vulnerable respectively. This novel approach to educational resilience meant that judgements of resilience were made on the basis of children's actual maintenance of performance compared with the expected level of change, rather than by their scores on a standardised test at a single point in time. After groups of participants who had demonstrated resilient and non-resilient responses were generated using this method, multiple regression was used to determine which risk and protective factors best predicted membership of the two groups.

The third approach to investigating the link between Kumon study and educational resilience was undertaken in order to more fully address the relation between the timing of adversity, the length of Kumon study and the outcomes of educational resilience. Under this approach, participants were classified as experiencing adversity before, between, or after sitting their LAN tests, and categorised on this basis into one of four groups: Early Adversity, Middle Adversity, Late Adversity or No Adversity (see Table 8.8 in Chapter 8). The timing participants' commencement of Kumon study was also assessed. Participants who had a pattern of Early Adversity or Middle Adversity, and who, in the case of the Kumon students, commenced Kumon studies after their LAN1 test and before their LAN2 test, were included in this model.

3.4. Study Design and Procedure

The study design was essentially cross-sectional, with the majority of data collected at a single point in time. In contrast, data relating to performance on standardised school tests were collected at two points in time, to provide an indication of the maintenance of academic achievement, which is required to inform judgements about educational resilience.

Measures used in the study included a mixture of norm-referenced assessments, self-report questionnaires and semi-structured interview. Data were collected through a combination of written and verbal responses to these questionnaires and tests. Testing with participating children was conducted in the child's home for Kumon participants, and at the child's school for non-Kumon participants. Due to the different methods of sourcing participants from the two groups, data collection procedures varied slightly between Kumon and Control participants.

3.4.1. Data Collection from Kumon Students

Data collection occurred at the child's home in 89% of cases – 7 participants requested that a room at The University of Adelaide be provided for the data interview, as their home was unsuitable for data collection. On arriving at the house, a "quiet area with a desk" was requested to conduct the interview. After parents were briefed on the study design, they provided consent for their child to participate in the study, as well as consent for the researcher to access relevant school or Kumon records. Children were asked to complete the Child Demographics questionnaire (see Appendix B), with parental support where required. Parents were then requested to leave the immediate testing area to avoid distraction. Children completed the tests in the following sequence:

- California Healthy Kids Survey – Section B

- Kumon Diagnostic Test

- Ratings of importance of values

- Woodcock-Johnson III Tests of Cognitive Abilities: BIA

- Locus of control

- Qualitative questions

As the test period was relatively long (~one hour), the order of the tests was selected to ensure that the response format varied from test to test, to keep children engaged during testing.

Parents completed the Child Experience of Adverse Events, the Adult Demographics questionnaire and the Family Inventory of Life Events while their child was being tested. They also shared past Literacy and Numeracy test information, and completed the Adult Qualitative Interview.

Qualitative interview

Kumon participants (children and parents) also completed a brief qualitative interview, of average duration around 3 minutes. Each child was interviewed individually to minimise the impact of parental or peer prompting, and by a single interviewer, to ensure the maximum possible consistency in question format. Parents responded individually (n = 34 instances) or jointly (n = 3 instances), depending on their availability. Questions followed a standard format and clarification was provided where necessary. Adult and child participants were asked parallel versions of four questions relating to "doing OK". The interview questions are reviewed in more detail in Chapter 4 on page 129, and more information about the rationale underlying the qualitative approach is also provided in Chapter 4.

3.4.2. Data Collection from Control Group Students

Data collection for these students occurred at the child's school. A quiet room with a desk was used for data collection. Parents returned signed consent forms, and were sent a questionnaire pack to complete following their child's testing session.

Parents completed relevant questionnaires (Child Experience of Adverse Events, the Adult Demographics questionnaire, the Family Inventory of Life Events), and returned them in reply paid envelopes directly to the researcher. The only difference in the adult questionnaires provided to the Control group was the elimination of questions relating to Kumon, and the removal of the Adult Qualitative Interview. Children were interviewed on the same tests, in the same sequence, as the Kumon students, but the final qualitative questions were not asked, in order to keep the interview length to 45 minutes.

3.5. Analysis

3.5.1. Missing Data

Of the 164 respondent families, full data were available for 106, or 64.6%. The majority of missing data were Literacy and Numeracy (LAN) test scores, unavailable for one or both tests needed to calculate the LAN Change score. The distribution of missing data across the two participant groups was not significantly uneven (see Table 3.5). In many cases parents did not keep a record of the child's LAN score report (which was sent home to parents by the school some months after the LAN testing); following up with the school to view the file copy was successful in some cases but not in others. Access to the data was especially unreliable where the child had moved schools. The Parental Ranking of Values scale was missing for 14.6% of cases – these cases were excluded from the analysis for any analyses relating to this scale. Other scales were missing data at a proportion of <1% or lower. Imputations for such small proportions of missing data are widely recognized as inconsequential (Harrell, 2001; Tabachnick & Fidell, 2007); these data were therefore replaced with the series mean for the item.

Table 3.5

Available LAN data by source

Source	LAN1 data available (%)	LAN2 data available (%)	LAN change data available (%)
Kumon	93.5	75.8	71.0
Control	72.5	75.5	64.7
All	80.5	75.6	67.1

3.5.2. Data Entry and Analysis

Data entry was conducted by the researcher, and the data file was checked for entry errors by reviewing a randomly selected set of cases. Data were screened in SPSS to ensure there were no out-of-range variables, using the appropriate method for each data type (categorical or continuous). Out-of-range variables that were identified were corrected in the data file after checking against the original paper data record.

Analysis was conducted using the SPSS–PASW 17.0 statistics package. A number of new variables were calculated within SPSS from raw scale data entered into the table. Table D1 in Appendix D describes the new variables, their calculation and rationale.

Descriptive statistics were calculated and data were assessed for normality using the Explore function of SPSS. Since most statistical tests operate on the assumption that the data being tested are normally distributed, the maximum likelihood estimation can result in distortions to statistical outcomes when this assumption is severely violated (Curran, West, & Finch, 1996). Therefore key variables that had distributions that significantly deviated from normality were transformed using an appropriate transformation as recommend by Tabchnick and Fidell (2007), and their distributions subsequently re-assessed. None of the variables

had distributions that met the guidelines for severe non-normality (i.e., skew > 3; kurtosis > 10, as proposed by Curran, West & Finch, 1997). Table 3.6 contains a record of the transformation applied to relevant variables. Where transformation of the variable did not result in a more normal distribution, the transformation was reversed and the original variable was used. Transformation for the Tough_Life_LOG variable was achieved by adding 0.5 to each count, to avoid zero inputs, as per statistical convention (McDonald, 2009, pp. 160-164).

After transformation, the variables were assessed for Outliers and the following issues were identified. Five cases had significant outliers once the data had been transformed, and in accordance with the recommendation by Tabchnick and Fidell (2007) for retaining data where outliers are present, the outlying scores were adjusted as per Table 3.7. The adjustments permitted the inclusion of extreme data points in the analysis without distorting the statistical analyses (Tabachnick & Fidell, 2007).

Statistical methods used in this study are described, with the relevant results, in Chapters 5, 7 and 8. Effect sizes for t-tests were calculated using the Effect Size Calculators (L. A. Becker, 1999) and effect sizes for multiple regressions were calculated using Effect Size Calculator for Multiple Regression (Soper, 2010).

3.6. Key Terms

The operationalisation of key variables used in the current study are outlined in Table 3.8.

Table 3.6

Variable transformation for normality

Original variable name	Normality transform required?	Type of transform	Transform successful?	New Variable name
CEAE_total	Yes	Inverse	No	[unchanged]
FILE_Total_A	Yes	SqRt	Yes	FILE_A_SqRt
FILE_Total_B	Yes	SqRt	Yes	FILE_B_SqRt
FILE_Total_overall	Yes	SqRt	Yes	FILE_overall_SqRt
Tough_Life	Yes	Log	Yes	Tough_life_LOG (c+0.5)
Total_age_mths	Yes	SqRt	No	[unchanged]
Kumon_total	Yes	SqRt	Yes	Total_Kumon_SqRt
DT_time	Yes	Reflct/Inv	No	[unchanged]
DT_percent_accuracy	Yes	Reflct/SqRt	Yes	DT_perc_acc_Reflct SqRt
CHKS_total	No	Normal	-	[unchanged]
Locus_of_control	No	Normal	-	[unchanged]
BIA_Verbal	No	Normal	-	[unchanged]
BIA_Concept	No	Normal	-	[unchanged]
BIA_Visual_Match	No	Normal	-	[unchanged]
BIA_Total	No	Normal	-	[unchanged]
Ext_resil_total	No	Normal	-	[unchanged]
Int_resil_total	No	Normal	-	[unchanged]
Resil_total	No	Normal	-	[unchanged]
LAN2subLAN1_Num	No	Normal	-	[unchanged]
LAN2subLAN1_Read	No	Normal	-	[unchanged]

Original variable name	Normality transform required?	Type of transform	Transform successful?	New Variable name
CEAE_total	Yes	Inverse	No	[unchanged]
FILE_Total_A	Yes	SqRt	Yes	FILE_A_SqRt
FILE_Total_B	Yes	SqRt	Yes	FILE_B_SqRt
FILE_Total_overall	Yes	SqRt	Yes	FILE_overall_SqRt
Tough_Life	Yes	Log	Yes	Tough_life_LOG (c+0.5)
Total_age_mths	Yes	SqRt	No	[unchanged]
Kumon_total	Yes	SqRt	Yes	Total_Kumon_SqRt
DT_time	Yes	Reflct/Inv	No	[unchanged]
LAN2subLAN1_Write	No	Normal	-	[unchanged]
LAN2subLAN1_Spell	No	Normal	-	[unchanged]

Table 3.7

Outliers and adjustments to data file.

Case	Scale	Issue	Correction
15	BIA_Concept	High outlier	Decreased BIA_Concept to 137.5 (half a point higher than the next highest score)
33	BIA_Concept	High outlier	Decreased BIA_Concept to 137.5 (half a point higher than the next highest score)
38	Total_CHKS	Low outlier	Increased Total_CHKS score by 12 points to 114 (1 point lower than next lowest score)
	Ext_resil	Low outlier	Increased Ext_Resil by 4 to 61 (1 point lower than next lowest score)
	Resil_Total	Low outlier	Increased Resil_Total by 9 to 108 (1 point lower than next lowest score)
	FILE_Overall_SqRt	Low outlier	Increased File_Overall_SqRt from 0.0 to 0.4 (1 unit lower than next lowest score)
142	FILE_A_SqRt	High outlier	Decreased File_A_SqRt to 5.5 (1 unit higher than next highest score)
	FILE_Overall_SqRt	High outlier	Decreased File_Overall_SqRt to 7.2 (1 unit higher than next highest score)
105	BIA_Concept	High outlier	Decreased BIA_Concept to 137.5 (half a point higher than the next highest score)

Table 3.8

Operationalisation of key variables used in the study.

Variable	Operationalisation
Resilience (Defined on p.44)	Not directly measured in this study
Educational resilience (Definition on p.61)	Resilience: Top quartile of standardised residuals from regression of LAN2 on LAN1. Non-resilience: Bottom quartile of standardised residuals from regression of LAN2 on LAN1.
Academic achievement	LAN1 and LAN2 scores
Maintenance of academic achievement	LAN change scores (LAN2 – LAN1)
Cognitive ability	Woodcock-Johnson III Brief Intelligence Assessment
Locus of control	Locus of Control Scale for Children
Protective factors	California Healthy Kids Survey Module B: Resilience
Mathematical ability	Kumon Diagnostic Tests for Mathematics
Risk factors	Family Inventory of Life Events Child Experience of Adverse Events

3.7. Summary

Using a sample of 164 children, this study compared the variables of: cognitive ability, locus of control, mathematical ability, risk factors, protective factors, and key demographic information, to present a summary of the factors related to educational resilience in South Australian primary school children. The study also compares children's educational resilience and academic achievement under two conditions (Kumon and Control), using a series of multiple regression models to determine whether Kumon study influences educational resilience.

Chapter 3 has described the current research program, including the key features of study design and procedure, the process used to recruit participants, the data collection process, and the participant groups involved in the study. The tests used in the study, and their reliability and validity, have been described. The rationale for the approaches chosen has been provided and key features of the analysis procedures conducted have been outlined. Chapters 4, 5, 7 and 8 contain the results of the data collection and analysis process, and describe the information gathered in this study.

SECTION B

RESULTS AND DISCUSSION

Structure of Results and Discussion Chapters

Aims and Hypotheses

The research undertaken was organised around the two Aims described in the Introductory chapters (Section A), and three main hypotheses, as described in Figure 2.

The results and discussion chapters (Chapters 4 - 9) have likewise been structured around these Aims and Hypotheses.

Aims

Aim 1: To gain a better understanding of the factors and processes affecting the resilience and educational resilience of young people in Australia.

Aim 2: To determine whether the Kumon method influences educational resilience in Australian children.

Hypotheses

H1: Parents and children will have different understandings of the meaning of children's resilience

H2: Parents and children will have different priorities for education – parents will rate education as more important than children.

H3: Kumon children will demonstrate greater educational resilience than Control group children, when factors that are also known to affect resilience are controlled for (including: sex, intelligence, locus of control, and life challenges)

Figure 2. Aims and Hypotheses of the study

Structure of Section B

Chapter 4 responds to Aim 1, using a qualitative investigation of parental and child beliefs about resilience to determine similarities and differences in the way these two groups conceptualise understandings of vulnerability, adversity, resilience and success, and provides a test of Hypothesis H1. Chapter 5 also responds to Aim

1, and deals with the characteristics of all participants in the study, including demographic information, family composition, parental working arrangements and family income levels, Literacy and Numeracy (LAN) testing outcomes, and attitudes to education. Chapter 5 also addresses the risk and protective factors in operation within participants' lives at the time of the study, and their relation to Literacy and Numeracy scores. Factors examined include: child-and family- based stressors; child-, family- and school-based protective factors; and measures of mathematics ability. Chapter 5 provides a test of Hypothesis H2. Chapter 6 provides a discussion of the results presented in Chapter 5.

Chapter 7 provides a summary of similarities and differences between the Kumon and Control groups with regard to the characteristics outlined in Chapter 5, to ensure that any systematic differences between the two groups are accounted for before further analysis is undertaken.

Chapter 8 describes the process of creating and testing a series of linear regression models that capture the influences on educational achievement and resilience in the participant group. These models, which are described in detail within Chapter 8, provide a test of Hypothesis H3. Chapter 9 provides a detailed discussion of the results from Chapters 7 and 8. An integration of the findings of the entire research program, and the conclusion to the thesis, are provided in Section C.

4. RESULTS OF QUALITATIVE INTERVIEWS

This chapter summarises the findings of a set of qualitative interviews conducted with a subset of the participant group. The interviews investigated parent and child beliefs about the factors in life which contribute to resilience (more generally, rather than educational resilience specifically), as well as the characteristics that allow one to recognise a child who demonstrates a resilient attitude to life. Contributors to, and characteristics of, non-resilient responses were also gathered. These data were collected for a subset of the Kumon participant group (*N*= 37), due to the constraints around participant access and the time-consuming nature of qualitative data collection. Nonetheless, it is to be hoped that the results generalise to the larger population, as these results are presented in response to Aim 1, which sought to characterise factors affecting the resilience and educational resilience of young people in Australia. This chapter also tests the hypothesis that children and their parents will have different understandings of the meaning of children's resilience (Hypothesis H1), and provides a discussion of the findings.

4.1. Rationale

Educational resilience was earlier defined as "achieving better than expected outcomes despite the presence of stressful events, environmental conditions or personal vulnerabilities that are known to place students at risk of doing poorly" (page 61, Chapter 2). In many ways, this definition also applies to a more general conception of resilience. The majority of research into resilience has been undertaken in the United States (US), but data gathered in this context may not be directly applicable to the Australian milieu. While both Australia and the US are multicultural societies, differences between the configurations of privilege and disadvantage that exist in each country suggest that in simply applying North American research to the Australian context, important subtleties in socio-cultural differences will be missed (B. Johnson, et al., 1997).

Furthermore, Rigsby (1994, in Harvey & Delfabbro, 2004) has made the point that the concept of resilience, as it is typically defined, has become so profoundly linked with the cultural and social norms of westernised countries such as the US, Britain and Canada, that it embodies cultural-specific meanings about so-called "normal" functioning, and those results and behaviours that are regarded as indicative of success. The extent to which individuals and families from different cultural and socio-economic backgrounds see these norms as appropriate, healthy or desirable has not been determined. However, there is evidence that a range of different coping styles, definitions of competence and responses to adversity are used by members of different cultural groups (Harvey & Delfabbro, 2004), and thus a monolithic/monocultural perception of resilience may fall short when providing explanations for behaviour across culturally and socio-economically diverse groups. The wholesale application of research results from North America may therefore be problematic in an Australian context, and more work that defines the Australian perspective on resilience is required.

By contributing to the literature on Australian "context-specific, grounded and multi-faceted constructions" of resilience (B. Johnson, et al., 1997, p. 8), it is hoped that this study will provide a culturally-specific view of resilience in Australian families. Howard, Dryden and Johnson (1999) commented that much research in resilience is characterised by "normative, middle-class values…[that] may well be irrelevant for children from different ethnic, racial, religious or social groups" (S. Howard, et al., 1999, p 317); determining the extent to which Australian parents apply similar perspectives will provide richer information about resilience in the Australian context. These pre-conceptions may affect the way that parents think about children's resilience, which may in turn influence the way that they foster and promote resilience in their own children.

As discussed previously, it is also important not to assume that children's views of resilience will mimic those of adults, as children's views have been

demonstrated to differ from those of adults in a number of ways. Johnson, Howard, Dryden and Johnson (1997) argued that research is required to determine whether children's understandings of resilience, and the factors that affect it, are similar to those of adults, or whether systematic differences between child and adult perceptions exist. Such systematic differences, if they exist, may result in unexpected outcomes from interventions designed by adults to address resilience in children. Qualitative research is a means of examining beliefs about resilience in children and adults.

Finally, qualitative research in resilience can capture new insights into protective factors, as well as support the understanding of quantitative findings (Luthar & Brown, 2007). In responding to these issues, the requirement to determine an Australian perspective on resilience that takes into account the views of both parents and children is clear, and Hypothesis H1 was designed to test whether differences in these views exist.

This chapter presents the results of a qualitative analysis that explores children's interpretations of what it means for a child to be "doing OK" in life. This analysis is based on concepts used in previous studies conducted in South Australia (Dryden, et al., 1998; S. Howard & Johnson, 2000; B. Johnson, et al., 1997). The conceptualisation of "doing OK" comes from this previous study (B. Johnson, et al., 1997), in which 125 children aged 9 – 12 years, from five primary schools in the Northern Adelaide metropolitan area, participated in small group interviews that addressed three central questions relating to resilience: what made life "tough" for some children; what it meant for children to "do OK" in life; and why some children with a "tough life" seemed to "do OK", while others did not. In addition, 29 teachers from the five schools were also interviewed on the same topics.

For the present study, the focus of investigation was narrowed somewhat. It focussed on the second of the three areas addressed in Johnson, Howard, Dryden and Johnson's (1997) study: what are the characteristics of a child who is "doing OK"

in life, and what factors contribute to a child "doing OK"? – in short, what does it mean for a child to succeed at the job of "being a child"? However, the present work altered the participant scope by inviting both children and their parents to consider these issues, and did not interview teachers. Under the scope of Aim 1, which sought to characterise factors affecting the resilience and educational resilience of young people in Australia, this component of the study aimed to determine whether parents and children in Australia have similar perspectives on what it means for a child to be "doing OK" in life. It is important to assess these similarities, because

> adults are the ones who devise and implement intervention strategies. Usually these strategies are based on adult understandings and assumptions and often do not take into account the perceptions and understandings of those for whom the intervention is designed—if these perspectives are found to differ significantly, then the success of the intervention is cast into doubt. (S. Howard & Johnson, 2000, p. 325)

Ensuring that children's perspectives on the criteria for success are considered when designing interventions to increase resilience will hopefully go some way towards improving the positive influence of these interventions in future.

4.2. Method for the Qualitative Component of the Study

4.2.1. Participants for the Qualitative Component of the Study

Children were eligible to participate in the study if they were in Grade 4, Grade 5, Grade 6 or Grade 7, and were studying at a Kumon Education Centre in the Adelaide Metropolitan area at the time of recruiting. Parents of these children were also eligible to participate in the study. Participants were recruited to the study using invitations sent (via the Manager of each Kumon school) to all families with eligible children. Some managers declined to invite their students to participate, and eligible children from these schools were therefore not asked to participate. In addition,

families who attended bi-annual Kumon awards ceremonies for high achieving children were able to register for participation through an information stand at the awards ceremony.

Participants were 37 children and 37 parents (see Table 4.1). However, some families had more than one child participating in the study, and hence a single adult's responses might correspond to two child responses. Additionally, six parents declined to be interviewed, although they allowed their child to participate. In three cases, two adults (ie, a male and female parent of a single child) were interviewed together, and both parents' responses transcribed. Where joint parent interviews were conducted, the data were assessed as a single case, hence the totals in Table 4.1 for adults sum to more than 37. With regard to interview structure, "individual interviews with a mother" predominated (n = 31). Twenty-one girls and 13 boys participated in the interviews. Table 4.1 shows the distribution of children and parents for each Grade level by sex. The mean age for child participants was 130 months (SD= 15.62), or just under 11 years. Age data for parents were not collected.

Table 4.1

Number of child respondents in each Grade level by gender, and number of adults respondents by gender.

Grade level	4	5	6	7	Total N
Number of girls	7	4	8	2	21
Number of boys	6	0	7	3	16
Number of mothers	10	5	12	7	34
Number of fathers	4	1	1	0	6

The majority of participants were from couple-headed families (n= 32) with a smaller number of single parent families (n =5). Most adults interviewed for the study

were the biological parents of the children interviewed (n = 34), although there were a few adult participants (n = 3) who were caring for fostered or adopted children.

4.2.2. Data Collection and Questionnaires

Questions were asked at the conclusion of a longer data-collection interview, involving a combination of standardised tests and questionnaires. Permission was sought to interview each participant, and record his/her answers to the questions, from the parents and from each child him/herself. As described in Chapter 3, each child was interviewed individually, and independently, to minimise the impact of prompting by parents or siblings, and by a single interviewer, to ensure consistency in question format. Parents responded individually (n = 34 instances) or jointly (n = 3 instances), depending on their availability. Questions were asked using the standard format outlined in Figure 3, with a focus on general resilience (rather than educational resilience). Clarification on the meaning of the questions was provided where necessary. Adult and child participants were asked developmentally appropriate versions of four questions relating to "doing OK". These questions were designed to tap participants' understanding of the characteristics which indicated that a child was "doing OK" or "not doing OK", and the life events, environmental circumstances, personality factors and other contributors that resulted in a child "doing OK" or "not doing OK".

Questions were designed to draw on two aspects of resilience: characteristics of child success (e.g., "How would you know a child was 'doing OK' in life?"); and factors contributing to success or failure (e.g., "What are the things that make some children feel like they are 'not doing OK' in life?").

The structure of the questions used in the current study was adapted from research undertaken by Johnson, Howard, Dryden and Johnson (1997; "What 'doing OK' in life means", p. 10), in which they sought to identify groups of children who were seen by their teachers and peers as resilient or non-resilient, and to ask

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teachers and children "what makes the difference?" between these two groups (S. Howard & Johnson, 2000, p. 325). In small groups, participants of the original study were asked:

What makes "life tough" for some children;

What "doing OK" in life means;

Why some children with a "tough life" seem to "do OK" while others don't. (B. Johnson, et al., 1997, p. 10)

Child questions	Adult questions
There are lots of things that can make kids feel like they are "doing OK" or "not doing OK" in their lives. Thinking about all the kids you know (including yourself):	There are lots of things that can make children feel like they are "doing OK" or "not doing OK" in their lives. Thinking about all the children you know (not just your own):
• How would you know if a kid was "doing OK" in life?	• How would you know if a child was "doing OK" in life?
• How would you know if a kid was "not doing OK" in life?	• How would you know if a child was "not doing OK" in life?
• What are the things that make some kids feel like they are "doing OK" in life?	• What are the things that make some children feel like they are "doing OK" in life?
• What are the things that make some kids feel like they are "not doing OK" in life?	• What are the things that make some children feel like they are "not doing OK" in life?

Figure 3. Questions used in the study

The resilient group was therefore conceptualised as "kids with a tough life who are doing OK". While a full replication of Johnson, Howard, Dryden and Johnson's (1997) work was beyond the scope of the current study, it was considered relevant to incorporate a consideration of children's and parents' opinions on the second question: what it means to be "doing OK" in life. The present study's questions did not tap a participant's view on resilience as thoroughly as the study by Johnson, Howard, Dryden and Johnson (1997). However, gaining a deeper and more detailed view of the similarities and differences between parents' and children's views on how to measure positive or acceptable life outcomes in children has implications for the standards to which children with difficult life circumstances are expected to "live up to" to demonstrate resilience. To put it another way, this component of the study did not aim to answer the "why" question of resilience: Why do some children with a 'tough life' seem to 'do OK' while others don't?; rather it sought to gain new answers to two "what" questions of resilience: "What life skills and personal qualities would children with a 'tough life' need to demonstrate in order to be considered resilient?" and "What characteristics of the child's environment could help or hinder a child in demonstrating these skills and qualities?"

Johnson, Howard, Dryden and Johnson (1997) do not delve deeply into the rationale behind the selection of the phrase "doing OK" as a proxy for child success when talking to a lay audience. Use of this phrase was continued in the current study for two reasons. Primarily, it was considered that the idea of "doing OK" was one which both adults without psychological training, and children, would easily be able to understand. Anecdotally, it appears that this was the case, as only five child participants in the present study requested additional clarification about the concepts of "doing OK" or "not doing OK" in life. Secondarily, it was hoped that by asking questions structured similarly to those used by the Johnson, Howard, Dryden and Johnson (1997) study, comparisons between the two data sets might be more effective.

4.2.3. *Analysis of Qualitative Data*

Questions and responses were audio recorded, and transcribed verbatim for thematic analysis. Transcription was conducted by the researcher as the preliminary stage of thematic analysis, as recommended by Braun and Clarke (2006), and the transcripts were checked for accuracy. The average question/response session time was approximately 3 minutes, although some interviews were markedly longer (11 min 32 sec) or shorter (1 min 07 sec) than the mean (Parent $\overline{X}$ session length = 165 sec, *SD* = 78.43; Child $\overline{X}$ session length = 176 sec, *SD* = 103.40). Thematic analysis of the data was undertaken using the inductive method as described by Braun and Clarke (2006): transcripts were reviewed and coded for themes emerging from the data set – no *a priori* assumptions were made about themes that might be likely to emerge. Adult and Child data were reviewed and coded separately, with child data reviewed first, and adult data reviewed approximately 10 months later. It is hoped that the long period of time between analyses may have reduced any pollution of the adult data coding by the codes that were selected for the child data set. Initial codes were clustered into broader inclusive themes, and then the basic themes were used to structure a more detailed analysis of the transcripts. Some codes were counted in more than one theme; for example comments relating to "academic success" were categorised under the *Success, competence & failure*, and *School* themes. These double-coded topics are italicised in figures and tables. Re-reading of the interview transcripts allowed for more comprehensive coding of specific codes within each theme, and ensured that themes were internally consistent and distinctive.

Once this coding was complete, a comparison was made between the clusters of themes that emerged from analysis of the parent and child data. Sufficient similarity was found between the two groups to warrant structuring the analysis under identical headings to enable comparison between the two datasets.

Inter-rater reliability testing was conducted to ensure the validity of themes extracted from the data. A random sample of 10% of the text (4 child and 4 adult

interviews) was selected for inter-rater review. Reviewer 1 (R1), the original

researcher, re-coded the sample texts according to the categories derived from the

full data corpus. Reviewer 2 (R2) was provided with the same sample texts, and the

list of categories, and asked to code the samples according to the categories.

Reviewer 1 counted 97 instances of themes, while Reviewer 2 counted 95 instances.

The results are provided in Table 4.2.

Where differences existed, the individual cases were discussed and resolved

during a second pass-through the data, as outlined in Table 4.3:

- R1's interpretation took precedence: 20 times

- R2's interpretation took precedence: 12 times

Table 4.2

First-pass Inter-rater agreement between R1 (reviewer 1) and R2 (reviewer 2)

Status of observation	N	%
R1 = R2	74	69.8
R1 saw something R2 did not	14	13.2
R2 saw something R1 did not	12	11.3
R1 and R2 saw different things	6	5.7
R1 N	97	91.5
R2 N	95	89.6
Total N	106	

Table 4.3

Second-pass inter-rater agreement after discussion

Resolved in favour of:	R1	R2	Total N
R1 saw something R2 did not	12	2	14
R2 saw something R1 did not	4	8	12
R1 and R2 saw different things	4	2	6

In the final interpretation, R1's coding decisions were agreed by R2 in 88.7% of cases.

4.3. Overview of Qualitative Results

The results are presented in two sections. The initial section provides a brief overview of the data. The following section provides a review of parent and child responses, focussing on the most prominent themes that emerged from analysis, and drawing comparisons between the two groups.

Direct quotations from the participants are used to illustrate themes that emerged during the interviews; quotes provided are a representative sample that best illuminated the topics. Selected quotes have been edited for clarity where necessary (primarily by the insertion of elision marks to indicate pauses, and the insertion of pronouns where these were implied during interview, indicated with square brackets). To preserve participant confidentiality, each quotation is coded by participant number and either parental role, or child age and sex; a quotation coded (027, Mo), means that the speaker was participant 027, mother; a quotation coded (P01, 10, F), means that the speaker was participant P01, a 10-year-old girl.

4.4. Qualitative Results Part 1 – Data Overview

Twelve themes emerged from analysis of the complete parent and child data sets (see Table 4.4). As can be seen in Table 4.4, parents generated a greater total quantity of instances of themed content than did children. Table 4.5 provides the figures as percentages (to adjust for the greater number of instances extracted from parent interviews), illuminating the different frequencies with which each theme was mentioned between the two groups. Children more frequently mentioned Themes 1, 2 and 5; parents more frequently mentioned Themes 3 and 7.

Table 4.4

Absolute frequency of instances of themes emerging from analysis of parent and child interviews

Theme #	Theme	Instances – children	Instances – parent	Total
1	Friendship & Social Interaction	85	98	183
2	Behaviour of child	82	95	177
3	Parents & Family	35	95	130
4	Success, Failure & Competence	51	75	126
5	Displayed Emotion	55	49	104
6	School	49	51	100
7	Psychological Characteristics	22	71	93
8	Behaviour of others to child	19	51	70
9	Life Events	40	24	64
10	Noticeable absences	17	-	17
11	Physical Health	1	10	11
12	Opposite of "doing OK"	-	6	6
	Total N	456	625	1081

Table 4.5

Themes emerging from analysis of interviews with parents and children: content of theme, and proportional frequency of instances of themes mentioned, adjusted for total number of participants in each group.

Theme	Content	Children	Parents
Friendship & Social Interaction	Responses relating to interaction with peers; interactions in the playground; bullying and social exclusion; quantity and quality of friends.	18.6%	15.7%
Behaviour of child	Responses relating to the observable actions of the child; excludes behaviours linked to the display of emotion.	18.0%	15.2%
Parents & Family	Responses relating to parents, siblings, extended family.	7.7%	15.2%
Success, Failure & Competence	Responses relating to the child's experiences of success or failure, or the child's demonstrated competence to perform at an acceptable/expected level, in any field of endeavour.	11.2%	12.0%
Displayed Emotion	Responses relating to the child's behaviour as it indicates the experience of emotion (e.g., crying, laughing, angry facial expression, etc).	12.1%	7.8%
School	Responses relating to the child's experiences at school, with teachers, with lessons or classes; excludes consideration of peer interactions in a school context.	10.7%	8.2%

Theme	Content	Children	Parents
Psychological Characteristics	Responses relating to the observer's inferences about the child's psychological state/context based on observed behaviour; responses relating to psychological characteristics "possessed" by the child (e.g., intelligence, courage, etc).	4.8%	11.4%
Behaviour of others to child	Responses relating to the manner in which others treat the child.	4.2%	8.2%
Life Events	Responses relating to significant noticeable or disruptive events in a child's life, e.g., around the world trip, parental divorce, death in the family, serious illness.	8.8%	3.8%
Noticeable absences	Responses relating to a perceived absence of stimuli (e.g., "not being teased", "parents not paying attention")	3.7%	0.0%
Physical Health	Responses relating to the child's physical health	0.2%	1.6%
Opposite of "doing OK"	Responses whose content consisted of indicating that the given answer was "the opposite" of the respondent's answer to the characteristics of "doing OK".	0.0%	1.0%
Total N		446	625

> *Hypothesis H1:* Parents and children will have different understandings of the meaning of children's resilience.

The results partially support Hypothesis H1: While both parents and children listed very similar concerns overall with regard to children's resilience, children were more likely to focus on Friendship and Social Interaction, Behaviour of the Child, Displayed Emotion and School, while parents tended to focus on the importance of factors relating to Parents and Family, and Psychological Characteristics.

4.4.1. Themes Emerging from Analysis of Parent Data

The most prominent themes emerging from analysis of the parent data were Friendship and Social Interaction; Parents and Family; Behaviour; Success, Competence and Failure; and Psychological Characteristics (see Table 4.6).

Less frequently mentioned themes included School; the Behaviour of others towards the child; Displayed Emotion; Life Events; Physical Health; and Opposites (see table 4.6). Results are divided into those which parents related to "doing OK" and those which parents related to "not doing OK".

4.4.2. Themes Emerging from Analysis of Child Data

Prominent themes that emerged from analysis of the children's data included: Friendship and Social Interaction; Behaviour; Displayed Emotion; Success, Competence and Failure; and School. Less frequently mentioned themes included: Parents & Family; Psychological characteristics; Behaviour of others; Noticeable absences and Life Events (see table 4.7). Once again, themes are divided into those that children nominated as relating to "doing OK", and those that children saw as relating to "not doing OK".

Table 4.6

Frequency with which each theme was mentioned by parents in relation to children who are "doing OK" or "not doing OK"

Theme #	Doing OK		Not doing OK		Total
1	Friendship & Social Interaction	32	Friendship & Social Interaction	66	98
3	Parents & Family	36	Parents & Family	59	95
2	Behaviour	45	Behaviour	50	95
4	Success, Failure & Competence	42	Success, Failure & Competence	33	75
7	Psychological Characteristics	29	Psychological Characteristics	42	71
6	School	25	School	26	51
8	Behaviour of others to child	26	Behaviour of others to child	25	51
5	Displayed Emotion	27	Displayed Emotion	22	49
9	Life Events	6	Life Events	18	24
11	Physical Health	4	Physical Health	6	10
12	Opposites	0	Opposites	6	6
	Total	272		353	625
	Percentage	43.5%		56.5%	100.0%

Table 4.7

Frequency with which each theme was mentioned by children in relation to children

who are "doing OK" or "not doing OK"

Theme #	Doing OK		Not doing OK		Total
1	Friendship & Social Interaction	34	Friendship & Social Interaction	51	85
2	Behaviour	33	Behaviour	49	82
5	Displayed Emotion	26	Displayed Emotion	29	55
4	Success, Failure & Competence	31	Success, Failure & Competence	20	51
6	School	26	School	23	49
9	Life Events	10	Life Events	30	40
3	Parents & Family	13	Parents & Family	22	35
7	Psychological Characteristics	11	Psychological Characteristics	11	22
8	Behaviour of others to child	10	Behaviour of others to child	9	19
10	Noticeable absences	10	Noticeable absences	7	17
11	Physical Health	0	Physical Health	1	1
	Total	204		252	456
	Percentage	44.7%		55.3%	100.00%

Responses were analysed in terms of two aspects of success: characteristics of success (or lack thereof) (e.g., "How would you know a child was 'doing OK' in life?"), discussed below as "characteristics"; and factors contributing to success or failure (e.g., "What are the things that make some children feel like they are 'not doing OK' in life?"), discussed below as "contributors".

4.5. Qualitative Results Part 2 – Responses Categorised by Theme

Analysis of parent and child interviews resulted in a large body of data. A summary of all responses provided is presented in Appendix F. A detailed discussion of key similarities and differences between parents and children is presented here.

4.5.1. Theme 1 – Friendship and Social Interaction

Relationships with friends and ability to "fit in" socially were two of the areas that parents and children nominated as being important in distinguishing between children who were "doing OK" and those who were "not doing OK". There was evidence that both parents and children were more concerned with the negative impact of social interplay, with mentions of negative social interaction outweighing mentions of positive social interaction for both groups (See Theme 1 in Figures F1, F2, F3 and F4, Appendix F). Additionally, more types of social interaction were listed when parents and children were focussing on negative outcomes. Themes from this area were discussed predominantly as contributors to success, although in some cases (ie, quantity of friends) they might also be characteristics of success.

In the positive domain, parents distinguished between quality of friends:

"the friends that they do have are good friends" – 028, Mo;

and quantity of friends:

"they'd have lots of friends" – 027, Mo;

although the primary focus was on the existence of a circle of friends: "Having a good network of friends" (013, Mo).

Children also distinguished between quality of friends:

"I'd probably have good friends, who listen to me and look after

me, and we have fun together" – 024, 11, F;

and quantity of friends: "There would be lots of friends around them" (012, 9, F).

However, the primary focus for children was on the quantity of friends. This is in

contrast to Nangle, Erdley, Newman, Mason and Carpenter's (2003) observation that

strong dyadic friendships are more protective against depression in children than

mass popularity.

When children were identified as "not doing OK", there was a strong

emphasis on social isolation and social exclusion from both children and parents:

"No friends, sitting alone." – 022, 9, F;

"You will see them being isolated, you will see them not mixing

up with the other kids" – 020, Fa;

"If they feel they are not in the cliquey group then that will pull

them down" – 021, Mo;

"Probably people rejecting them." – 007, 12, M.

Peer rejection has been linked with negative outcomes for children, including

depressed mood, loneliness, psychological distress and social withdrawal (Boivin,

Hymel, & Bukowski, 1995; Cowen, Pederson, Bibigian, Izzo, & Trost, 1973).

Children also spoke about the opposite experience and noted that social

inclusion was related to children "doing OK":

"People are included in games at lunchtime." – 017, 11, M.

Continuing the focus on children who were "not doing OK", parents also

spoke about experiences of bullying, teasing and name-calling, although more

parents (N = 10) tended to refer to all-purpose "bullying" :

"I guess in their school environment, if there's a bit of bullying

going on" – 013, Mo;

rather than distinguishing different methods or means of social exclusion:

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"By other children teasing them or calling them names, makes them then feel a lot more inadequate" – 012, Mo.

In contrast, children frequently and explicitly distinguished between the negative social interactions of:

- bullying, gossip: "There could bullying or friends might be kind of talking behind their backs" – 001, 10, F;

- put-downs: "Putdowners. It's like going up to somebody and saying 'Hey, you did the worst at maths today, you're the worst.'" – 009, 9, M;

- teasing: "They may be teased about their weight or how they look." – 021, 12, F;

- social exclusion: "Someone bullying them, someone saying bad words to them, someone not including them in lunch activities." – 017, 11, M;

- name-calling, and physical violence: "Someone might be yelling at them or calling them names and punching them." – 012, 9, F;

when talking about children who were "not doing OK". This trend may be a reflection of children's more immediate experience with the social environment of the schoolyard. It is also conceivable that the children's expanded vocabulary regarding negative social interactions resulted from exposure to the in-school anti-bullying programs run by many primary schools (Dept of Education and Children's Services, 2007).

Parents and children both recognised the significance of "trouble" in children's social relationships, particularly their close friendships, to their capacity to "do OK". Fighting with friends,

"If they have … a big fallout with friends" – 008, Mo;

changing social dynamics,

""Maybe their friend goes, like they have a fight maybe? Or when

their friend like leaves them to go with somebody else or

something." – 020, 9, F;

or loss of a friend through external circumstances,

"Maybe their best friend left the school to go to Canberra or

somewhere like that." – 026, 10, F;

were considered to negatively affect a child's ability to do OK.

Both adults and children identified a range of social and friendship experiences as having a significant impact on a child's tendency to be "doing OK". Children appeared to rate Theme #1 as having a stronger impact on child outcomes than did parents.

4.5.2. Theme 2 – Behaviour of Child

There was broad recognition by both groups that a child's behaviour was a reliable characteristic of success, rather than a contributor (See Theme 2 in Figures F1, F2, F3 and F4, in Appendix F). A number of binary oppositions emerged in the analysis of Theme #2, where the signs of "doing OK" were direct opposites of "not doing OK": happy expression versus sad expression, obedience versus disobedience, talkative versus quiet, being well-behaved versus getting into trouble. This may indicate a tendency for both adults and children to view behaviour-based aspects of "doing OK" in black-and-white terms, rather than as a spectrum or continuum – any given child could be judged, based on their behaviour, as either "doing OK" globally or "not doing OK" globally, without consideration to possibilities that they might be "doing OK" in some areas, but not others, or "doing kind of OK". However, is likely that this finding is an artefact of the question structure, which drew a binary distinction between children who were, and were not, "doing OK", and may have encouraged respondents to provide more categorical responses.

A prominent theme for parents and children was the existence of a change from normal behaviour as indicating "something wrong":

"They're doing things different, like change, like they're not acting like normal, and they're changing their clothes style and everything." – 006, 11, F;

"yes, just a change in their overall personality I suppose." – 028, Mo;

whereas perpetuation of normal behaviour, or "...just being his usual self" (P03, 11, M) was seen as a signal that the child was "doing OK". This carried with it an implication that the baseline standard for all children was to be "doing OK" and that any child who was "not doing OK" was demonstrably abnormal in some way:

"[They are OK] if they are continuing to behave as we have seen in the past. If anything abnormal, just you know being quiet or being too noisy or being a terror… then there's some issues" – 020, Fa;

"If he was just being plain mean, that's usually when something's gone wrong, and yeah, cos it's a person who doesn't usually do it, then obviously something's gone wrong….Yeah, acting different, basically, yeah." – P03, 11, M.

Children noted aggressive behaviour:

"Maybe very aggressive person, likes to be competitive… mainly put you down." – 010, 12, M;

and anti-social behaviour:

"They might not be very nice to people, they might become a bit mean cause of what's been happening to them." – 013, 12, F;

"Saying bad words to other people, that you're really rude." – 022, 9, F;

as an indication of someone "not doing OK". In contrast, pro-social behaviour:

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"They'd be acting nicely, they'd be being really nice to people" –

013, 12, F;

"Being nice. Sharing. Listening." – 022, 9, F;

"I think it makes them feel better when they're nice as well." –

P01, 10, F;

suggested that a child was "doing OK". Parents were more likely to focus on a child's

tendency to misbehave in order to express distress:

"...could be a problem, disruptive behaviour..." – 026, Mo;

or gain attention from adults:

"The behaviour might be completely different, um naughty, trying

to seek attention, if that's in a negative way to get attention, would

lead me to think that something wasn't right." – 012, Mo.

Both groups used body language cues

"Sort of "down" body language." – 035, Mo;

"Always head down" – 004, Fa;

and facial expression cues

"It's usually in their eyes" – 005, Mo;

"I suppose it shows in their expression, in facial expression." –

001, Fa;

"Have a droopy mouth and aggressive frown and stuff" – 019,

9, F;

to distinguish children who were not doing OK. Likewise, these types of cues were

also used to describe children who were doing OK:

"They look all happy, dancing and stuff" – 028, 10, M;

"He'd always have a smile on his face" – 011, 10, M;

"They would sit up straight" – 012, 9, F;

"I think they've got a ready smile, I think they've got a very open

sort of stance, they look excited and they look like they're

energetic" – 035, Mo.

In contrast to children, parents also used cues from children's eating and

sleeping behaviour

"Eating well" – 020, Fa;

"Not sleeping well, not eating well" – 033, Mo;

 "Putting on weight, sleeping a lot" – P104, Mo;

when determining whether they were doing OK.

Physical and behavioural changes were considered indicative of a child who

had recently altered their status from "doing OK" to "not doing OK", while

misbehaviour, or anti-social behaviour, were characteristic of children who were "not

doing OK". Both parents and children provided a greater number of responses under

Theme #2, when talking about children who were "not doing OK".

4.5.3. Theme 3 – Parents and Family

In the area of parents and family, there were a variety of responses.

Interestingly, parents mentioned instances of Theme #3 nearly twice as often as

children did (See Theme 3 in Figures F1, F2, F3 and F4, in Appendix F), with this

theme comprising 15.2% of parent coded remarks, and only 8.2% of children's coded

remarks. Once again, however, parents and children listed a greater quantity and

variety of factors likely to have a negative impact on a child (compare total instances

of Theme 3 in Figures F1, F2, F3 and F4, in Appendix F). Parents and children

considered that issues in the family arena were predominantly contributors to a

child's status as OK or not OK, although there was some recognition that this theme

might also have value as a diagnostic characteristic. For example, a child who was

"not doing OK" might be seen to fight with siblings more frequently.

The majority of parents and children provided information for Theme #3 in a hypothetical, third person sense, rather than by using experiences from their own lives

"I guess *if you're talking in general terms*, if parents separate or divorce, then [the child] might feel guilty" – 003, Mo (emphasis added);

"Their parents *could be* getting a divorce *or something like that*, or someone's died in *their* family" – P06, 13, F (emphasis added).

This is in contrast to responses in Theme #1, which were generally described as the result of parent's concrete knowledge of their children's experience, or the children's personal experience:

"We always know with [our son]…not last year but the year before he…" – 030, Mo;

"…you've still got all these other friends to play with and you won't be upset when they go away. *I know from experience*" – 003, 9, F (emphasis added);

Parents were more likely to mention family harmony

"Family is secure and functioning" – 009, Mo;

as a contributor to whether a child was "doing OK" or not, with less frequent references on this topic from children:

"The parents not fighting." – 018, 8, F.

There was a widespread agreement among children that divorce, or the death of a family member, could have a negative influence on a child's life:

"Maybe their parents divorced or something, or yeah. If their grandparents pass away or something, someone in the family." – 011, 10, M;

with nearly 25% of all children interviewed nominating the former, and 20% the latter, as events that contribute to whether a child was "doing OK". These perceptions were partially in line with the research literature: Amato (1991) noted that a meta-analysis of the impact of divorce showed that children who had experienced divorce scored consistently lower on a variety of outcome measures compared to children from intact families. However, Harrington and Harrison (1999)(1999) reported that the evidence relating childhood bereavement to negative outcomes in life was highly context sensitive, and predominantly affected children whose subsequent parenting experiences were inadequate, or where the bereavement led to a substantially reduced economic position for the family. Adults also described life events such as bereavement,

> "I guess if somebody died, you know, in immediate family" – 008,
> Mo;

and parental divorce,

> "If parents separate or divorce" – 003, Mo;

as well as child abuse perpetrated by family members,

> "If there's abuse in the home" – 021, Mo;

as events that would contribute to a child "not doing OK". However, proportionally speaking, parents did not mention these significant "one-off" events as frequently as children did; they seemed to consider a consistent level of ongoing family disharmony as more challenging to a child's ability to "do OK":

> "at home, if there's tenseness in the family between the parents,
> or if they're not getting along with their siblings, that can usually
> cause the child to feel not OK." – 013, Mo.

Parents listed "family disharmony" as a contributor to not doing OK in 27 of 59 instances (45.7%), while only one child mentioned it in 22 instances (4.5%); in contrast, children mentioned death or divorce 14 times in 22 instances (63.6%) while parents mentioned it only 13 times in 59 comments (22.0%). Parents considered a

child's perception that they were loved, safe and supported by their parents to be a relevant factor in a child doing OK.

> "If they know someone loves them, if they believe somebody loves them" – 037, Mo;

Children also perceived this love and support, as well as parental attention and recognition, as important contributors to a child's likelihood of "doing OK" or "not doing OK".

> "When your parents says 'well done Charlie' or whatever your name is, or… because if you've done well in a test they take you out…[as] recognition" – 010, 12, M;

> "Maybe their parents are working full time and the person, or the little kid doesn't get to see their parent a lot so they get quite upset." – 026, 10, F;

Parental expression of favour (linked with "doing OK")

> "They [parents] praise them." – 002, 9, F;

or disfavour (linked with "not doing OK") was a common topic in the responses of children within this theme:

> "Maybe their parents aren't very friendly, or maybe their parents are a bit grumpy at times." – P01, 10, F;

Parents' stronger focus on "family harmony" and "the child's perception of parental love and support" in considering the impact on whether a child was "doing OK", was reflected in their tendency to mention these issues at a significantly higher frequency than children did. Children's focus on the impact of "catastrophic" single disruptive events like death or divorce may reflect a high level of salience of these events. Children also appeared to perceive parental actions as important, such that parental demonstrations of love, support and approval were important contributors to whether a child was "doing OK", with the converse also true.

4.5.4. *Theme 4 – Success, Failure & Competence*

Children indicated that success in any of a diverse range of endeavours was a characteristic of "doing OK", while failure generally characterised children who were "not doing OK". Competence in a range of activities was also seen as a characteristic of "doing OK", although lack of competence, especially "needing help" was seen as a negative characteristic by children. In contrast to children, parents indicated that success, or at least positive participation, in a diverse range of endeavours was a both contributor to, and characteristic of, "doing OK", while experiences of failure contributed to, and characterised, "not doing OK". Notably, in this category, both groups nominated more instances of positive characteristics than negative characteristics, reversing the general trend for participants to focus more strongly on the negative when responding (see Figures F1, F2, F3 and F4, in Appendix F for detail).

Both parents and children focussed strongly on the role of academic achievement in affecting a child's tendency to be "doing OK". Both academic success:

> "If they are having very good grades, they're getting good grades…[The] main thing for me is grades." – 010, 12, M;

> "Doing well at school, I suppose, or not doing well at school but happy to go to school" – P06, Mo;

together with positive participation in schooling,

> "They do their work at school. They do OK" – 002, 9, F;

> "School report reflects that they're doing OK both academically and socially" – 021, Mo;

were by far the most frequently mentioned topics in terms of children's and parent's level of concern with them as a marker of "doing OK". Conversely, academic failure was seen as a direct contributor to, and characteristic of, "not doing OK".

"if they're feeling like they're not coping with the work that's set,

their school work, if they're not understanding concepts and

there's no support network" – 013, Mo.

There was also clear evidence that parents recognised academic failure as a contributor to children's attributions about whether they perceived themselves to be "doing OK".

"What makes children feel like they're not doing well I think is just

not achieving at school, that's the *big thing*, you know." – 029, Mo

(emphasis in original);

This distinction was not made by children themselves.

General competence was also a topic raised by both adults and children. Being "good at something" was a valued characteristic, demonstrated by ease in completing everyday tasks,

"If he…thinks he can do stuff and does it without any problems." –

P02, 11, M;

and success experiences:

"They'll be happy if they are doing well in their 'whatever they are

involved in'." – 001, Fa;

However, simply needing assistance with their school work was seen as a negative by children. Children who were not "doing OK" were those who needed help:

"They'd be asking for help and not really sure what to do…They

need help all the time… If teachers always need to help 'em or

else they can't do their work." – P02, 11, M.

In summary, children perceived experiences of success and positive participation as important characteristics of children who were "doing OK", while parents saw these experiences as both contributors and characteristics. Academic success or competence was highly valued by both groups.

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4.5.5. Theme 5 – Displayed Emotion

The link between a child's displayed emotion and "doing OK" was mentioned more frequently by children than by adults. However, most participants judged displayed emotion to be a characteristic, rather than a contributor, to a child's status as "doing OK". The variability in type of emotion listed was much higher when respondents were focussing on negative circumstances (see Figures F1, F2, F3 and F4, in Appendix F). "Happiness" was the main emotion used by both children and parents to judge whether a child was "doing OK". Emotions which suggested a child was "not doing OK" included sadness, anger and "bad temper".

Display of emotion was generally described as something that would allow an observer to determine whether the child was "doing OK" or not. If a child was "doing OK", positive emotions were described:

"They're pretty much joyful" – 031, 11, F;

"Probably if they're happy…just being happy." – 007, 12, M;

A range of negatively-valenced emotions were seen as characteristic of a child who was "not doing OK":

"Sometimes they get cross and sometimes they get angry and sometimes they get sad." – P01, 10, F;

"They'd be upset and they'd be…really moody and very sad." – 023, 10, F;

"Just, you know, being unhappy" – 023, Mo;

"I know that when [my daughter's] not doing well she can be quite short tempered, I guess like any adult" – 033, Mo.

However, emotion itself was occasionally seen as a contributor by some children:

"They might be a bit naughty because of all the things, all the frustration through their life." – 024, 11, F.

Parents and children both indicated that displayed emotions were a diagnostic of whether a child was "doing OK", although this theme seemed more salient to children, as it was mentioned more frequently by them.

4.5.6. Theme 6 – School

Events that occurred at school were an important theme for children in terms of "doing OK" or "not doing OK", with both groups seeing this area primarily as a contributor to "doing OK". As well as the impact of academic success or failure, and social interactions, as discussed in previous sections, other features of the school experience (such as the child's teacher) contributed to children's judgements about what resulted in a child "doing OK". As noted previously, parents likewise considered academic success, or at least competence, as an important contributor to a child "doing OK". In addition, being willing, or even happy, to go to school was seen as a key characteristic in "doing OK" by both groups. Theme #6 was notable for the balance between the numbers of times participants mentioned positive and negative aspects of the theme. For parents, 49% of comments on this topic were positive, while 51% were negative (see Table 4.6); for children, 53% of comments on this topic were positive, while 47% were negative (see Table 4.7; see also Figures F1, F2, F3 and F4, in Appendix F).

Willingness or unwillingness to attend school was an indicator of how a child was doing for both groups. A child who was "doing OK" was seen as happy to go to school:

"If they are my age…they come to school with a smile on their

face." – 010, 12, M;

while a child who was "not doing OK" would resist going to school:

"Not really wanting to come to school, that would be the main." –

010, 12, M;

"Refuses to go to school" – 019, Fa and Mo.

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Qualities of the teacher were relevant to a child's experience of "doing OK", with both positive and negative attributes mentioned by children. Children who were not doing OK were described as having disliked teachers,

"They don't like their teacher." – 029, 10, M;

busy teachers,

"Teachers might not be able to help you with it cos they've got

other things to do." – P06, 13, F;

and teachers who told them off:

"They get in lots of trouble by the teacher." – 002, 9, F;

"The teacher can yell at you, especially a yelling kind of teacher."

– 003, 9, F.

In contrast, a teacher who praised children was linked with children who were "doing OK": "Maybe when the teacher says 'good work, you've done really well'" (020, 9, F).

Parents did not seem to have the same appreciation of the role of the teacher in their children's lives. The only adult who mentioned the qualities of the teacher as a factor in whether a child was "doing OK" ("Teachers [who] are accessible and dependable and reliable, [who] treat the children with respect" – 013, Mo) was herself a teacher by profession.

Parents mentioned a child's willingness to go to school more frequently than did children, whereas children more frequently mentioned the qualities of a child's teacher as relevant. These tendencies perhaps reflect the salience of the respective issues for each group – children, spending all day with their teachers, appreciate the contribution a good or bad teacher can have in the life of a child, while parents may be more focussed on what they learn about the child from their behaviour at home.

4.5.7. Theme 7 – Psychological Characteristics

Parents and children used their perceptions about a child's internal state to make judgements about whether the child was "doing OK", although parents

mentioned this theme far more frequently. Theme #7 was typified by high variability, low frequency topics relating to the theme, with both parents and children listing many psychological states as characteristics that would enable them to judge whether a child was "doing OK" or "not doing OK". Parents however, demonstrated more clustering of topics than did children (see Figures F1, F2, F3 and F4, in Appendix F).

A range of positive characteristics were seen as hallmarks of a child who was "doing OK", including:

- Confidence: "Confident in things that they do, so confident in trying new things" – 009, Mo;

- Self esteem: "High self-esteem" – 036, Mo;

- Sociability: "They should be able to mix around with friends from different cultures" – 010, Mo;

- Positivity: "You'd be thinking positively and like "yeah I can do this, this isn't too hard". Instead of "oh this is too hard" when it really isn't." – 003, 9, F;

- Resilience: "You would do things that usually you couldn't do cause you're physically more happy, you say you can do things that usually before you couldn't do." – 008, 12, M; and

- Respect: "They would have respect for others" – 021, 12, F.

Several negative traits were seen as an indication that a child was not "doing OK", such as:

- Uncommunicative: "Quiet, reserved, angry, hard to talk to" – P06, Mo;

- Tends to catastrophise: "When something happens it's the end of the world" – 036, Mo;

- Low self esteem: "They just think to themselves that they can't get better." – 030, 12, F; and

- Distractable: "Not that focussed on work." – 020, 9, F.

In addition to focussing on the theme more strongly overall, parents were also more likely to nominate the negative aspects of children's presumed psychological characteristics as evidence that a child was "not doing OK", than they were to use positive characteristics to describe a child who was "doing OK".

4.5.8. Theme 8 – Behaviour of Others to Child

Parents saw praise, social acceptance, parental support and rewards as behaviours that would result in a child doing OK. From the children's perspective, encouragement was seen as the main contributor to a child "doing OK". Parents and children both noted that the types of treatment by others that resulted in negative outcomes for children comprised overt expressions of disapproval: being teased or bullied; being told off, criticised or punished, being yelled at. Topics noted by respondents relating to the behaviour of others towards the child are presented in Figures F1, F2, F3 and F4, in Appendix F.

Encouragement and praise were seen as important by both groups:

"Maybe when the teacher says "good work, you've done really

well" or they get encouraged by someone." – 020, 9, F.

Parents also noted the importance of encouraging and praising effort as well as success:

"I think a lot of positive praise for doing a good job, [or] maybe

you didn't do as well there but that's OK because I saw you do

your best effort, and we're very proud of you." – P03, Mo;

Treatment which contributed to "not doing OK" included punishment,

"They've done something they're not meant to and they get punished with something they like doing [being taken away] and so they might not really like that very much" – P03, 11, M;

"Usually when they're stuck in their bedroom because they've misbehaved, usually when some sort of discipline action has happened or some sort of treat's been taken away," – P03, Mo;

and criticism

"If they're verbally told they're not doing well." – 033, Mo;

Once again, participants held a balanced perspective for this theme, mentioning positively and negatively-valanced topics equally.

4.5.9. Other Themes

A brief discussion of other themes that were raised is provided.

Theme 9 – Life events

Several factors that would make a child feel like they were "doing OK" were nominated, including "everything's sort of working well" (P03, Mo); however, the focus for both parents and children was on the life impact of negative events. The majority of the negative life events linked to "not doing OK" were also categorised under Social or Family themes and have been discussed previously (e.g., divorce, bereavement, bullying). Life events were generally seen as contributors to child success or failure.

Theme 10 – Noticeable absences

Some children appeared to appreciate the fact that an absence of certain stimuli could also cause, or indicate, a child's emotional state. "Not getting into trouble" and "not being bullied" were two categories associated with children who were "doing OK", while "lack of recognition" and "having no-one care about you" were mentioned as factors for children who were "not doing OK".

This theme was not raised by parents. Noticeable absences could be contributors or characteristics of children who were "doing OK".

Theme 11 – Physical health

Parents nominated their child's physical health as both a contributor and characteristic factor as to whether a child was doing OK. Consistent low-level ill-health was seen as something that might indicate not "doing OK", while major health disruptions might cause a child to not "do OK".

"If they have a lot of sickness" – 013, Mo;

"Usually health can suffer and I think sort of long term their health…can suffer if they've been a bit depressed" – 021, Mo.

This theme was raised by a single child, with regard to "Not Doing OK".

4.5.10. Other Patterns in the Data

Several other notable patterns were evident in the analysis of the interview transcripts and the categorising of responses into themes. Several parents noted that a binary opposition existed in the answers to the stimulus questions, whereby a child who was not "doing OK" could be seen as one who was the opposite of a child who was "doing OK".

"Just the reverse of the last [response] I guess" – P01, Mo;

"The opposite of what I have said in the previous question!" – 022, Mo;

"I guess the opposite" – 038, Fa.

Again, this may have been an artefact of the binary structure of the interview questions, which distinguished only children who were, and were not, "doing OK", rather than considering children who were "mostly OK" or "only a little bit OK". This may have encouraged respondents to provide more categorical responses. This appreciation of the binary nature of the questions was not noted by children.

Female children seemed more able to draw explicit links between events in children's lives and the effect on their mood. They noted both positive cause-and-effect (emphasis added):

"They'd be better tempered because they're happy about their marks" – 003, 9, F;

"They can do extra work at home and then they go to school and then they find it really easy like the other children." – 027,10, F;

and negative relations between life events and outcomes:

"They might not be very nice to people [or] they might become a bit mean 'cause of what's been happening to them." – 013, 12, F;

"You probably might not be paying attention, you might just be really worried about what your next marks are going to be." – 003, 9, F;

"They might be a bit naughty because of all the things, all the frustration through their life." – 024, 11, F.

Similar links were not noted by male child respondents. However, the ratio of male:female respondents was approximately 2:3; a more balanced ratio of participants may have returned a more balanced result in this area.

Parents disagreed as to whether children had developed the capability to clearly express their distress when they were not "doing OK". Some parents felt that children were able to indicate whether they were coping with life's challenges.

"Oh they're pretty good at expressing what they don't like and when they're not feeling very good and when they think life is really tough for them." – P03, Mo.

Others indicated that there was a level of incomplete knowledge when it came to judging whether their child was really "doing OK":

"But then sometimes you don't always know when a child's not

going OK because they don't always know how to express it." –

034, Mo.

There was recognition from parents that those who know a child well are best placed

to detect how the child is coping with life.

"If you know a child better, then in the case of what "upset" is or

"not coping"…you would pick that up more easily." – 007, Mo.

Overall there was no consensus as to whether children could express their level of

distress, but agreement that if anyone should or would notice such distress, it would

be parents.

4.6. Discussion of Qualitative Results

This section addresses the study's first Aim, by providing a discussion of the

importance and implications of the qualitative results presented in this chapter,

pertaining to the beliefs about children's resilience of a subgroup of participants in the

study. It also comments on the relevance of the study's findings to Hypothesis H1:

that Parents and children will have different understandings of the meaning of

children's resilience.

Aim One – To gain a better understanding of the factors and processes affecting the resilience and educational resilience of young people in Australia
H1:   Parents and children will have different understandings of the meaning of children's resilience.

The responses presented in this chapter offered insights into the similarities

and disparities in parents' and children's interpretations of what it means for a child to

be "doing OK". Furthermore, concrete examples from both parents and children of

the characteristics of children who were "doing OK" and those who were "not doing

OK", as well as the life circumstances that are believed to contribute towards these two states, were categorised and analysed. This information is useful to researchers in the field of resilience, as reviews have noted that a failure in the field is the absence of children's viewpoints in the determination of what constitutes resilience (B. Johnson, et al., 1997; Winbourne & Dardaine-Ragguet, 1993).

4.6.1. Similarities and Differences between Parent and Child Responses

In terms of similarities in viewpoint, there was broad agreement between parents and children as to those aspects of a child's life that *contributed* to them "doing OK", and those aspects that could be considered *characteristic* of a child who was "doing OK". The areas of Friendship & Social Interaction, Parents & Family issues, the Behaviour of Others Towards the Child, and Life Events, were all primarily considered as contributors to whether a child was "doing OK" in life. Particular subsets of a child's Behaviour and Psychological Characteristics, as well as the type of emotions they displayed, were seen as characteristic of a child who was either "doing OK" or "not doing OK".

Certain aspects of the areas of School; Success, Failure and Competence; and Noticeable Absences, as well as Physical Health, were seen to play either a causative or a diagnostic role in considering whether a child was "doing OK". For example, failure at school might result in a child feeling that they were not "doing OK", while significant disruptions in another area of a child's life that resulted in the child not "doing OK" might have a flow-on effect to the child's school performance, leading to school failure. These areas were especially sensitive to context as to whether interviewees described them as a contributor to, or a characteristic of, success. However, with regard to interpretations of contributors to and characteristics of resilience, the results provided only partial support for H1. Both parents and children had similar perspectives on the types of events and factors that were

contributory to, and characteristic of, resilience, but the two groups seemed to place different weightings on the importance of these individual factors.

4.6.2. Positively and Negatively Weighted Responses

Hypothesis H1 was supported with regard to another area of interest – the positive and negative valence of responses. Parent responses contained more topics relating to "not doing OK" than to "doing OK". In some themes, negative instances outweighed positive instances by 145-206%, and this trend was most notable in the areas of "Friendship and Social Interaction", "Parents and Family" and "Life Events".

Only in the theme of "Success, Failure and Competence" did parents and children nominate a higher number of positive responses. Notably, this theme was characterised by a high degree of consistency in responses, with parents and children (both within and between groups) frequently nominating the same topics within this theme. "Displayed Emotion" likewise contained a higher number of positive responses, although for parents only, and was similarly internally consistent.

Overall, parent's negative responses outweighed the positive responses by 13%. Child responses overall were marginally more balanced between positive and negative responses to the questions, but still reflected a tendency to focus on the negative, similar to the views of adults. In line with previous research suggesting that negative events and evaluations are seen as more important than positive ones (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001), parents may have a tendency to focus on the negative when considering children's path through life, despite the evidence that the vast majority of children manage resilient development (Benard, 2000; Spencer, et al., 2005) into adulthood.

The results obtained may have been affected by the structural characteristics of the question/answer format, and the context of the previous questionnaires completed by parents and children. Many of the previous questions, asked of the parents in questionnaires they completed before interviews were held, focussed on

negative events that may have occurred in their family lives, or to their children. This may have created a priming effect, resulting in the negative focus seen in the adult results. The children's questions in other parts of the study tended to focus on the child as they were at the moment of testing, rather than recalling negative events that may have happened to the child, thereby reducing the impact of priming and perhaps resulting in a reduced negative bias to their answers. However, the children had all completed an IQ test in which it was common to have to answer 3-6 questions incorrectly before a "test ceiling" could be established, so it is possible that the recent experience of apparent failure also had a priming effect. Similarly, parents' results may have been affected by a social desirability bias, with adults wishing to present as "well-informed" parents, aware of the myriad harms that could befall their offspring (Nederhof, 1985). Future work might benefit from alternating the order of the qualitative questions component of the data collection protocol, to control for within-subjects effects of fatigue, change in motivation and priming.

4.6.3. Similarities and Differences in Contributors and Characteristics

While both parents and children agreed broadly on the themes that related to a child "doing OK", there were a number of areas where the proportional impact of topics was quite different between the two groups, providing further support for Hypothesis H1. When considering contributors to success, parents were far more likely to be concerned with the impact of other people's behaviour on the child, and more likely to look to parent and family factors to explain a child's success, than were children. In contrast, children focussed on the contribution of friendship and social interaction to a child "doing OK". This mismatch may reflect the proportion of time each group spends with children – adults usually see their children before and after school and on weekends, in the family unit, while children of the ages of those interviewed in this study spend the majority of their waking hours with large groups of other children at school. The disparity may also highlight an important difference in

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perception of a child's agency, with adults underestimating the child's belief in their own self-determination and seeing them as passive targets of external forces, compared with children's perceptions of themselves as active agents in their own lives (Wyness, 1999). This view of children as social agents is increasingly being recognised in the wider milieu, as their opinions and perspectives are acknowledged as different to those of adults, and valid within the context of their own experiences (McIntosh, 2007; Seymour & McNamee, 2008).

Similarly, in talking about the characteristics of a successful child, adults were more likely to use a child's observed psychological characteristics to make judgements about a child's status as "doing OK" or "not doing OK", than were children, who focussed more on displayed emotion, or an assessment of the child's behaviours. This makes sense when considered in light of children's developing ability to evaluate the emotional state of other people. While children are capable of interpreting the emotional state of others from a very young age, younger children are more likely to privilege external cues over internal states as explanations for the emotional state (Fabes, Eisenberg, Nyman, & Michealieu, 1991). This balance changes with cognitive development and increasing social experience as people grow older.

The results indicated that participants distinguished more closely between negative aspects of "Displayed Emotion" for children, with nine distinct emotional states related to "not doing OK" compared with two states for children who were "doing OK". It is possible that this is a reflection of the fact that "people seem to find it more important to recognise and label the distinctions" between negative emotions than positive emotions (Baumeister, et al., 2001, p. 332). There are more words for negative emotions than for positive ones. Averill (1988, in Baumeister, et al., 2001) demonstrated that in a comprehensive analysis of 558 emotion words, participants rated two-thirds of the words as negatively valanced. Similarly, when Van Goozen and Fridja (1993, in Baumeister, et al., 2001) asked participants in seven countries to

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freely recall as many emotion words as they could in five minutes, respondents from all countries except The Netherlands reported more negative words than positive words.

A number of children commented that simply "needing help" was a sign that children were "not doing OK". This perception may make some children resistant to offers of assistance or support, where these offers of help automatically define them as failing at life. Alternatively, an offer of assistance may cause fearful feelings relating to the potential for judgement, or embarrassment, or cause recall of previous unsuccessful experiences of receiving help. Kushner and Sher (1991) defined a similar resistance in adults who need psychological therapy – some may resist seeking help due to "treatment fearfulness", which encompasses, among other aspects, fear of embarrassment, fear of negative judgement and fear associated with past negative experiences in seeking help from mental health services. Children's fear of "needing help" may make it harder for adults to support children who are struggling with aspects of their lives.

Hypothesis H1 was predominantly supported by the results of this study – while there were substantial areas of overlap, parents and children did interpret the meaning of "doing OK" in different ways. Taking these differences in the areas of relevance, perception of agency, developmental stage, and tendency to focus on the negative into account will be important for the design of future interventions intended to increase children's level of resilience.

4.6.4. What Does it Mean to Ask if a Child is "Doing OK"?

The idea of "doing OK" seemed to make sense to most participants, with only five of the child participants requiring clarification on this topic. However, the idea of "doing OK" is only one component of resilience, and thus these results cannot be used as a direct proxy for parents and children's views on resilience. As discussed previously, this study has assessed the question: what are parents' and children's

beliefs about the criteria for a child's success, or at least adequacy, at 'the job of being a child'? As such, it has focussed on two aspects of the "what" of resilience – "What life skills and personal qualities do children with a 'tough life' need to demonstrate in order to be considered resilient?" and "What characteristics of the child's environment can help or hinder a child in demonstrating these skills and qualities?" The results have demonstrated that, while there was overlap between the views of parents and children in this area, there was also a significant variation in the qualities and skills each group considered important in measuring a child's success in life. It will be important to recognise these differences in conducting future resilience research (Luthar & Brown, 2007) and constructing future resilience interventions.

4.7. Summary

This chapter provided information about the similarities and differences between parents' and children's beliefs about aspects of resilience. The data presented partially supported Hypothesis H1 (that parents and children will have different understandings of the meaning of children's resilience), but also reflected many similarities of opinion between the two groups. The purpose of this component of the study was to investigate parents and children's thoughts and beliefs about the criteria for success in "the job of being a child", as part of a larger investigation into educational resilience within South Australian school children.

The qualitative study interviewed 37 children who attended Kumon educational centres for after-school tuition in mathematics, and 37 parents of these children. All participants were asked questions that aimed to elicit their beliefs about the factors contributing to the creation, and the identifying characteristics, of a child who was "doing OK". Participant's answers were recorded, transcribed and analysed, identifying 10 major themes: Friendship & Social Interaction; Behaviour of the Child; Parents and Family; Success, Failure & Competence; Displayed Emotion; School;

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Psychological Characteristics of the Child; Behaviour of Others to the Child; Life Events; and Noticeable Absences. In addition, parents noted the themes Physical Health; and Opposite of "doing OK", but these were not mentioned by children.

Parents and children identified different themes as having the most impact or importance on outcomes. Both groups agreed that Friendship & Social Interaction, the Behaviour of the Child, and experiences of Success, Failure and Competence were important contributors to, and characteristics of, successful children. However, children also focussed on Displayed Emotion and School in their talk about "doing OK", while parents believed that Parents and Family and the child's Psychological Characteristics were more relevant. Parents also had a proportionately more negative set of responses, with more talk focussed on children who were "not doing OK", a comparison which was true within and between groups. These differences may be due to a range of influences: different perceptions about children's level of agency, developmental factors, the fact that negative emotions seem to have greater relevance to most people, or the possibility that parents may focus on the negative when considering important events in their children's lives. The differences may also be to some extent an artefact of the structural characteristics of the interview format.

An integration of the results presented in this chapter with the results of work from the quantitative components of this study, as well as a comparison of the findings of this qualitative study with findings from previous research, are presented in Chapter 10.

5. CHARACTERISTICS OF STUDY PARTICIPANTS

This chapter describes the characteristics of participants in the study, with regard to the demographic data collected, as well as family views on education and results of Literacy and Numeracy (LAN) tests. These data include information about individual and microsystem variables including: the age, sex and school grade of child participants; the cultural background of the children and their families; family composition, including information about single parents, step-parents and adoptive parents; the working arrangements of parents; and family income levels. Information about the mesosystem factors of educational experiences and parents' relationships with their child's school is provided for all participants; data relating to parents' thoughts and feelings about Kumon schools are provided for Kumon families only. The results of LAN tests are provided for all participants for whom full data were available; the relation between LAN test results and selected variables is also presented.

This chapter also describes the child participants' exposure to various risk and protective factors throughout their lives, across the whole sample. Risk factors included stressors at the individual child level (such as bullying, ill health, social problems and learning difficulties), as well as family stressors likely to impact on all members of the family (microsystem factors such as divorce, illness of death of a family member, money troubles, conflict within the family and family transitions). Protective factors included aspects of school and home life (such as the presence of a caring adult, the opportunity to participate in valued activities and a sense of belonging), as well as various personal characteristics of the child (intelligence, locus of control, goal-orientation and mathematical ability).

The information in this chapter is organised with reference to all participants in the study, as these results respond to Aim 1, which relates to factors and processes affecting the resilience and educational resilience of young people in

Australia. Comparisons between Kumon and Control group participants with regard to many of the variables described in this chapter are held over for discussion in Chapter 7. This chapter also tests the hypothesis that parents will rate education as more important than children (Hypothesis H2).

5.1. Participants

Of the 164 families participating in the study, ~38% were from Kumon and ~62% were from the Control group (see Table 5.1). All Control participants were drawn from two State schools in neighbouring areas, approximately 5km from the CBD. Kumon participants attended a mix of State and private schools, but school data were not collected as part of the survey protocol, so the proportions of State and private schools in the Kumon sample are unknown.

The mean age of child participants was 131 months (SD 14.20), or 10 years and 11 months, and 48.8% of the sample were male (see Table 5.2). The age of parent respondents was not collected, and the majority of adult respondents were mothers (~84%), rather than fathers, although the gender-neutral title of "parents" is generally used to describe the responses provided by adults. The child participants' school grade level at the time of testing is provided at Table 5.3. Adult participants nominated their family's cultural background, and 52% considered themselves to be Anglo-Australian; 1.8% were Aboriginal-Australian, 8.5% were of Greek extraction, and 2.4% recognised multiple cultural backgrounds. The remaining cultural descriptions are provided in Table 5.4.

Table 5.1

Participant source – total sample

Source	N	%
Kumon	62	37.8
Control	102	62.2
School 1	*47*	*28.7*
School 2	*55*	*33.5*
Total	164	100.0

Table 5.2

Participant sex, percentage – total sample

Sex	N	%
Male	80	48.8
Female	84	51.2
Total	164	100.0

Table 5.3

Participant's school grade at the time of testing – total sample

Grade at testing	N	%
Year 4	52	31.7
Year 5	45	27.4
Year 6	41	25.0
Year 7	25	15.2
Year 8	1	0.6
Total	164	100.0

Table 5.4

Cultural background of participants – total sample

Cultural Background	*N*	%
Aboriginal Australian	3	1.8
Anglo-Australian	86	52.4
Asian	30	18.3
European	42	25.6
Other	3	1.8
Total	164	100.0

5.2. Family Composition

Nearly all participants (98.8%) lived with their birth mother; and 81% had their birth father at home (see Table 5.5). Single-parent families, all headed by the child's birth mother, accounted for 13% of respondents, an under-representation of single-parent families in the wider community, where they comprise 25% of all families with children in this age-range (Australian Bureau of Statistics, 2007a). Co-parenting families (where the child spent more than three nights per month with a non-custodial parent) comprised just over 10% of the sample (see Table 5.6), about half the frequency seen in the overall population (Australian Bureau of Statistics, 2007a). Step- or blended families were unusually rare in this sample: only one respondent lived with a stepmother, while 3% lived with a step-father (see Table 5.5) and only 2.4% of respondents lived with a step-sibling (Table 5.7). In the wider community, up to 7% of step- or blended families would be expected (Australian Bureau of Statistics, 2007a). Adoption relationships were represented in this sample; however, only one respondent (0.6%) lived with an adoptive mother and father, while a further 1.8% lived with an adoptive father and a birth mother. Only 3% of children had a second-degree relative living in the home, while 1.2% had non-related adults living in the

home. Nearly 20% of respondents were the only child in the household, with no sibling or step-siblings living in the home, and 91.5% of respondents had three or fewer children in the home.

Table 5.5

Family composition – total sample

Adults living with participant child	*N*	*%*
Birth Mother	162	98.8
Birth Father	133	81.1
Stepmother	1	0.6
Stepfather	5	3.0
Adoptive mother	1	0.6
Adoptive father	4	2.4
Another relative	5	3.0
An unrelated adult	2	1.2

Table 5.6

Children co-parenting (spending more than three nights per month at the non-custodial parent's house on a regular basis) – total sample

Spending time elsewhere	*N*	*%*
Yes	17	10.4
No	147	89.6
Total	164	100.0

Table 5.7

Total number of children in respondent's families (including child respondent, siblings and step-siblings) – total sample

N children in family	Count	(%)
1	30	18.3
2	84	51.2
3	36	22.0
4	10	6.1
5	-	-
6+	4	2.4
Total	164	100.0

When asked about working conditions for adults in the household, respondents described a range of alternatives (see Table 5.8). Full time employment accounted for 64% of male adults and 35% of female adults, while 13% of male adults and 46% of female adults worked part time. Around 18% of male adults and 15% of female adults were unemployed, but only in 2.4% of households was there no adult employed at all. Employment data were missing for 4.3% of respondents.

Table 5.8

Adult working arrangements – total sample

Adults working arrangements	Male		Female	
	N	%	N	%
Full time	105	64.0	57	34.8
Part time	22	13.4	75	45.7
Not employed	30	18.3	25	15.2
Work data missing	7	4.3	7	4.3

Respondent families displayed large variations in annual family income, as seen in Table 5.9. As defined by Saunders, Hill and Bradbury (2008), the poverty line is considered to be an annual income at less than 50% of the median Australian income. Australian median income was $53,404 in 2006, the last year for which data were currently available (Australian Bureau of Statistics, 2006); adjusting for inflation according to the Reserve Bank of Australia (2010), that figure becomes $58,905. The poverty line for Australia in 2009 could therefore be estimated at $29,452. Other sources classify the poverty line higher, at $33,908 for a three-person household (two adults and one child; Melbourne Institute of Applied Economic and Social Research, 2009). For ease of classification an intermediate figure of $30,999 has been selected as representing the poverty line in the present study (see red line in Figure 4)[5]. In the present study, sixteen families (almost 10%) were estimated as living below the poverty line (See Table 5.10).
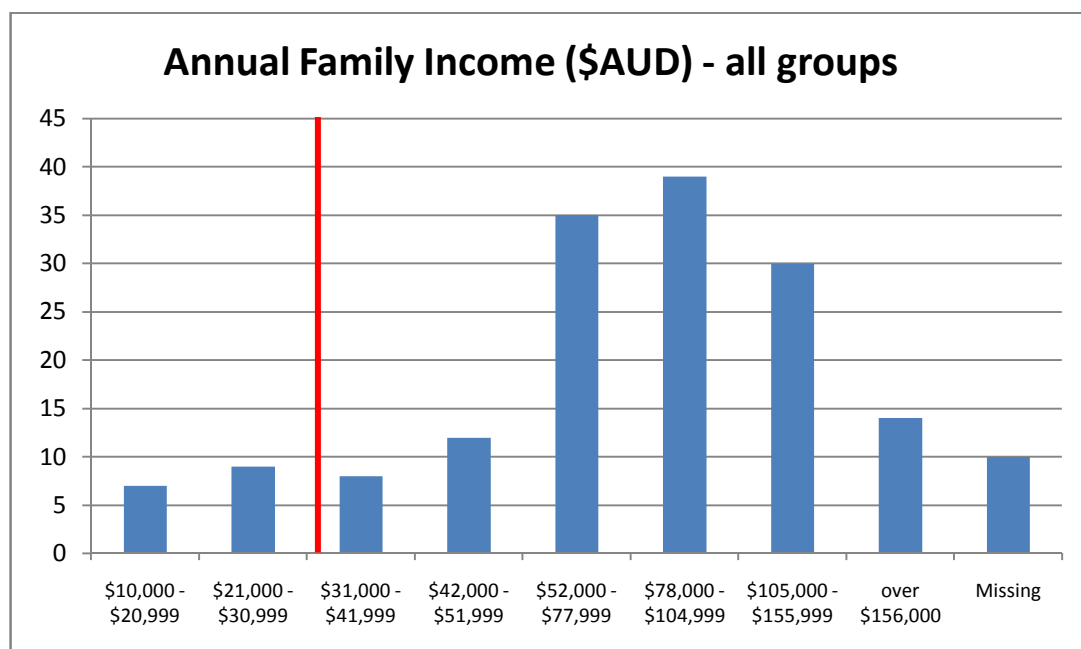
Figure 4. Annual Family Income of participants

* Vertical line indicates the poverty line

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[5] This differs slightly from the official OECD definition of relative poverty which takes into account an equivalised household income of less than 60% of the median income, controlling for household size.

Table 5.9

Average income band by parental working arrangements – full time (FT), part time (PT) or not employed (NE), arranged by income level – total sample

Working arrangements	X̄ income band	Corresponding salary range	N	%
Both Parents NE	2.67	$10,000 - $20,999	3	1.8
Male NE, Female PT	4.27	$31,000 - $41,999	11	6.7
Male PT, Female NE	5.17	$42,000 - $51,999	6	3.7
Male NE, Female FT	5.47	$42,000 - $51,999	15	9.2
Male FT, Female NE	5.91	$42,000 - $51,999	11	6.7
Both PT	6.00	$52,000 - $77,999	5	3.1
Male FT, Female PT	6.98	$52,000 - $77,999	58	35.4
Male PT, Female FT	7.10	$78,000 - $104,999	10	6.1
Both parents FT	7.38	$78,000 - $104,999	29	17.7
Data missing	-	-	16	9.8
Total/Average	6.38	$52,000 - $77,999	164	100.0

Table 5.10

Gross family income bands – total sample

Annual family Income	Income band	*N*	%
$0 - $9,999	1	0	0.0
$10,000 - $20,999	2	7	4.3
$21,000 - $30,999	3	9	5.5
$31,000 - $41,999	4	8	4.9
$42,000 - $51,999	5	12	7.3
$52,000 - $77,999	6	35	21.3
$78,000 - $104,999	7	39	23.8
$105,000 - $155,999	8	30	18.3
over $156,000	9	14	8.5
Missing	-	10	6.1
Total		164	100.0

* Grey rows indicate families living below the poverty line

5.3. Education Experiences

While 37.8% of respondents were currently undertaking extracurricular tutoring through Kumon, a further 14% had undertaken private academic tuition (see Table 5.11), primarily for English reading and writing skill development[6]. Of these, 10 were Kumon students and 13 were Control group students. The majority of children were educated in the mainstream schooling system, with only 5.5% of children undertaking significantly different modes of schooling in the past (e.g., overseas education, or Montessori), and no children were currently enrolled in alternative

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[6] The effect of extra tuition was assessed during tests relating to Kumon's effect on educational resilience (see Appendix G), and was found to have no impact; these participants were therefore retained in the sample.

education options (see Table 5.12). However, this question had a relatively high rate

of missing data (9.8%), perhaps due to its position on the questionnaire document.

Table 5.11

Experience in private tutoring – total sample

Experienced Private tutoring	*N*	%
No	134	81.7
Yes – academic	23	14.0
Yes – non-academic (e.g., piano)	5	3.0
Missing	2	1.2
Total	164	100.0

Table 5.12

Experience in non-mainstream education – total sample

Experienced non-mainstream education	*N*	%
No	139	84.8
Yes	9	5.5
Missing	16	9.8
Total	164	100.0

The majority of parents (55.5%) believed their relationship with their child's

school was "Good", while a further 31.1% classified this relationship as "Excellent";

only one respondent endorsed a negative school relationship, noting that the

relationship was "Non-existent" (see Table 5.13). Likewise, over 90% of parents were

"Satisfied" or "Happy" with their child's progress at school (see Table 5.14). Of the

parents who were unhappy with their child's progress at school, 46% were Kumon

families and 54% were Control group families. When considering their child's

experiences at school, 90% of parents once again nominated themselves as "Satisfied" or "Happy" (see Table 5.14).

Table 5.13

Parents' relationship with child's school – total sample

Relationship	*N*	%
Non-existent	1	0.6
Average	19	11.6
Good	91	55.5
Excellent	51	31.1
Missing/did not answer	2	1.2
Total	164	100.0

Table 5.14

Parents' satisfaction with child's progress and experiences at school – total sample

Satisfaction with experiences	*N*	%	Satisfaction with progress	*N*	%
Unhappy	8	4.9	Unhappy	13	7.9
Satisfied	62	37.8	Satisfied	62	37.8
Happy	86	52.4	Happy	87	53.0
Missing/did not answer	8	4.9	Missing/did not answer	2	1.2
Total	164	100	Total	164	100.0

5.4. Kumon Experiences

For the 62 families who participated in Kumon, almost 50% had been studying for two years or less (see Table 5.15); however, the mean length of study at the time of interview for each family who provided data (*N* = 58), was 25.33 months (*SD* 15.24), with a minimum of 5 months and a maximum of 5 years.

Table 5.15

Years of Kumon experience – total sample

Years of Kumon (all participants)	*N*	%
Never attended	102	62.2
< 1	11	6.7
1-2	19	11.6
2-3	13	7.9
3-4	6	3.7
4-5	7	4.3
5-6	2	1.2
Missing	4	2.4
Total	164	100.0

Almost all Kumon parents classified their relationship with their child's Kumon supervisor as "Good" or "Excellent" (see Table 5.16); 98.4% of parents were "Satisfied" or "Happy" with their child's progress in Kumon (see Table 5.17); and all parents were "Satisfied" or "Happy" with their child's experiences at Kumon (see Table 5.17).

Table 5.16

Kumon parents' relationship with child's Kumon supervisor – Kumon group

Relationship with Kumon supervisor	*N*	%
Average	2	3.2
Good	28	45.2
Excellent	32	51.6
Total	62	100.0

Table 5.17

Parents' satisfaction with child's progress and experiences at Kumon – Kumon group

Satisfaction with progress	N	%	Satisfaction with experiences	N	%
Unhappy	1	1.6	Unhappy	0	0.0
Satisfied	13	21.0	Satisfied	14	22.6
Happy	48	77.4	Happy	48	77.4
Total	62	100.0	Total	62	100.0

5.4.1. Reasons for Enrolment in Kumon

Parents nominated several reasons for enrolling their children in Kumon (See Table 5.18). Parents were allowed to nominate as many reasons as they felt applied to their situation, so the percentages do not sum to 100%.

Table 5.18

Reasons parents chose to enrol their child in Kumon – Kumon group

Reasons for enrolling in Kumon	%
Improvement in maths skills	58.3
Access to extension materials	17.2
Improving confidence	15.5
Methods used in school were considered inadequate	15.5
Word-of-mouth recommendations	13.8
Sibling equality	10.3
Improving other learning skills (punctuality, independence, self-learning, timing, competitiveness)	10.3
Improving work ethic	6.9
Access to one-on-one attention from a tutor	6.9
An increased quantity of homework	6.9

5.5. Values

A measurement of parents and children's values was taken, by asking participants to rank various aspects of life (see Table 5.19) in order of importance. The value placed on education by parents and children was seen as most relevant to the current study (see Table 5.19, highlighted bar).

Hypothesis H2: Parents and children will have different priorities for education – parents will rate education as more important than children.

The results support Hypothesis H2: Parents rated education as more important than children, with paired samples t-tests revealing that the difference was significant, t (130) = -3.927, $p < 0.01$, with a medium effect size, $d = 0.45$.

Table 5.19

Mean ranking for the importance of aspects of a child's life (1 = most important, 7 = Least important) – total sample

Area of life	Parent $\overline{X}$ (N = 132)	Child $\overline{X}$ (N = 157)
Happiness	1.70	2.71
Enjoying time together as a Family	2.45	1.99
Education	2.80	3.45
Exercise and Sport	4.46	4.25
Artistic Expression - music, art, drama, creative writing	4.93	4.96
Informal play and relaxation – alone or with friends	5.05	6.14
Volunteer work or Religious responsibilities	6.47	4.50

5.6. Literacy and Numeracy Test Results

Results from standardised Literacy and Numeracy (LAN) testing over two testing periods were available for 110 participants. Using the method described in Chapter 3, the mean scores achieved on LAN tests by participants are outlined in Table 5.20. Four categories of scores were consistent across all test types: Numeracy, Reading, Writing and Spelling, and results for the four sub-tests are reported.

Although individual subtests were available for slightly more participants, and first or second LAN tests were available for between $N = 122$ and $N = 127$ participants respectively, complete LAN data (all scales on both tests) were available for only 108 participants (see Table 5.20).

Table 5.20

Mean Literacy and Numeracy test results by sub test and test iteration – total sample

Sub test	N	First LAN test $\overline{X}$ (%)	SD	Second LAN test $\overline{X}$ (%)	SD
Numeracy	110	73.7	0.22	76.7	0.17
Reading	109	76.7	0.23	80.8	0.15
Writing	110	79.1	0.25	79.5	0.17
Spelling	109	80.2	0.25	80.9	0.17

As expected, the first and second scores on all subtests were significantly correlated with each other, as outlined in Table 5.21.

Table 5.21

Correlations between subtests on literacy and numeracy tests, during first and second iterations of testing – total sample

Subtest	Pearson Correlation	Significance
Numeracy	.71**	< 0.01
Reading	.64**	< 0.01
Writing	.27**	0.05
Spelling	.59**	< 0.01
Average all subtests	.68**	< 0.01

A LAN Change Score was calculated by subtracting a student's LAN 1 subtest score from their LAN2 subtest score, for all subtests. This meant that if a student improved on their second test the LAN change score was positive, while if their score declined over time, the LAN change score was negative (see Table 5.22).

Table 5.22

LAN Change scores for all subtests – total sample

Subtest	Change score $\overline{X}$ (%)	Change score SD
Numeracy change score	2.7	0.15
Reading change score	3.9	0.18
Writing change score	0.0	0.27
Spelling change score	0.4	0.20
Average LAN change score	1.7	0.14

5.7. LAN Change Scores and Other Variables

5.7.1. Sex

When LAN change scores were analysed by sex, an interesting pattern emerged (see Table 5.23) – female participants had lower mean change scores than males across all subtests, and in some subtests females achieved negative change scores (indicating a decrease in mean scores on the second test), while male scores increased across all tests except Spelling, where they remained stable.

Independent samples t-tests conducted to examine these differences attain significance at the 0.05 level for the Writing subtest, t (96) = 2.02, p = 0.05, d = 0.41, and approach significance for Average LAN change score, t (96) = 1.76, p = 0.08, d = 0.36; none of the other test differences is significant.

Table 5.23

LAN Change scores by sex – total sample

N = 98	Source	N	$\overline{X}$ (%)	SD
Numeracy change score	Male	43	4	0.16
	Female	55	0	0.13
Reading change score	Male	42	5	0.19
	Female	55	1	0.17
Writing change score	Male	43	6	0.26
	Female	55	-5	0.26
Spelling change score	Male	42	0	0.21
	Female	55	-1	0.20
Average LAN Change score	Male	43	4	0.15
	Female	55	-1	0.13

However, when the underlying LAN1 and LAN2 scores were reviewed (see Table 5.24) it was clear that the reporting of the change scores was obscuring a pair of important trends: male participants were building on an early superiority in numeracy scores to achieve significantly higher scores than females in this area by the second LAN test, t (87.7) = 1.99, $p > 0.05$, $d = 0.43$; and females consistently scored higher than males in the tests of literacy, although the gap between the two groups lessened by the second test, as a result of males' larger LAN change scores and decreases in females' scores. The only significant difference in literacy scores was found in the LAN1 writing score, t (83.6) = -2.48, $p < 0.05$, $d = 0.54$.

5.7.2. *Kumon*

There was a significant positive correlation between length of time studying Kumon, and LAN change scores ($r = .34$, $p < 0.01$, $N = 98$). While all Kumon participants had studied for six months or longer, up-to-date Literacy and Numeracy test results were not available for all students. Full LAN data were available for 48 Kumon students. When the number of months of Kumon study was calculated in comparison to the date of the second LAN test, 44 out of 48 children had completed some Kumon study before attempting their second LAN test ($\overline{X}$ = 25.65 months, SD = 13.42), with 40 children having completed at least 6 months of Kumon study before sitting the second LAN test. Four children in the study completed their second recorded LAN test before starting Kumon study. A further four children had not completed 6 months of Kumon study before testing. These eight children were removed from the dataset before inferential analyses were conducted (See Appendix E).

Table 5.24

LAN1 and LAN2 scores by sex – total sample

N = 98	Source	*N*	$\overline{X}$ (%)	*SD*
Numeracy LAN1 score	Male	47	76	0.22
	Female	59	73	0.21
Numeracy LAN2 score	Male	47	81	0.19
	Female	59	74	0.15
Reading LAN1 score	Male	46	75	0.24
	Female	59	79	0.22
Reading LAN2 score	Male	47	81	0.15
	Female	59	81	0.14
Writing LAN1 score	Male	47	73	0.28
	Female	59	85	0.21
Writing LAN2 score	Male	47	79	0.17
	Female	59	81	0.18
Spelling LAN1 score	Male	46	78	0.27
	Female	59	83	0.23
Spelling LAN2 score	Male	47	80	0.19
	Female	59	82	0.15

5.8. Risk Factors

5.8.1. Child stressors

Child aspects of a difficult life were examined using the Child Experience of Adverse Events questionnaire (CEAE), completed by parents on behalf of their children. Sixty-seven children scored one or more Adverse Events as measured by

the scale. The most common difficult life event was Bullying, experienced by 25% of the entire participant group, followed by Friendship Difficulties, which was an issue for 14.6% of children (see Table 5.25). Physical Illness or Disability issues affected 12.7% of children, while Learning Difficulties (e.g., dyslexia) affected 2.4% of children (see Table 5.25).

Table 5.25

Children experiencing difficulties in life (CEAE score summary) – total sample

Type of difficulty	*N*	*%*
Chronic Health Condition (e.g., asthma)	12	7.3
Acute illness	4	2.4
Disability	5	3.0
Bullying	41	25.0
Friendship difficulties	24	14.6
Dyslexia	4	2.4
Dyscalculia	0	0
Central Auditory Processing Disorder	0	0
Autistic Spectrum Disorders	1	0.6
Attention-Deficit Hyperactivity Disorder	5	3.0
Physical disability	3	1.8
Sensory Disability	3	1.8
Other	13	7.9
Total	115	
Children scoring >= 1 on the scale	67	40.8

Differences in the CEAE scores of male and female participants in the study were found, with female participants generally reporting both higher and more

variable CEAE scores than males (see Table 5.26). The maximum score possible on the CEAE was 13; the highest score achieved by any individual participant was 4.

Table 5.26

Mean scores on the Child Experience of Adverse Events scale, by sex – total sample

		N	$\overline{X}$	SD
Overall group	Male	70	0.41	0.65
	Female	75	0.73	1.12

When compared using independent samples t-tests, there was a significant difference between CEAE scores of males and females, t (120.1) = -2.12, p = 0.04, d = 0.39.

5.8.2. Family Stressors

Parent respondents also completed the Family Inventory of Life Events (FILE), which counted the number of stressful life events that families had experienced in the last 12 months, and at any time in their history. The stressful events were categorised as outlined in Table 5.27. The mean number of stressful events was relatively low across the whole sample, but many of the events described in the questionnaire would be sufficiently stressful individually (e.g., death of a family member, moving house, starting a new job, increased arguments within the family, birth of a child) to increase family stress levels substantially. Only one family scored zero on the entire test, indicating no significant life stressors over the life of the child participant. The mean score on the FILE across all families was 16.48. This figure comprised approximately equal numbers of stressors occurring within the last 12 months, and stressors occurring before the last 12 months (see Table 5.27). However, the maximum score achieved was 69, out of a possible 142, in two families, both of which had experienced significant stress and hardship over a sustained period of time.

Table 5.27

Family experiences of stressful events (FILE score summary) – total sample

FILE section (*N* = 164)	$\bar{X}$	SD	Min	Max	Total Score Possible
1 – Intra-family Strains	5.45	4.56	0	24	34
2 – Marital strains	0.54	1.11	0	5	8
3 – Pregnancy & Childrearing strains	0.26	0.76	0	5	8
4 – Finance & Business strains	3.49	3.35	0	20	24
5 – Work-Family Transitions & strains	3.48	3.12	0	14	20
6 – Illness & Family Care strains	1.74	2.13	0	10	16
7 – Losses	0.90	1.10	0	7	12
8 – Transitions in and out	0.52	1.02	0	8	10
9 – Family Legal Violations	0.10	0.48	0	4	10
Overall FILE A (in last 12 months)	8.18	5.93	0	36	71
Overall FILE B (before last 12 months)	8.30	6.71	0	33	71
Overall FILE A&B (total)	16.48	11.41	0	69	142

5.8.3. Total Life Challenges for Children

The data from CEAE and FILE were combined to provide a "Total Life Challenge" score, as described in Chapter 3 (see Table 5.28).

Table 5.28

Total Life Challenge score (CEAE+FILE score summary) – total sample

	$\bar{X}$	SD	Min	Max	Possible
Total life challenge score	17.03	11.71	0.00	71.00	155

When these data were mapped against the areas known to predispose children to have a "tough life" (as described in Chapters 1 and 2), a few points are

notable (see Table 5.29). Just over 12% of children in the sample had either current or past experience of living with an adult who had a mental health issue, but a further 20% of children were living with an adult whose current mental health issues had also been problematic throughout the child's life. Similarly, parental alcohol and drug abuse issues tended to affect families over long periods of time. In contrast, for the majority of children who experienced parental divorce or separation this event had either occurred in the past and families were now living peacefully with the resulting arrangements, or a recent separation was a challenging issue for families at the time of the study; there were few families who nominated family separation as a long term disruption that extended into the present day. Physical/sexual abuse and criminal behaviour in the home were rarely reported in this sample.

Table 5.29

Challenging life events experienced by children, by time of occurrence – total sample (N=164)

Area of concern experienced:	Never	%	In either past or present	%	In both past and present	%
Parental Mental Health issues	112	68.3	20	12.2	32	19.5
Parent alcohol/drug use	151	92.1	3	1.8	10	6.1
Parental Divorce/separation	144	87.8	19	11.6	1	0.6
Physical or sexual abuse, or violence, in home	160	97.6	3	1.8	1	0.6
Criminal behaviour in home	162	98.8	2	1.2	0	0
Below the poverty line (as defined in Section 5.2)	148	90.2	16	9.8	--	--

However, when lower level stressors were counted cumulatively, 13.4% of children had experienced more than three instances of family discord in their lives (e.g., "increase in conflict between husband and wife"; "increase in conflict between parents and children"), even if they were not experiencing physical abuse or violence; and 17.1% lived in families that had experienced more than three instances of financial strain (e.g., "increasing financial debt due to overuse of credit cards"; "increased strain on family 'money' for food, clothing, energy, health care"), even if they were not living below the poverty line (see Table 5.30).

Table 5.30

Number of lower level stressors experienced by children, lifetime exposure – total sample

Area of concern	0	1	2	3	4+
(*N* = 164)	(%)	(%)	(%)	(%)	(%)
Family discord	88	20	23	11	22
Scored 0-12	(53.7)	(12.2)	(14.0)	(6.7)	(13.4)
Financial strain	77	28	23	8	28
Scored 0-8	(47.0)	(17.1)	(14.0)	(4.9)	(17.1)

5.9. LAN Change Scores and Risk Factors

Total life challenge did not correlate with LAN Change scores (r = -.021, p = 0.83), nor did FILE total (r = -.044, p = 0.66). CEAE scores, however, correlated weakly with LAN change scores (r = .28, p < 0.01). Somewhat paradoxically, this suggested that children with greater experience of adversity in childhood (illness, bullying, friendship difficulties, etc) tend to show greater improvement in their second LAN test. Further investigation appeared warranted.

The CEAE comprised six subscales. The CEAE subscale "disability", on which five participants received a score, was highly correlated with LAN Change

score (r = 0.53, p <0.01). Since Disability was a binary scale, such a large correlation would only be likely if all participants with a disability also made very large gains in their LAN scores, and this was what had happened (See Figure 5) – the two participants with a disability for whom LAN change scores were available, were skewing the distribution of scores.
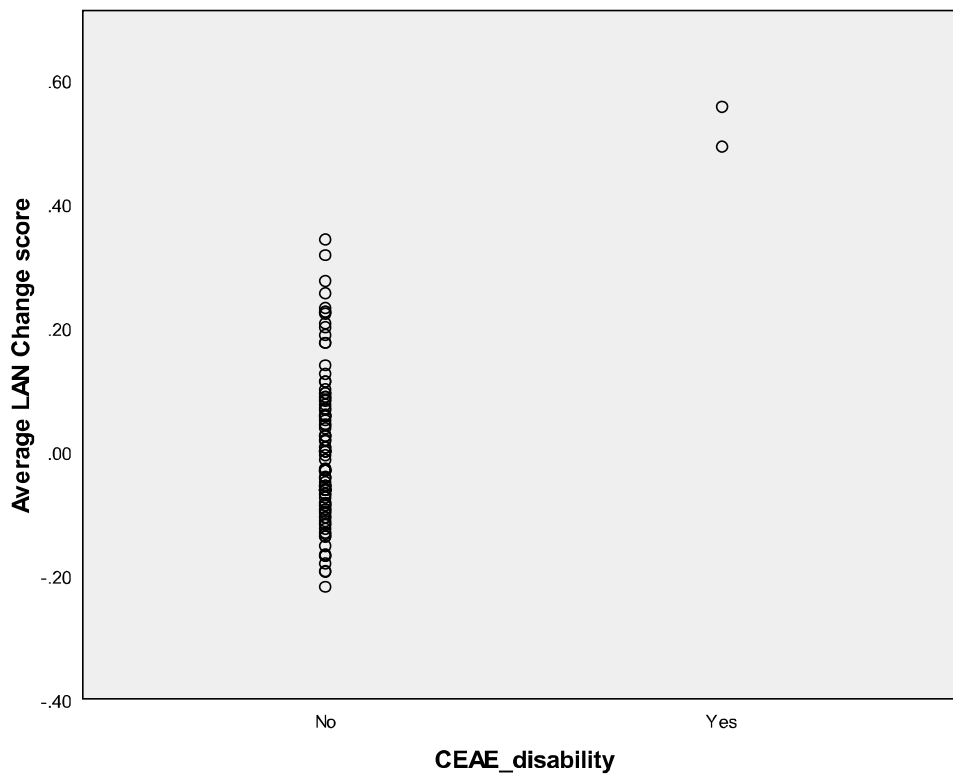
Figure 5. LAN change scores by disability status.

However, LAN change data were unavailable for the remaining three participants who scored on the CEAE disability subscale. Thus there was no way of knowing how their hypothetical data would have compared to the two participants for whom data were available. Additionally, Kumon students were over-represented in the "disability" category: four of the five participants who recorded a disability were Kumon students. When a "CEAE without disability" scale was constructed (counting all categories of the CEAE except disability/physical disability/sensory disability), the correlation between LAN change data and the CEAE was insignificant (r = .11, p =

0.28), even though "CEAE without disability" correlated very strongly with the original CEAE scale (r = .91, p < 0.01). It appeared that the disability subscale of the CEAE skewed the results of the analysis. The "CEAE without disability" score was therefore used for the remainder of the analyses.

5.10.   Protective Factors

5.10.1. School Protective Factors

Protective factors are often categorised by the realms in which they operate (school, home, community), or by whether they are internal (factors within the child) or external (factors acting on the child). The *California Health Kids Survey Module B: Resilience (CHKS-B)* can be analysed in a variety of ways, providing information about protective factors that operate in different arenas and dimensions – these are described in detail in Section 3.2.3. The general pattern was for relatively high levels of self-reported protective factors amongst all children in the study, with means trending closer to possible maxima than possible minima (see Figure 6; Table 5.31).
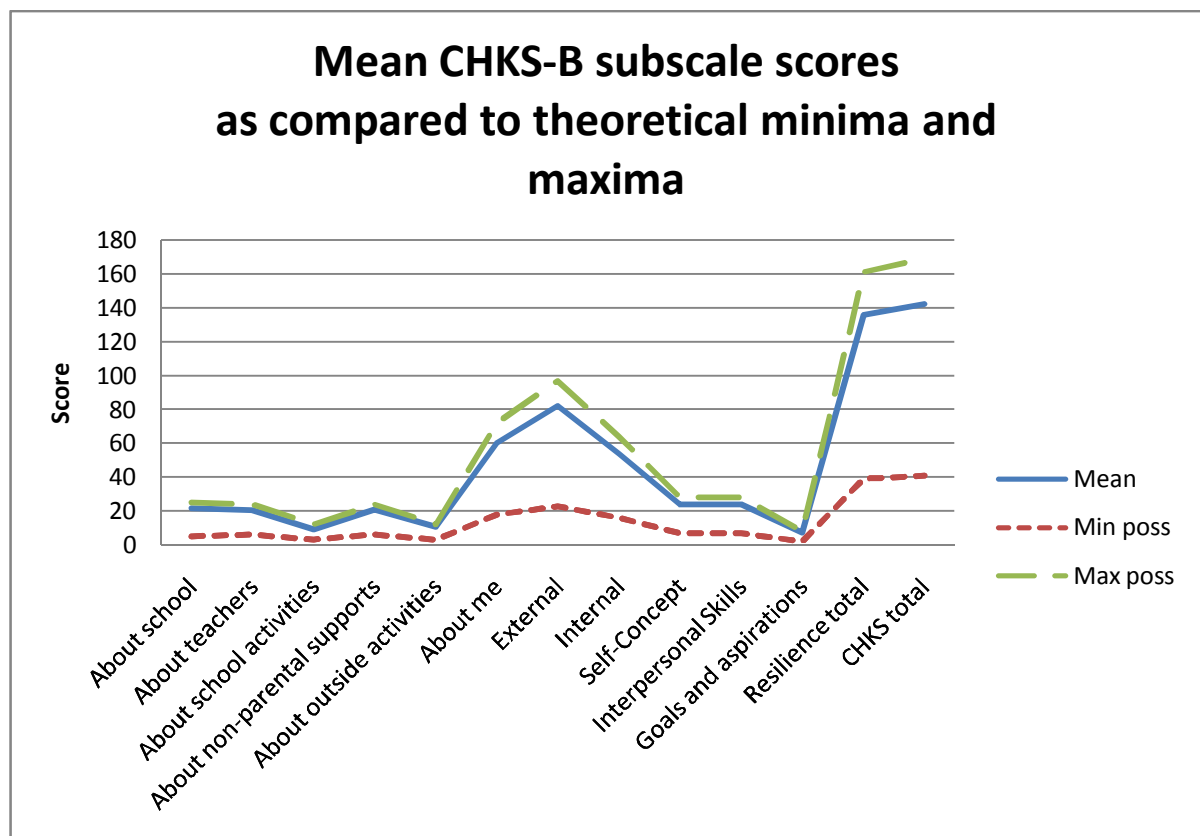
Figure 6. Mean CHKS-B subscale scores as compared to theoretical maxima and minima.

Table 5.31

California Health Kids Survey Module B: Resilience (CHKS-B) results – total sample

CHKS-B section (N = 164)	$\bar{X}$	SD	Min	Max	Min poss	Max poss
About school	21.45	2.56	14	25	5	25
About teachers	20.40	2.94	6	24	6	24
About school activities	8.99	1.86	3	12	3	12
About non-parental supports	20.81	3.63	6	24	6	24
About outside activities	10.34	1.77	4	12	3	12
About me	60.22	6.54	42	72	18	72
External	81.97	8.90	54	97	23	97
Internal	53.64	5.94	37	64	16	64
Self-Concept	23.90	2.89	14	28	7	28
Interpersonal Skills	23.65	3.23	14	28	7	28
Goals & aspirations	7.09	1.07	3	8	2	8
Resilience total	135.61	13.38	99	161	39	161
CHKS-B total	142.23	13.93	102	169	41	169

5.10.2. Locus of Control

Mean locus of control scores, another reportedly protective factor, came in lower than would have been expected. This suggested that overall, the sample of children tested had a slightly more internal locus of control than would be expected for their age (see Table 5.32). There were no significant gender differences in locus of control scores observed in this sample.

Table 5.32

Locus of Control results for participants, by school grade – total sample

LCSC (N = 163)	Observed $\bar{X}$	Expected $\bar{X}$	Observed SD	Expected SD	Min	Max
Grade 4	15.31	18.44	4.32	3.58	6	23
Grade 5	14.51	18.32	3.99	4.38	7	23
Grade 6	13.33	13.73	3.99	5.16	5	21
Grade 7	14.16	13.15	5.06	4.87	4	22
Overall	14.43	-	4.28	-	4	23

5.10.3. Cognitive Ability

Results on the Brief Intellectual Ability (BIA) scale clustered around the expected mean of 100, with slightly lower variability than expected in some subscales, which may have been an artefact of sample size (see Table 5.33). However, the distribution of BIA scores for the Kumon participants was flatter, with longer tails, than that of Control participants. This was also reflected in the greater number of outliers seen in Kumon participants compared to Control participants. Two scores, as reflected in Table 5.33, were significantly higher than the expected mean of 100.0: Concept Formation t (157) = 6.51, $p < 0.01$, $d = 1.04$, and BIA overall scores t (157) = 4.127, $p < 0.01$, $d = 0.66$.

Table 5.33

BIA results for all participants

N = 163	$\bar{X}$	SD	Min	Max	Outliers Kumon	Outliers Control
BIA Verbal	102.68	9.92	82	131	0	0
BIA Concept Formation	106.66	12.59	72	139	3+, 1-	1+
BIA Visual Matching	99.81	14.76	63	136	0	0
BIA overall	104.39	13.15	77	148	2+	1+

5.10.4. Mathematical Ability

All child participants completed a grade-appropriate Kumon "Diagnostic Test" – an assessment of mathematical skill. Students sitting tests P1, P2 and P3 (the lower level tests) were given 10 minutes to complete as many test questions as possible, while students sitting the higher level P4 and P5 tests were allowed 15 minutes, as is standard for the administration of these tests. At the conclusion of the set time, students were instructed to finish the sum they were working on and stop. Across all tests the mean time taken was 10.88 minutes (min – 1, Max – 19, *SD* – 4.481), but time results by test level are more meaningful due to the different time limits for different levels of the test, and are presented in Table 5.34. The mean % accuracy across all tests was 74.87% (min 2.86%, max – 100.0%; *SD* – 20.19), and mean accuracy results by test level are likewise presented in Table 5.34. A clear trend of increasing time and decreasing mean accuracy is present as the test difficulty increases, as would be expected.

Table 5.34

Kumon Diagnostic Tests

Diagnostic Test Level	Approx Grade level	N	%	$\bar{X}$ time (min:sec)	$\bar{X}$ accuracy (%)
P1	K/1	9	5.5	2:11	98.15
P2	2	2	1.2	4:00	97.14
P3	3/4	53	32.3	7:91	85.50
P4	5	44	26.8	13:25	73.34
P5	6/7	55	33.5	13:53	61.24
Missing	-	1	0.6	-	-

Diagnostic tests were scored on a seven-point scale (1 = highest achievement; 7 = lowest achievement), calculated by correlating time taken to

complete the test, and accuracy. It is thus possible to compare results across different Diagnostic Test levels, as a child who achieved Band 1 on a grade-appropriate test has demonstrated the top level of skill that would be expected for a student in that grade. The scaled scores are given in Table 5.35; Figure 7 demonstrates that these scores are far from normally distributed, with over 50% of participants scoring in the two lowest bands.

Table 5.35

Kumon DT Band scaled scores – total sample

Test Rank	*N*	%
1	18	11.0
2	14	8.5
3	9	5.5
4	15	9.1
5	18	11.0
6	39	23.8
7	50	30.5
Missing	1	0.6
Total	164	100.0

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Diagnostic Test Result Band
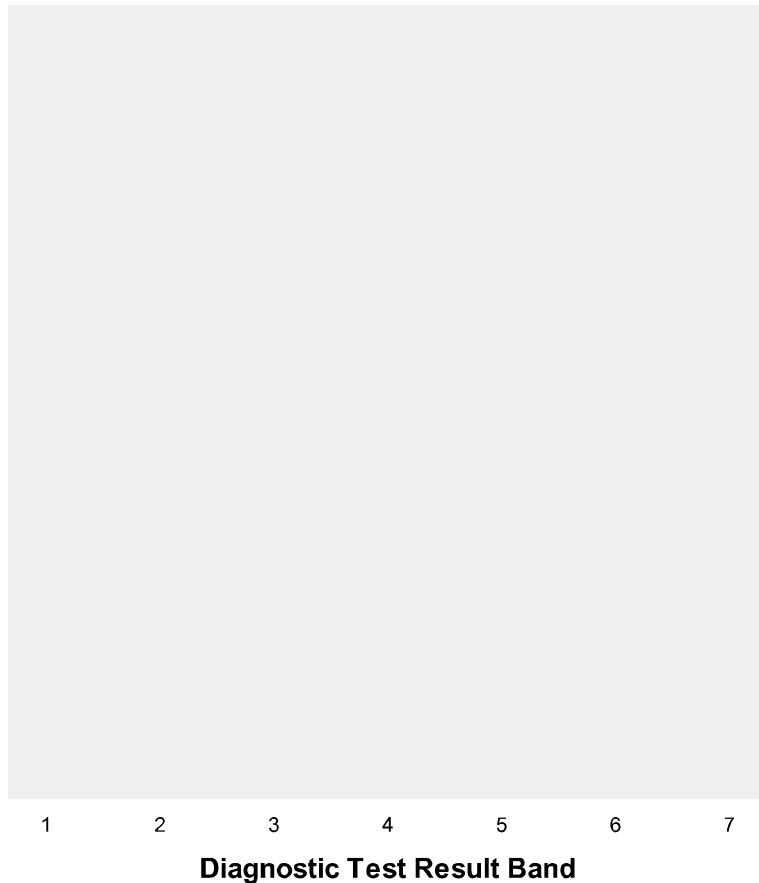
Figure 7. Distribution of Diagnostic Test results

5.11.   *LAN Scores and Protective Factors*

5.11.1. *Cognitive Ability*

BIA scores were not a predictor of LAN Change scores, being essentially uncorrelated with them (r = -.09, p = 0.40). This was expected, as the variability attributable to BIA would be expected to show up between participants, not within participants; in other words, IQ should have a relatively constant effect across time, and not influence the change in LAN scores from one time period to another.

5.11.2. *Locus of Control*

As expected, locus of control was negatively correlated with LAN Change score (r = -.24, p = 0.02), indicating that children with a more internal locus of control tended to show improvement in their LAN scores over time.

5.11.3. Protective Factors

There were no significant correlations between CHKS-B and Average LAN change score (See Table 5.36).

Table 5.36

Pearson correlations between Average LAN change score and CHKS-B subscales – total sample

CHKS-B Subscale	Average LAN Change score (r)	Significance level (p)
About school	-.06	.57
About teacher	.02	.81
School activities	-.09	.36
Nonparental Adult	-.08	.46
Outside activities	-.11	.26
About me	-.07	.50
Total scale	-.08	.45

5.11.4. Mathematics Ability

A weak negative correlation was observed between mathematics Diagnostic test scaled scores and LAN2 numeracy results (r = -.30, p = 0.03), suggesting that students who scored a higher ranking in the diagnostic test were also achieving better scores on the LAN2 Numeracy test.

5.12. Risk and Protective Factors and Enrolment in Kumon

As described earlier, parents nominated several reasons for enrolling their children in Kumon, including "needing remedial assistance" and "seeking extension work". These two groups were investigated for systematic differences in characteristics or outcomes, but were reasonably similar (see Table 5.37).

Table 5.37

Mean score for students enrolled in Kumon for remedial or extension work – Kumon group

Predictor Variable	Extension	Remedial
BIA Total	115.2	101.8
Locus of Control	14.0	14.1
Total Months in Kumon	36.2	27.6
Total Life Challenges	17.0	13.4
Parental Income code	7.6	6.7
Average LAN Change score	0.04	0.03
Average LAN1 Score	0.79	0.69

Independent samples t- tests revealed that only the differences in IQ levels between remedial and extension Kumon students were statistically significant t (33) = -2.59, p = 0.01, d = 0.90.

5.13. Summary

This chapter has provided baseline data for all participants in the study, with regard to many characteristics thought to influence resilience through their relations with particular risk and protective factors. A summary of the participants' exposure to particular risk and protective factors related to educational resilience, including factors that operated at the level of the individual, the family and the school, was also presented. Some of the data presented were used to test Hypothesis H2 (that parents would rate education as more important than children), and this hypothesis was supported. The implications of the results presented in this chapter are discussed in Chapter 6.

6. DISCUSSION OF RESULTS FROM CHAPTER 5

This section addresses the study's first Aim, by providing a discussion of the importance and implications of the results presented in Chapter 5, pertaining to the demographic characteristics, and exposure to risk and protective factors, of all participants in the study. It also discusses implications of the confirmation of Hypothesis H2.

Aim One – To gain a better understanding of the factors and processes affecting the educational resilience of young people in Australia
H2:   Parents and children will have different priorities for education – parents will rate education as more important than children.

6.1. Demographics of the Sample Compared with Population Characteristics

The participants in the study represented a broad range of personal and family characteristics. The distribution of males and females in the study was very close to 1:1, and while the sample was weighted towards middle primary children, there were a sufficient number of older children represented. The proportion of indigenous families in the study was very close to population levels (see Table 6.1). The families in the sample had a higher proportion of traditional two-parent biological families than tends to be seen in the Adelaide population, with concomitantly fewer single-parent, step/blended, co-parenting or adoptive family relationships represented in the group (Australian Bureau of Statistics, 2007a). Most families in the study had three or fewer children living in the home, with one-fifth of participants being only children, but no data were available to compare these family structures at a population level. Nearly 80% of all adults who were involved in the child participant's lives were employed on a part time or full time basis, although data was missing for 4% of respondents. The median income band was $78000-104,999 (a

weekly income range of $1500-2019), substantially higher than the CPI adjusted median income of $1232 reported for the greater metropolitan Adelaide area (see Table 6.1). A related result was that the sample had a smaller proportion of respondents with incomes below the poverty line compared with Adelaide's overall population (see Table 6.1). Figure 8 represents the geographical dispersion of the greater Adelaide metropolitan population.
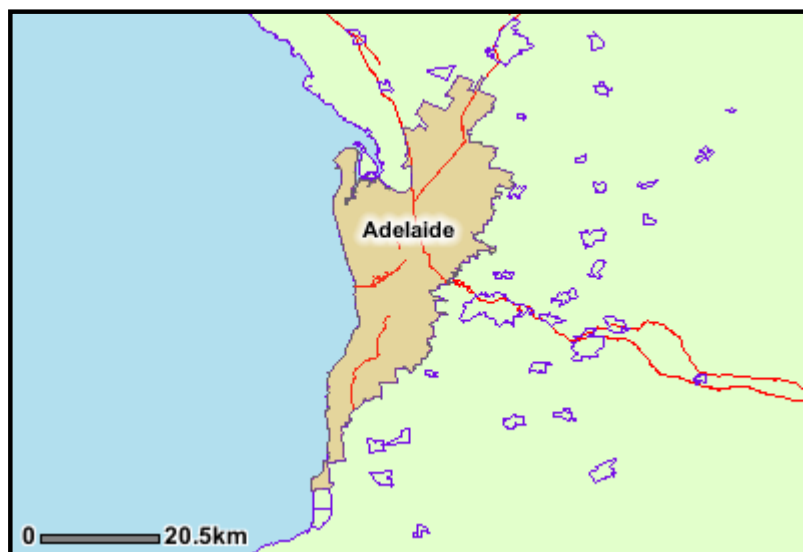
Figure 8. Adelaide – Urban Centre/Locality (Australian Bureau of Statistics, 2007b)

In many ways the sample chosen was broadly representative of the Adelaide population, when compared with 2006 Australian Census data (Australian Bureau of Statistics, 2008). However, the sample group had a substantially higher median weekly income, a much lower proportion of single parent families and families living below the poverty line, and a higher proportion of working women, than did the broader population (see Table 6.1). These differences will have to be considered when drawing implications from the sample, and making recommendations about supporting children's educational resilience.

Table 6.1

Comparisons between current study sample and wider population on selected key demographic indicators.

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┌─────────────────────────────────┐
│             NOTE:               │
│  This table is included on page 205 │
│  of the print copy of the thesis held in │
│  the University of Adelaide Library. │
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*adjusted for inflation to 2009 values, at a rate of 2.8% per annum (Reserve Bank of Australia, 2010)

In the final analysis, a weakness of this study is that participants were sourced from Kumon centres and local schools in a convenience sample, affecting the generalisability of the results. While Kumon students were sourced from across the greater metropolitan area, Control group students predominantly lived in Adelaide's inner Northern suburbs, and it seems likely that the overall sample did not represent the full range of socio-economic sub-groups resident in Adelaide. An ideal version of this study would use census data to recruit a representative sample of families to participate. This issue will be discussed further in Chapter 11.

6.2. Education

From an educational perspective, 9.8% of children in the original Control group sample had previously undertaken additional private academic tuition, a figure that is lower than some population-level estimates of ever receiving academic

tutoring, at 24% in Canada (Davies & Aurini, 2006) and 27% in the UK (Ireson, 2005). However, as the Control group was selected on the basis of never having done additional academic tuition, these figures are not likely to be representative of population levels of additional tuition in South Australia. A recent paper analysing the rate of uptake of private tuition in Australia concluded that spending on private tuition had increased nearly 20% between 1999 and 2004 and comprised 5% of the total average spending on children's education (Watson, 2008), so it is likely that the figure of 9.8% is an under-estimate.

When considering their relationship with their child's school, almost all parents from both Kumon and Control groups endorsed a response in the positive range. It is notable that parents who had chosen additional out-of-school tuition for their child still described their relationship with their child's school in positive terms. However, given that all Control group participants were sourced using a letter sent home to the parents via the school, it's less likely that parents with a poor relationship with their child's school would respond to an invitation to be involved in the study. A small proportion of parents held negative views about their child's progress and experiences at school, but the vast majority of parents reported positive views of their child's progress and experiences at school. Parents who were not satisfied with their child's progress at school were represented in both Kumon and Control groups, suggesting that dissatisfaction with a child's academic progress is not the sole determinant driving people to enrol their children in out-of-school tuition.

Kumon families showed an even stronger pattern of positive responses when considering their relationship with the Kumon supervisor responsible for their child. Likewise, almost all Kumon parents reported high satisfaction with their child's progress in Kumon, and no parents reported dissatisfaction with their child's experiences in Kumon. Given that Kumon is a private provider of academic tutoring, and that families can cease attending Kumon at any time, with little penalty, it is not surprising that the organisation has found ways to provide tutoring services that are

experienced positively by both parents and children. Additionally, a self-selection bias may again have been operating, as parents who are unhappy with their child's Kumon progress or experiences are likely to leave the program, and are thus not available to participate in studies such as this one.

The majority of parents chose to enrol their child in Kumon to improve their mathematics skill (~58%), but parents also selected the program for access to extension materials, as a means of improving their child's confidence or other educational skills, and as a result of dissatisfaction with the mainstream education systems. This variety of motivations for engaging in additional tuition may have reflected differences in family cultural backgrounds and structures.

In general, parents in the study rated education as the third most important value, behind their child's happiness and spending time together as a family, but well ahead of sport, artistic endeavour, informal play time, and volunteer/religious responsibilities. In contrast, children rated family time as most important, followed by their own happiness and then education, albeit at a significantly lower mean ranking than parents. Children also rated volunteer/religious responsibilities as more important than their parents did, and informal play time as substantially less important. These results provided moderate support for Hypothesis H2, demonstrating that while children do recognise education as comparitively important, they don't tend to rate it as highly as their parents do.

6.3. Risk and Protective Factors

A number of different risk factors were considered in the current study, including the child's exposure to stressors and the family's exposure to stressors. Protective factors included school-based protective factors, locus of control, cognitive ability, and mathematics ability.

6.3.1. Risk Factors

The factors analysed in the current study comprised those family risks addressed in the FILE, as well as additional adverse events that children may experience in the course of growing up, captured by the CEAE scale. Adverse events are thought to operate in a cumulative fashion, with an impact that continues into adult life (Felitti, et al., 1998; Flaherty, et al., 2006; Furstenberg, et al., 1999; Kessler, et al., 1997). Experience of multiple adversities can place a child at higher risk of negative experiences thoughout the lifespan, including: academic failure or learning problems (Werner, 1996; Zolotor, et al., 1999); behaviour problems, delinquency or teenaged pregnancy (Werner, 1996); physical or mental health issues in adulthood (Felitti, et al., 1998; Flaherty, et al., 2006; Furstenberg, et al., 1999; Grant, et al., 2003; Kessler, et al., 1997); or other negative life outcomes.

6.3.2. Exposure to Stressors

Participants in the study were exposed to a wide variety of stressors, either in their individual lives, or through the stressors experienced by their whole family. Parents reported their children's experiences of adverse events such as: bullying and illness; exposure to family stressors like poverty, involuntary parental unemployment or divorce; and serious long term dangers like parental alcohol or drug abuse, parental mental health issues, and physical or sexual abuse. Lower level, long-term stressors such as financial strain and family discord were also measured.

The mean number of individual stressors experienced by many child participants was low; however, 41% of participants had experienced one or more of the individual stressors in their lifetime. Bullying, friendship difficulties and health problems were the most commonly reported individual issues. Experiencing family stressors was more common, with almost all families endorsing two or more family stressors over the child's lifetime. In fact, of all respondents, only one family indicated that they had not experienced a single listed stressor on the CEAE or FILE scales.

The average number of child or family stressors experienced over the life of the child was 17, and five families scored over 40 combined child and family stressors. This suggests that most children will experience a stressful life event at some point in their lives, and thus techniques for promoting educational resilience in the face of stressful life events have wide application within South Australia. However, the majority of the stressors selected by participants were "everyday stressors", covering topics like family arguments, pregnancy, job loss, financial strain, divorce, and bereavements. While the FILE did contain items referring to more extreme life events (family legal violations, physical or sexual abuse in the home, alcohol and drug dependence, etc), very few participants endorsed these items. Therefore it seems that for the majority of families surveyed in the study, the family stressors reported fell within the normative range (B. C. Miller & Sollie, 1980), rather than occurring as catastrophic stressors (McCubbin & Figley, 1983).

The rates of some catastrophic stressors in the population were similar to those reported by participants in the study, but others were quite different. With regard to parental drug and alcohol abuse, a survey of substance use indicated that 8.7% of Australian adults met the criteria for ICD-10 alcohol or substance use disorder (Hall, Teesson, Lynskey, & Degenhardt, 1999). The current study found that 7.9% of parents indicated that a member of the family had a problem with alcohol or drugs, a reasonably similar proportion. Likewise, rates of parental mental illness have been estimated at 17% of all parents (Devlin & O'Brien, 1999), although Gopfert, Webster and Seeman (1996) estimate that half of all people with mental health disorders are also parents. The current study found that nearly 32% of respondents reported parental mental health issues. For rates of parental drug and alcohol abuse and mental illness, then, the rates seen in the survey group were similar, or even higher, than the rates seen in the population.

In contrast, the reported rates of child abuse were very different. For population estimates of child abuse, the most recent available figures indicate that

6.9% of children aged 0-16 were subject to substantiated cases of physical, emotional or sexual abuse or neglect in the 2008-2009 financial year (Australian Institute of Health and Welfare, 2010). Furthermore, a recent Australia-wide survey of the rate of childhood sexual abuse at the population level indicated that 4% of males and 12.5% of females reported unwanted, attempted or completed sexual penetration before the age of 16 years (Dunne, Purdie, Cook, Boyle, & Najman, 2003). The rates for unwilling participation in non-penetrative sexual abuse were even higher. Given that only 2.4% of respondents to the current study reported the existence of "physical or sexual abuse, or violence, in the home" over the child's lifetime, it seems that the current study was not representative with regard to the experience of child abuse.

Several factors may lie behind this finding. Firstly, the children in the current study were all aged between 9 and 13, and thus their exposure to risk for child abuse before the age of 16 was not yet concluded – particularly for girls, whose risk of sexual abuse peaks between the ages of 12 and 16 (Hatty & Hatty, 2001). Secondly, there was no question in the FILE relating to an experience of child abuse outside of the home, so it is possible that cases of abuse were under-reported if they were known to occur at a relative's home, or at school. Thirdly, the sample was known to be non-representative of the population in aspects relating to socio-economic status, which may have influenced prevalence rates. Finally, it is possible that parents were comfortable revealing information that related solely to themselves (drug and alcohol abuse, mental health) but chose to deliberately under-report their child's experiences of child abuse, either to protect their child, or themselves. For whatever reason, it seems likely that the current study has not captured the full spectrum of catastrophically challenging life events that might be experienced by children in Australia. Whether this is due to an inadequate sampling frame, or due to response bias, is unknown.

A further bias may perhaps be seen in the fact that parents reported that female participants experienced almost twice the mean level of child-focussed stressors, and 25% more family-based stressors, than did male children. One explanation for this result was simply that female children in this sample experienced a higher number of difficult life events by chance, and the results are more "noise" than "signal". Alternatively, it may be that female children in Australia tend to accumulate a higher number of life stresses than male children. This possibility is not supported by reports from around the world which indicate that young males experience all manner of individual stresses at higher rates than young females, including asthma (Horwood, Fergusson, & Shannon, 1985), being bullied (Archer, 1994), and loneliness (Koenig & Abrams, 1999) (although female children are at much greater risk of childhood sexual abuse than male children (Cutler & Nolen-Hoeksema, 1991; Hatty & Hatty, 2001). Finally, it may be that parental attributions about what constitutes "a stressful experience" vary by the sex of the child for whom a report is being made.

Similar gender-based variations in parental attributions have been found in such areas as the tendencies: to place more blame on male victims of child physical abuse than on female victims (Muller, Caldwell, & Hunter, 1993); to attribute more intentionality to male children with ADHD than female children (Maniadaki, Sonuga-Barke, & Kakouros, 2005); and even to ascribe children's social and academic outcomes to different causes, depending on the gender of the child (Cote & Azar, 1997). Given these differences, it is not impossible to consider that parents' recall and responses regarding their children's experiences of stressors may be affected by the gender of the child about whom they are reporting, with parents of girls recalling and reporting more stressors than parents of boys.

6.3.3. Reporting of Risk Factors

One caution in interpreting these results is the self-reported nature of the data collection methodology, which can often lead to biased responses, including social desirability bias and self-selection bias. Particularly with regard to survey-based research, a raft of research has demonstrated that social desirability bias can lead participants to "deny socially undesirable traits and to claim socially desirable ones, and...say things which place [them] in a favourable light" (Nederhof, 1985, p. 264). This can be problematic when a researcher is attempting to measure items that by definition as "risk factors" are seen as undesirable. It may be that the rates of risk factors reported in the present study are under-representations of true rates of risk occurence, particularly with regard to the catastrophic stressors (McCubbin & Figley, 1983), as respondents minimised or omitted reference to these events. Attempts to reduce the effects of social desirability bias were made in the present study, and included: assurances that all data would remain confidential, with specific assurances that the risk factor data would not be shared with the child's school or Kumon teacher, participant self-administration of the questionnaire (Nederhof, 1985), and provision of an envelope for the participant to seal their responses into once they had completed the CEAE/FILE questionnaires.

It is hoped that these strategies reduced participants' desire to present themselves in a positive light; however, no strategies were available to compare the data that were collected from study participants with the data that was not collected from eligible families that chose not to participate in the study. Self-selection bias, where "members of the target population who do not participate (either because they cannot be located or because they refuse) differ in a systematic way from those who do" (Costigan & Cox, 2001, pp. 706-707), may have resulted in families with particularly difficult histories (and therefore higher risk factor scores) not being included in the sampling frame, or choosing not to participate. In a well-designed double-contact study, Edwards, Anda, Nordenberg, Felitti, Williamson and Wright

(2001) reported that amongst survivors of childhood sexual abuse, non-respondents to a survey about adverse childhood experiences were more likely to report worse outcomes in the areas of depression, family problems, marriage problems and work problems, than respondents. Likewise, Costigan and Cox (2001) found that fathers in families with more risk factors were under-represented in family research. If these results generalise to the current survey, it is possible that families with very difficult past histories and more challenging lives presently are under-represented in the present study, through choosing not to participate.

6.3.4. Protective Factors

In general, participants rated themselves as high in protective factors across all areas considered. Particularly with regard to protective factors operating at school, as measured using the California Health Kids Survey Module B: Resilience (CHKS-B), children's mean responses tracked close to the top quartile on all factors examined. This suggests that across the range of internal and external assets measured (including co-operativeness, self-efficacy, empathy, problem solving, self-awareness, goals, caring relationships, positive school environment, high expectations of adults and meaningful participation), the children in the present study believed that they were generally doing well. Given that many of these factors have been linked to resilient responses to difficult circumstances, this is a positive result for the participants in the current study, as it implies that they have access to resources that promote a resilient orientation to life. However, it is also possible that social desirability responding was seen in this component of the study, or that response set bias led to some participants responding to the questions automatically (Constantine, Benard, & Diaz, 1999). Furthermore, Kruger and Dunning (1999) noted that individuals who are less competent in a particular area tend to overestimate their level of competence, so it may be the case that a proportion of the high responses reflected some children's over-estimates of their own abilities in this area. In contrast

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to the current findings, previous research has indicated that, from about age eight onward, children become their own harshest critics with regard to self-estimates of competence (Eccles, Wigfield, Harold, & Blumenfeld, 1993), so it is unusual that so many children in the 9 to 13 age group rated themselves highly on statements such as "there are many things that I do well" and "I can do most things if I try" from the CHKS-B.

An Australian study linked high scores on the CHKS-B to a school environment characterised by positive adult and peer social networks and a sense of autonomy, concluding that the school environment can make a substantial contribution to the development of children's resilience (Stewart, et al., 2004).

The locus of control scores achieved by participants seemed to favour a tendency towards more internal orientation than might have been expected from the age-appropriate means reported by Nowicki and Strickland (1973), across all grades except for Grade 7. According to previous research, internal scores are associated with a tendency towards higher academic achievement (Findley, 1983; Lynch, et al., 2002), greater resilience to life challenges (Newman, 2002) and greater educational resilience (Borman & Overman, 2004; Floyd, 1997; Martin & Marsh, 2006). The participants in the current study, therefore, may be more advantaged in the resilience stakes due to their more internal locus of control scores. Huebner, Ash and Laughlin (2001) reported that locus of control mediated the relation between negative life events and school satisfaction, with internal locus of control reducing the impact of negative life events on the level of school satisfaction. Gale, Batty and Deary (2008), in a longitudinal study, found that an internal locus of control at age 10 reduced the risk of obesity, overweight, poor self-rated health and psychological distress at age 30. Wang, Kick, Fraser and Burns (1999) found that locus on control predicted educational and occupational attainment even after that effects of parental education and occupation, race and gender were taken into account.

Australian norms reported by Center and Ward (1986) were even more external than the original American norms reported by Nowicki and Strickland (1973), providing no explanation for the generally more internal scores of participants in the current study. One potential explanation is that in both the United States and Australia, 25 years of cultural change regarding the expectations of children's control over their environment have led to an increasingly internal locus of control for many children, analogous to the Flynn effect for IQ scores (Flynn, 1987). While gender differences between males and females were observed in both American and Australian norming samples, the differences between American boys and girls were smaller than those for Australian children at most grade levels tested, with Australian females generally displaying a slightly more external locus of control. Sherman, Higgs and Williams (1997) found gender differences in the locus of control construct among adults, and suggested that locus of control trends observed in the general population may obscure differences between males and females. They found that internality was better related to achievement in males, while in females it had a stronger relation with social adaptation. However, since both of these traits reflect different pathways to resilience, no differences between the genders have been reported in childhood, and no gender differences in locus of control were found in the present study, the relevance of this research to the current study is limited.

The IQ results from all participants tended to cluster around the expected mean of 100, or marginally higher. Higher IQ has been related to both general and educational resilience (Newman, 2002), although Gutman, Sameroff and Cole (2003) found that this effect only operated for "low-risk" children, and that high IQ was not protective against more extreme forms of difficult life experiences. Interestingly, strong reasoning skills are linked with demonstrations of resilience (Martin & Marsh, 2006), and the mean score on a measure of Concept Formation, which taps fluid reasoning ability (*Gf*; Schrank, 2006), was 6 points higher in the sample for this study than the expected value of 100, across all participants (a statistically significant

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difference – $p < 0.01$). Likewise, the overall IQ level for this group was 4 points higher than expected, again, a statistically significant difference ($p < 0.01$). Although for most IQ tests, a difference this small falls within the confidence interval governing decisions about individual scores, the statistical significance of the general trend to higher IQ within this group is nonetheless worth noting. While some individuals in the group may have particularly benefited from the protective effects of high intelligence, as a cohort, the participants as a cohort appeared to derive a small resilience benefit from higher cognitive ability.

When the results of the diagnostic tests of mathematics ability were analysed, it was interesting to note that while 11% of participants scored in the top achievement band for their age, 54% performed in the lowest two age-appropriate score bands. This may indicate a discrepancy between the diagnostic test expectations and the South Australian curriculum, or it may indicate issues in mathematics education in South Australian schools. Adding weight to the latter hypothesis, when South Australian LAN test results in numeracy are compared with national averages, a higher proportion of South Australian students fall below the accepted minimum standard for numeracy than the national average for all grade levels (National Assessment Program, 2009), so it is possible that the South Australian curriculum has not educated students in South Australia to the same level in mathematics as other students nationally.

Relations between protective factors and LAN change scores were partially as expected, with locus of control predicting improvement in LAN scores over time. In contrast, IQ and CHKS-B results were not correlated with improvement in LAN scores. This indicated that locus of control appeared to have the strongest influence on maintenance of LAN scores over time, and thus potentially on resilience. These relations are further explored in Chapters 7 and 8.

6.4. LAN Results

LAN results over time were highly correlated with each other, with significant correlations of .68 across an average of all subtests analysed – this relation was expected, in line with test-retest consistency. Mean scores across all participants were also similar from first to second tests. Interestingly, female participants showed far less improvement from test to test than male participants, although in all areas except numeracy, the mean LAN2 scores of girls were higher than those of boys. This effect was particularly noticeable in the Writing subtests, where on average, males improved by 5% from the first test to the second, while females performed worse by 6%. As males' initial scores were around 13% worse than females', these changes represented an equilibration of writing skills, which was unexpected, as females' advantage on tests of writing ability has been widely reported (Diane F. Halpern & LaMay, 2000). It is possible that the increased burden of life stressors on female participants, as reported earlier in this chapter, adversely influenced the educational achievement of female participants and meant that they did not capitalise on their early advantages as would normally be expected.

The significant positive correlation observed between LAN change scores and length of time studying Kumon suggests that Kumon had a positive effect on academic achievement that was cumulative. This result aligns with previous international research demonstrating the academic improvements experienced by children who undertake Kumon study (Fuller, 1991; Haslam, 2007; McConnochie & Sneath, 2007; McKenna, et al., 2005; Medina, 1989; Oakley, et al., 2003; Oakley, et al., 2005; Thijsse, 2002), but this is the first time that such a result has been demonstrated in Australia.

The results of the second LAN test of numeracy were compared with test of mathematical ability, and a weak correlation between higher scores on the LAN test and better ranks on the maths test was found. This suggests that the Kumon

diagnostic tests are tapping some aspects of the skills measured in the LAN test of numeracy, but that the overlap is imperfect.

6.5. Summary

This chapter provided a discussion of the results with reference to the study's first Aim: to characterise the factors and processes affecting the educational resilience of young people in Australia. Analysis of the study's findings relating to demographic variables, risk factors, and protective factors was provided, and the processes that may have affected the responses of participants were considered. While the participants in this study showed some demographic differences to the overall population of greater Adelaide with regard to income levels, family structure and parental working arrangements, the results of the study are likely to be relevant at least to the educational choices of middle-class families in suburban Adelaide. Generalising the results beyond this segment of the population may not be warranted due to the specific socio-economic characteristics of the sample. Almost all parents in the sample considered their relationship with their child's school in a positive light, and education was seen as an important value by all parents. While 14% of families had undertaken additional academic tuition (besides Kumon), this figure is almost certainly an underestimate of population levels of tuition, as undertaking additional tuition was an exclusion criterion for the study.

Most participants had experienced normative levels of family or individual stressors. Rates of exposure to parental alcohol and drug abuse and parental mental illness were reported at population levels, or higher; rates of exposure to child sexual abuse and family violence reported in the study were much lower than reported rates of incidence in the population. This may have been due to response bias or an inadequate sampling frame. Notably, parents reported that female children had experienced almost twice as many stressors, on average, as male children; replicating previous findings that parents' attributions regarding their children may be

affected by the gender of the child. Further unreliability in the findings may have occurred through social desirability and self-selection bias in the participants' responses. Children's self-rated experience of protective factors was higher than would be expected, while locus of control scores were more internal than expected, both factors predicting a higher degree of resilience for participants. The ability to generalise these results to the broader population may be limited by socio-demographic factors as well as response biases.

LAN1 scores predicted LAN2 scores well for all participants, although unexpected results were seen in the writing subtest, where males' performance improved and females' performance declined over time, until both sexes received similar scores on the LAN2 writing subtest, in contrast to the expected result of females' continued superiority on writing tasks. It is thought to be unlikely that these results would generalise beyond the current sample; if they do, it may indicate a new finding with regard to sex differences in literacy. Tests of mathematical ability were weakly associated with LAN numeracy outcomes, suggesting that some aspects of numeracy were not well-mapped by the tests of mathematical ability used in the present study. Kumon study was associated with higher LAN change scores, suggesting that Kumon study has a direct result on academic achievement. This result echoes international findings for an Australian cohort.

This chapter outlined the prevalence of factors likely to affect the educational resilience of the entire participant group, and by extension, of other South Australian school children from relatively affluent socioeconomic backgrounds. The next chapter addresses similarities and differences between Kumon and Control group participants, with respect to the characteristics and factors outlined in Chapter 5.

7. COMPARISON OF THE CHARACTERISTICS OF KUMON AND CONTROL GROUPS

This chapter presents a comparison of Kumon and Control group participants on the demographic, risk and protective factors described in Chapter 5. In order to effectively test Hypothesis H3 and determine whether Kumon influences educational resilience, it was necessary to compare the two groups to make sure that any differences in outcome were not being driven by systematic differences between the two groups (other than the variable of interest, Kumon). Areas in which the two groups differed substantially are outlined below; non-significant differences are briefly reported.

In this chapter, results are presented regarding whether Kumon and Control groups are systematically different from each other on key demographic variables, including: cultural diversity; family structure; family income level; parental values; parents' relationship with school/Kumon; exposure risk and protective factors; and LAN scores.

7.1. Data Specification

Until now, the full data set had been used to address the hypotheses tested, but for the purposes of valid prediction of educational resilience, a more rigourous specification of the data was required. Therefore, the dataset used throughout Chapter 5 was revised as specified in Appendix E, to yield a final sample size of 106 participants for whom all relevant data were available. As this dataset was to be used for the purposes of multiple regression, it was these participants whose characteristics were compared for systematic differences.

7.2. Non-significant Differences

Kumon and Control groups were not significantly different with regard to the following characteristics:

- Sex balance;

- Student grade;

- Average number of life challenges;

- Average number of protective factors;

- Locus of control scores;

- Overall IQ, Verbal IQ, Conceptual IQ; or

- LAN1 scores for reading, Spelling or Numeracy.

7.3. Demographic Characteristics

Kumon and Control group students were not significantly different with regard to: sex, $\chi^2(1, N = 106) = 1.36$, $p = 0.24$; age, $t(104) = 1.541$, $p = 0.15$; or grade level, $t(104) = 0.649$, $p < 0.52$, of participants (see Table 7.1).

Table 7.1

Demographic characteristics of participants, by source – revised sample

Cultural Background (N = 106)	Kumon %	Control %	Overall %
% Female	55.0	56.1	55.7
$\overline{X}$ Age (months)	110	111	110
$\overline{X}$ Grade	5.3	5.0	5.1

7.4. Cultural Background

The Kumon sample comprised a more diverse group than the Control group. Only 37.5% of Kumon families nominated as Anglo-Australian, compared with 68.2% of the Control group (See Table 7.2). Asian families comprised 30.0% of the Kumon sample, and only 18.9% of the Control group respondents. There were no Aboriginal-Australian children in the Kumon group, but 3.0% of families from the Control group identified as Indigenous. Overall, Kumon families came from 13 different cultural backgrounds, while Control group families came from 12 backgrounds. When the cultural backgrounds were collapsed to recognise five categories (Aboriginal-Australian, Anglo-Australian, European, Asian and Other; see Table 7.2), the distributions were noticeably different from one another. Kumon children were distributed fairly evenly among Anglo-Australian, Asian and European backgrounds, while the Control group was predominantly Anglo-Australian.

Table 7.2

Cultural background of participants, by source – revised sample

Cultural Background (N = 106)	Kumon %	Control %	Overall %
Aboriginal-Australian	0.0	3.0	1.9
Anglo-Australian	37.5	68.2	56.6
Asian	30.0	12.1	18.9
European	30.0	16.7	21.7
Other	2.5	0.0	0.9

7.5. Family Structure

Around three times as many participants from Control backgrounds were living in single parent households compared to Kumon participants (see Table 7.3).

Table 7.3

Family structure of participant families, by source – revised sample

Family structure (N = 106)	Kumon %	Control %
Single-parent	5.0	15.2
Two-parent	92.5	83.3
Other	2.5	1.5

Kumon participants also tended to come from smaller families than non-Kumon students, with fewer siblings or step-siblings (see Table 7.4). Independent samples t-tests demonstrated that the difference in family size between the groups was significant, t (104) = -2.056, $p < 0.05$, $d = 0.40$.

Table 7.4

Family size of participant families, by source – revised sample

Family structure (N = 106)	Kumon	Control
Total siblings $\bar{X}$	1.03	1.44

7.6. Annual Income

There was some variation in annual income for families that participated in the survey, with noticeable differences between Kumon families, which tended to report higher incomes, and Control group families, which tended to report lower

incomes (See Figure 9). It is notable that none of the families with incomes below the poverty line came from the Kumon participant group.
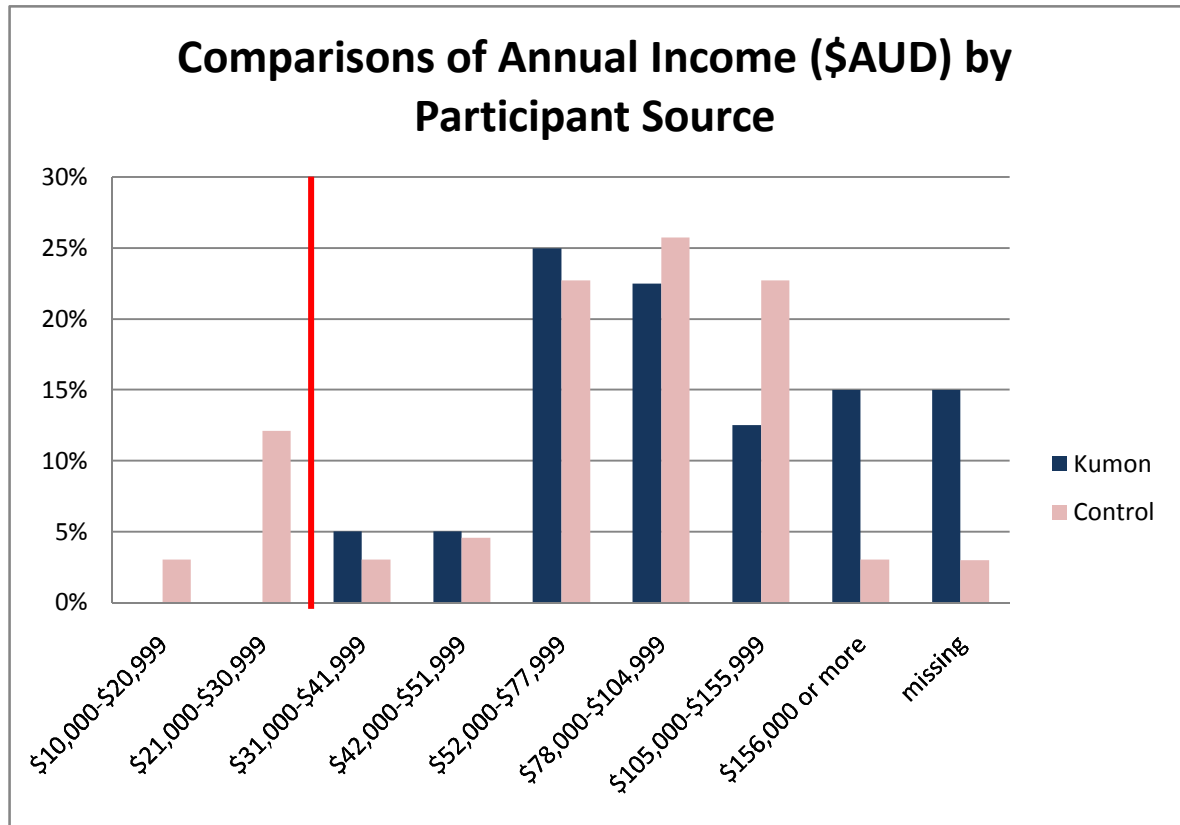
Figure 9. Annual Family Income of participants by source group (N= 106).

*Vertical line indicates the poverty line

Income data were collected in bands, and when the mean income for each group was calculated, there were systematic differences between the groups. Kumon families had higher mean income than families from the Control group (see Table 7.5). In real terms, these differences indicate that the average Kumon family was earning around $10,000 more per annum than the average Control group family.

Table 7.5

Income brackets by family source – revised sample

Source	Income bracket $\bar{X}$	N
Kumon	6.91	34
Control	6.22	64
Missing	-	8
Across all sources	6.46	106

An independent samples t-test revealed that the differences in income levels were very close to significance, t (96) = 1.94, p < 0.06, d = 0.40.

7.7. Education – Values

The value placed on Education varied between parents and children, and by source groups[7]. As described in Chapter 5, parents tended to rank education as more important than children did. Likewise, parents whose children studied under the Kumon method tended to rank education as more important than parents whose children did not study Kumon, and independent samples t-tests showed that this difference was significant t (86) = -2.12, p < 0.05, d = 0.48. However, children in both groups rated Education as comparably important (see Table 7.6).

Table 7.6

Ranking of education value by source and status – revised sample

Family status	Kumon	Control	All participants
Parents	2.45	3.05	2.84
Children	3.38	3.26	3.30

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[7] As described in Chapter 3, data on this question were not available for many adult respondents

7.8. Education – Relationship with School

While most parents endorsed answers which indicated positive opinions about their child's school, there was a tendency for Kumon parents to be slightly less positive in their rankings (see Table 7.7). While parents in both groups showed similar patterns of response regarding their relationship with the school, Kumon parents were more likely to endorse a weakly positive response when considering their level of satisfaction with their child's progress and experiences at school.

Table 7.7

Kumon and Control group parents responses with reference to their child's school – revised sample

Response indicating:	Kumon	Control
Non-existent relationship	0.0	1.5
Average relationship	23.7	7.6
Good relationship	44.7	62.1
Excellent relationship	31.6	28.8
Unhappy with child's progress	12.5	10.8
Satisfied with child's progress	50.0	33.8
Happy with child's progress	37.5	55.4
Unhappy with child's experiences	10.0	6.5
Satisfied with child's experiences	47.5	38.7
Happy with child's experiences	42.5	54.8

7.9. Risk Factors

Small differences existed between CEAE levels for Kumon and Control groups (see Table 7.8), but these differences were not significant $t(104) = 1.12$, $p = 0.27$. However, as described in Chapter 5, differences in the CEAE scores of male and female participants in the study were found, with female participants generally

reporting both higher and more variable CEAE scores than males. When these differences were analysed by participant source, it appeared that this difference was predominantly the result of low CEAE scores for male Control group participants (see Table 7.9).

Table 7.8

CEAE scores by source group – revised sample

CEAE	$\bar{X}$	SD
(*N* = 106)		
Kumon	0.68	0.94
Control	0.49	0.79

Table 7.9

Mean scores on the Child Experience of Adverse Events scale, by sex, by source – revised sample

N = 106		N	$\bar{X}$	SD
Overall group	Male	47	0.43	0.65
	Female	59	0.66	0.98
Kumon	Male	18	0.61	0.77
	Female	22	0.73	1.08
Control	Male	29	0.31	0.54
	Female	37	0.62	0.92

It seems the significant difference between CEAE scores of males and females in the overall group was driven by the CEAE scores from Control group participants only, as an independent samples t-test comparing CEAE scores of males and females in the Control group was significant at the 0.10 level, *t* (59.7) = -1.71, *p* <

0.10, *d* = 0.44, while the same test for the Kumon group was not significant, *t* (38) = -0.38, *p* = 0.70. Likewise, the difference in total life challenges between the two groups (see Table 7.10) was not significant *t* (104) = -1.283, *p* = 0.20.

Table 7.10

Total Life Challenge scores by source group – revised sample

Total Life Challenge (N = 106)	$\bar{X}$	SD
Kumon	14.85	9.57
Control	17.92	13.19

Once again, however, when these scores were analysed by sex, a substantial difference was apparent between males and females in the Control group, but not the Kumon group (see Table 7.11). When tested with an independent samples t-test, this difference between Control group male and female participants approached, but did not attain, significance, *t* (64) = -1.875, *p* = 0.07, *d* = 0.47.

Table 7.11

Mean scores on the Total Life Challenge scale, by sex, by source – revised sample

N = 106		N	$\bar{X}$	SD
Overall group	Male	47	14.6	9.03
	Female	59	18.5	13.76
Kumon	Male	18	14.8	8.70
	Female	22	14.9	10.43
Control	Male	29	14.6	9.38
	Female	37	20.6	15.14

7.10. Protective Factors

Participants from all sources tended to have equivalent numbers of resilience factors, as measured by the CHKS-B (see Table 7.12), with the differences between them not significant. For example, independent samples t-tests of the differences in total resilience factors returned the following non-significant result: t (68.2) = -1.618, $p > 0.10$.

Table 7.12

Resilience factors by source – from CHKS-B – revised sample

Source (N = 106)	Internal resilience factors $\bar{X}$	External resilience factors $\bar{X}$	Total resilience factors $\bar{X}$
Kumon	52.2	81.1	133.4
Control	54.7	83.1	137.8
Across all sources	53.8	82.4	136.1

7.10.1. Locus of Control

Independent samples t-tests demonstrated no differences between the locus of control scores of children from the two groups, t (104) = -0.67, $p > 0.50$; see Table 7.13).

Table 7.13

Locus of Control scores by source group – revised sample

LoC (N = 106)	Kumon $\bar{X}$	Control $\bar{X}$	Overall $\bar{X}$
Grade 4	14.8	16.6	16.1
Grade 5	15.1	14.6	14.8
Grade 6	13.2	13.4	13.3
Grade 7	13.0	11.0	12.2

7.10.2. Cognitive Ability

While children from all sources scored above 100 in the verbal and conceptual subtests of the BIA (see Table 7.14), Kumon children scored noticeably higher than children from the Control group in the test of visual matching, a measure of processing speed. Independent samples t-tests demonstrate that these differences were significant at the 0.10 level, t (104) = 1.88, p = 0.06, d = 0.37. Comparisons on all other measures of IQ were not significant.

Table 7.14

Comparisons on BIA subtest scores between source groups – revised sample

BIA scores ($\bar{X}$) (N = 106)	Verbal Comprehension	Concept Formation	Visual Matching	BIA Total
Kumon	102.2	108.3	103.9	107.2
Control group	104.3	106.7	98.5	104.2
Overall	103.5	107.3	100.6	105.3

Although Kumon students achieved higher BIA visual matching scores than Control group students, there was no relation between the length of time studying Kumon, and the BIA visual matching score (r = .05, p < 0.73), as illustrated in Figure 10.

BIA Visual Matching Scores by months in Kumon
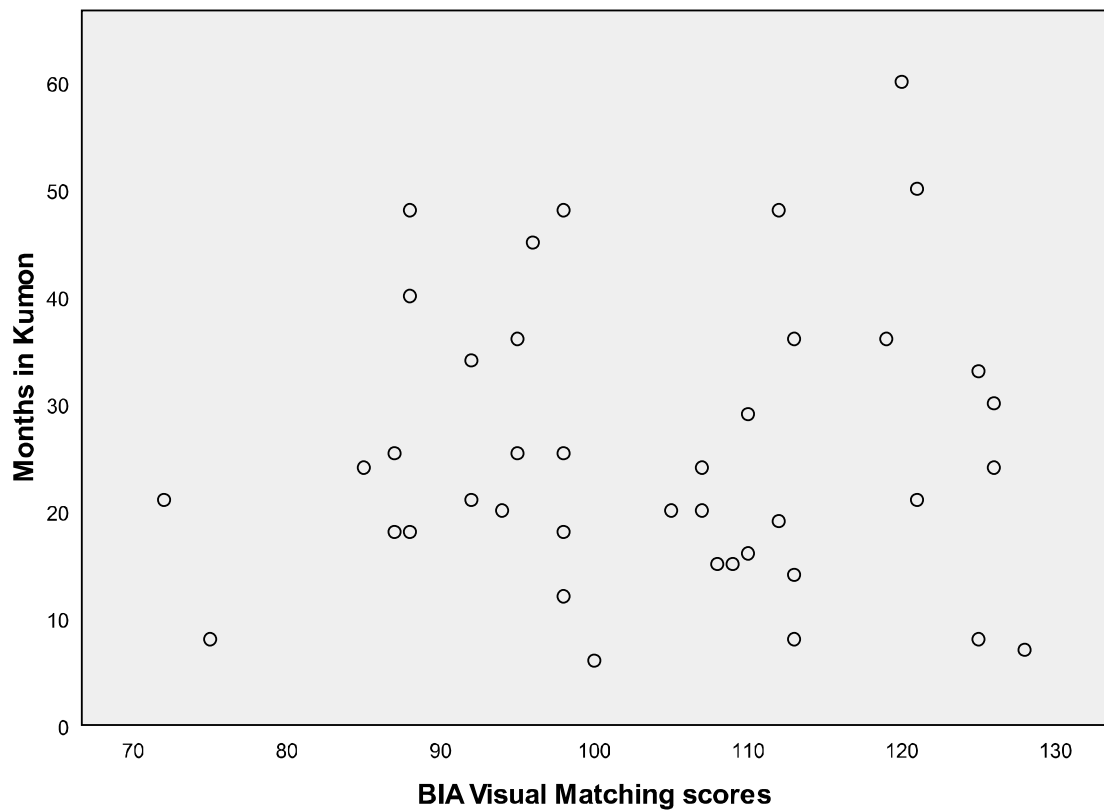
Figure 10. Scatterplot of BIA visual matching scores by months in Kumon

Analysis of the shape of the distributions of the IQ scores shows that the Schools distribution was slightly more peaked than the Kumon distribution (see Figure 11), and both groups had a slight skew towards higher IQ scores. Despite this, both distributions were sufficiently normal to allow them to be used in statistical tests that assumed a normal distribution of scores.
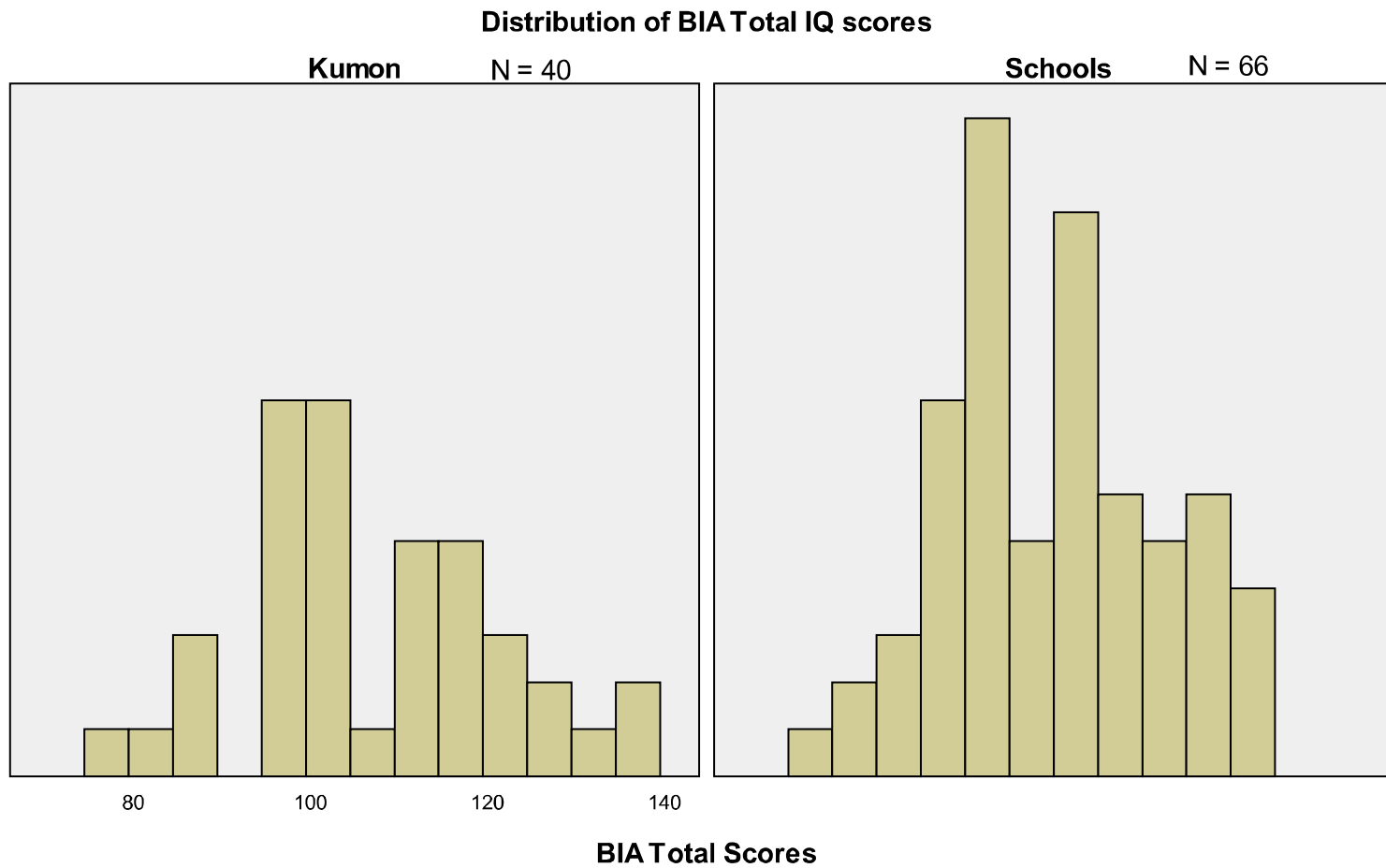
Figure 11. Distribution of Kumon and Control group IQ scores

7.10.3. Mathematics Ability

As described in Chapter 5, when Kumon diagnostic test results were examined across all participants, mean scores revealed a trend of high-to-moderate achievement and faster-than-maximum times. A different picture emerged when the diagnostic test results were analysed by source. Kumon children achieved higher mean percentage accuracy, and completed the tests in a faster time, than did children from the Control group (See Table 7.15).

Table 7.15

Kumon Diagnostic test results (time and accuracy) by participant group – revised sample

Test Level	Kumon $\bar{X}$ Accuracy (%)	Control $\bar{X}$ Accuracy (%)	Kumon $\bar{X}$ Time (min)	Control $\bar{X}$ Time (min)
3	97.95	80.00	4.57	10.16
4	85.45	70.71	10.00	14.47
5	77.75	56.33	9.63	14.33

Independent samples t-tests demonstrated that there was a significant difference between the means of the groups, for both percentage accuracy, t (98.83) = 7.25, p < 0.001, d = 1.46, and time taken to complete the tests, t (60.2) = -9.16, p < 0.001, d = 2.36.

When scaled scores were compared, there was likewise a notable difference between the Kumon and Control groups (see Table 7.16, where 1 is the highest mean scaled score).

Table 7.16

Kumon Diagnostic Test scaled scores by participant group – revised sample

Source	$\bar{X}$ scaled score	SD
Kumon	2.87	1.82
Control	6.06	1.09
Across all sources	4.88	2.09

As would be expected, given that the scaled score was derived from speed and accuracy scores, independent samples t-tests demonstrated that the differences were large and significant, t (54.4) = -11.22, $p < 0.001$, $d = 3.04$.

While there was a weak correlation between Diagnostic Test scaled score and LAN2 numeracy test results when the results were analysed for all participants, comparing the strength of the correlations by participant source was instructive (see Table 7.17). As noted in many other areas throughout this chapter, a moderate correlation across the whole participant sample breaks down to markedly different correlations when Kumon and Control group scores are compared.

Table 7.17

Correlations between diagnostic test results and LAN2 numeracy scores compared by source – revised sample

Group	N	Correlation (r)	Significance (p)
All participants	97	-.30	0.03
Kumon	39	-.69	< 0.01
Control	58	-.30	0.03

This result means that for Kumon students, there existed a much stronger correlation between their measured maths ability and their LAN2 numeracy results, than existed for Control group students.

7.11. Literacy and Numeracy Test Results

The key criterion for educational resilience is the ability to maintain a level of achievement over time, despite the presence of stressful events, environmental conditions or personal vulnerabilities that are known to place students at risk of doing poorly at school. Figure 12 presents Kumon and Control group students' LAN1 and LAN2 results, graphed against each other with a line of best fit. As can clearly be seen, Kumon students' mean maintenance of academic achievement over time was higher than Control group students', even though both groups show comparable exposure to risk and protective factors on average.

When mean LAN results are analysed by subtest and source, there is a weak trend for Kumon students to perform worse than Control group students in their first LAN test and the same or better in their second LAN test (see Table 7.18). However, the majority of the differences in subtest scores between the source groups are not statistically significant, except for the first test of writing, where Kumon students performed significantly worse than Control students (see Table 7.19).

It was notable that by the second writing test, Kumon students were performing on-par with Control students in this area (see Table 7.18), even though the Kumon instruction they received targeted mathematics ability.
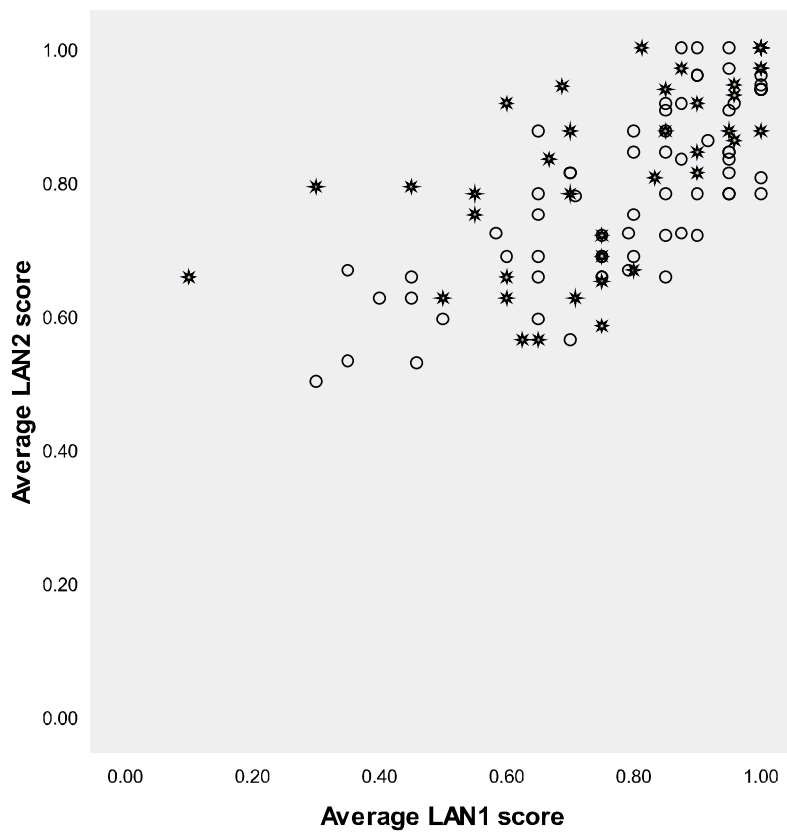
Figure 12. Maintenance of LAN achievement over time: Kumon and Control

participants

Table 7.18

Mean Literacy and Numeracy test results by sub test and test iteration, by source –
revised sample

Sub test	Kumon N	Kumon LAN test $\bar{X}$ (%) (SD)	Control N	Control LAN test $\bar{X}$ (%) (SD)
Numeracy 1	58	68.2 (0.24)	69	73.8 (0.23)
Numeracy 2	46	75.7 (0.19)	76	76.0 (0.16)
Reading 1	57	71.4 (0.27)	69	77.6 (0.21)
Reading 2	46	82.0 (0.15)	76	77.6 (0.16)
Writing 1	58	71.5 (0.28)	69	81.9 (0.23)
Writing 2	46	79.8 (0.20)	76	78.5 (0.16)
Spelling 1	57	76.4 (0.29)	69	79.8 (0.25)
Spelling 2	46	82.4 (0.16)	76	78.0 (0.17)
Valid *N* listwise	42		66	

Table 7.19

t-test results for LAN subtests by participant source, Kumon vs Control group scores

– revised sample

Sub test	*t*	*df*	*p*
Numeracy 1	-1.34	125	0.18
Numeracy 2	-0.09	83.01	0.93
Reading 1	-1.40	103.81	0.16
Reading 2	1.53	120	0.13
Writing 1	-2.32	125	0.02**
Writing 2	0.38	77.24	0.71
Spelling 1	-0.70	124	0.48
Spelling 2	1.40	120	0.16

As outlined in Chapter 5, the first and second scores on all subtests were significantly correlated with each other. However, when these correlations between subset iterations were analysed by participant source, subtle differences were seen, as demonstrated in Table 7.20. For all subtests, the first iteration of the LAN testing is more weakly correlated to the second iteration of the corresponding subtests for Kumon students than for Control students. This suggests that the first LAN score predicts less of the variance in the second LAN score for Kumon students. Across all participants, the first LAN test score predicts 46% of the variance in the second LAN test score. For Kumon participants, LAN1 score predicts 37% of the variance in LAN 2 scores, and for Control group participants, LAN1 score predicts 57% of the variance in LAN2 scores.

Table 7.20

Correlations between subtests on Literacy and numeracy tests, first and second iterations, by participant source – revised sample

Subtest	Kumon	Kumon	Control	Control	All participants	All participants
	r	*p*	*r*	*p*	*r*	*p*
Numeracy	.52**	< 0.01	.76**	< 0.01	.65**	< 0.01
Reading	.50**	< 0.01	.76**	< 0.01	.63**	< 0.01
Writing	.28	0.08	.30*	0.02	.29**	0.03
Spelling	.47**	< 0.01	.77**	< 0.01	.64**	< 0.01
Average all subtests	.61**	< 0.01	.76**	< 0.01	.68**	< 0.01

As described in Chapter 5, LAN Change Scores were calculated by subtracting a student's LAN1 subtest score from their LAN2 subtest score, for all subtests. This meant positive LAN change score indicated improving scores over time. Table 7.21 contains the LAN change scores for participants by source. As can be seen, the mean Kumon change scores were improvements of between 3% and 9%. In contrast, average change scores for Control group students were less consistent, with declines in some tests (on one subtest, by up to 4%), and average improvements in reading and numeracy of 1% and 2% respectively.

A mean LAN change score was calculated to summarise the change shown between tests, by taking the arithmetic mean of each child's four subtest scores. The source group means are shown in Table 7.21. The differences in Average LAN change scores are significant at the 0.05 level when measured using Independent samples t-tests, t (104) = 2.09, p = 0.04, d = 0.41.

Table 7.21

LAN change scores by subtest by source – revised sample

Subtest	Source	N	$\bar{X}$ (%)	SD
Numeracy change score	Kumon	44	4	0.17
	Control	66	2	0.15
Reading change score	Kumon	43	9	0.21
	Control	66	1	0.15
Writing change score	Kumon	44	7	0.28
	Control	66	-4	0.24
Spelling change score	Kumon	43	3	0.22
	Control	66	-1	0.19
Average LAN change score	Kumon	44	6	0.16
	Control	66	0	0.12

As can be seen, the average Kumon student improved by 6% on their second LAN test, while the average Control student did not improve, with a mean difference of 6.2% between the two groups. Proportionally, 41% of Kumon children scored lower on their second LAN test (ranging from 1% to 17% worse), and 59% scored the same or better on their second LAN test (with a range of 0% to 56% improvement). Meanwhile, 55% of Control group children scored lower on their second LAN test (ranging from 1% to 22% worse) and 45% scored the same or better (with a range of 0-32% improvement).

However, analysis of the distributions of the LAN change scores (see Figure 13) suggests that the higher mean scores for the Kumon group are being driven by the dramatic improvements of a smaller group of participants who achieved LAN change score in the 25 – 60% range, and that the larger body of Kumon students achieved change scores similar to those of the Control group.

7.11.1. *Paired Samples Testing*

When a subset of 54 students (27 Kumon and 27 Control) were matched on sex, grade, parental income and cognitive ability, the difference in average LAN change scores was even more pronounced. In this case, the mean Kumon LAN change score was 9% while the mean Control score was -3%. A paired samples t-test of Average LAN Change scores was significant, t (26) = 2.83, $p < 0.01$, with a Cohen's d of 0.82, which is considered large.
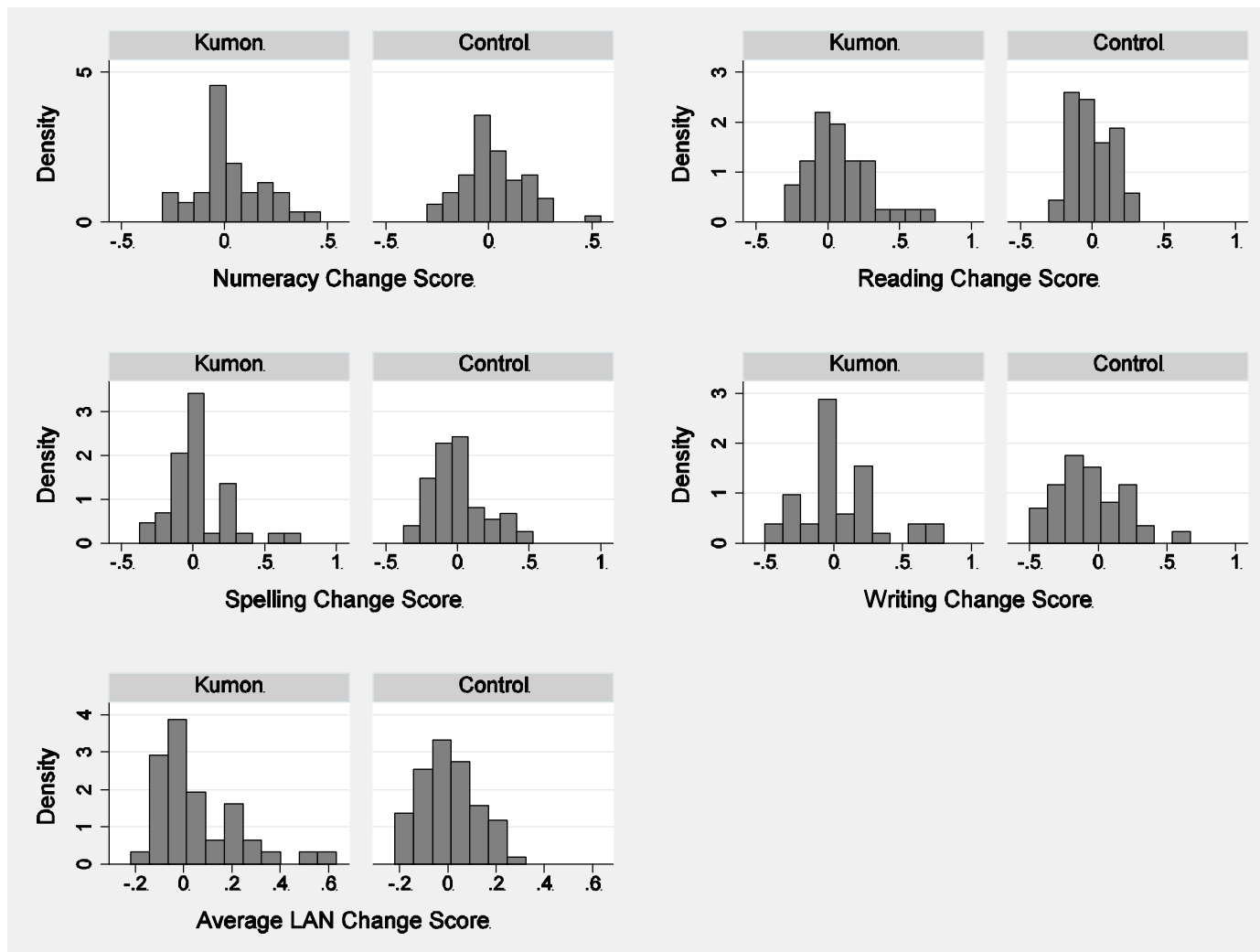
Figure 13. Distributions of LAN change scores for subtests and overall test, by participant source

7.12.   Impact of Sex on LAN Change Scores

As noted in Chapter 5, female participants had lower mean change scores than males, across all LAN subtests. This pattern of higher male improvement also held true when participant source was considered, although Kumon females scored as well on average as Control group males (See Table 7.22).

Table 7.22

Mean LAN Change scores by sex and participant source – revised sample

	Source	N	$\overline{X}$ (%)	SD
Kumon	Male	18	8	0.18
	Female	22	3	0.16
Control	Male	29	3	0.11
	Female	37	-3	0.11

In this case, independent samples t-testing indicated that males and females were not significantly different from one another when participant source was considered, although this may have been an artefact of the smaller group sizes leading to an underpowered test.

7.13.   Summary of Similarities and Differences

Due to the differences between Kumon and Control groups reported throughout this chapter, it seems that the two groups were systematically different from one another with respect to some key risk and protective factors related to resilience. However, the two groups were also similar on many variables.

The results demonstrated that children from the Kumon group were not different from children in the Control group on many of the variables listed in Table

7.23. The two groups had comparable patterns of scores on the individual, microsystem and mesosystem factors of:

- Sex balance, student age and grade

- Average number of life challenges

- Average number of protective factors

- Parents' relationship with school/Kumon

- Overall IQ, Verbal IQ, Conceptual IQ

- Locus of control

Table 7.23

Similarities between Kumon and Control group students – revised sample (N=106)

Area of $\bar{X}$ similarity	Kumon	Control
Female participants as % of total	55.0%	56.1%
Student age (months)	110	111
School grade	5.3	5.0
Parent's feelings about child's school	Positive	Positive
Risk factors – CEAE	0.68	0.49
Risk factors – Total Life Stress	14.85	17.92
Protective factors – CHKS-B	133.4	137.8
Overall IQ	107.2	104.2
Verbal IQ	102.2	104.3
Conceptual IQ	108.3	106.7
Locus of control	14.23	14.81

A number of differences in important individual and microsystem areas were noted between the groups, as summarised in Table 7.24. The Kumon families tended to:

- be more culturally diverse

- have a lower incidence of single-parent families

- have fewer siblings

- have a higher average income

- have parents who ranked education as more important.

Kumon children tended to have:

- a higher visual matching IQ

- a higher maths diagnostic test score

- a lower initial LAN writing score

- a higher average LAN change score.

Table 7.24

Differences between Kumon and Control groups – revised sample (N = 106)

Area of $\bar{X}$ difference	Kumon	Control
Cultural Diversity – % Anglo-Australian	37.5%	68.2%
Family composition – % Single-parent families	5.0%	15.2%
Family size – $\bar{X}$ number of siblings	1.03	1.44
Annual Income band	6.91	6.22
Parental ranking of the importance of education	2.45	3.05
Visual Matching IQ subscale	103.9	98.5
Mathematics Diagnostic Test score	2.87	6.06
Initial LAN Writing subtest	71.5	81.9
Average LAN change score	6%	0%

The differences outlined in the upper seven rows of Table 7.24 may have driven some of the difference observed in LAN change scores. Despite the differences noted, it was considered appropriate to proceed with the analysis of Kumon's effect on educational resilience, since the impact of individual factors was to be explored using multiple regression analyses. Most of the areas of difference noted were already nominated as variables in the planned analyses. Chapter 8 describes the process of creating models that predict educational resilience, while taking these differences into account; most of the areas of difference noted in the present chapter were already planned independent variables in these models. Chapter 9 presents a discussion of the differences between the groups and the potential effects on educational resilience.

7.14.   Summary

This Chapter presented results relating to similarities and differences between Kumon and Control group students, with the aim of determining whether the two groups were systematically different on a range of variables known to affect educational resilience. A substantial number of similarities between the two groups were noted. However, differences were found in several key areas known to affect educational resilience. Kumon children achieved more favourable scores on socio-economic criteria, family composition, cultural background, parental valuing of education, and measures of intellectual and academic abilities. These results are discussed in more detail in Chapter 9. Chapter 8 describes three models that further explore the relation between Kumon, risk and protective factors, and educational resilience factors in children.

8. FACTORS RELATED TO RESILIENCE IN KUMON AND CONTROL GROUPS

The previous chapter described the similarities and differences between the Kumon and Control group students on a range of relevant factors, including intelligence, locus of control, risk factors and protective factors, as well as family composition, mean income and parental beliefs about education. Work presented in this chapter summarises the development of three models assessing the relative contributions of various factors to educational resilience, as measured by the maintenance of LAN achievement over time in the presence of challenging life events. The models will explore whether students who study Kumon achieve superior maintenance of academic achievement than Control group students, when the effects of other factors are controlled for. The model will also investigate whether Kumon study acts to protect academic achievement in the face of difficult life events, and which other factors are associated with educational resilience in this sample. A small number of cases will be examined in more detail, to further explore any protective effect of Kumon. This chapter presents a test of Hypothesis H3: that Kumon children will demonstrate greater educational resilience than Control group children, when factors that are also known to affect resilience are controlled for (including: sex, intelligence, locus of control, and life challenges). It does so by examining a series of regression models with different dependent variables: LAN2 achievement; and high and low maintenance of academic achievement. A third model addressing the timing of adversity and its effect on educational resilience is also presented.

The first model presented uses an interaction term (between Kumon study and adversity) to test whether Kumon study was protective of educational achievement in the face of adversity. One benefit of this method is that is also allows a test of Kumon's impact on academic achievement. The second model uses

maintenance of academic achievement as a dependent variable (called "educational resilience" in this context, given that almost all participants had experienced some level of adversity, as described in Chapter 5) and looked at factors that were associated with high and low resilience. However, this model did not take into account the timing of adversity experienced, and thus a third model was required.

This third model was developed in order to more fully address the relation between the timing of adversity, the length of Kumon study and the outcomes of educational resilience.

Hypothesis H3: Kumon children will demonstrate greater educational resilience than Control group children, when factors that are also known to affect resilience are controlled for (including: sex, intelligence, locus of control, and life challenges).

8.1. Data Specification

As discussed in Chapter 7, for the purposes of valid prediction, the specification of the data for Chapter 8 was more rigorous than that used in Chapter 5. Within Chapter 8, a final sample of 106 participants for whom all relevant data were available was used. According to the calculations presented by Tabchnick and Fidell (Tabachnick & Fidell, 2007, p. 132), the sample size used in this set of analyses allowed for a maximum of 8 predictor variables to be used in the regression model in order to preserve statistical power.

8.2. First Model

8.2.1. Exploratory Multiple Regression

An exploratory Multiple Regression model was constructed encompassing all the factors known to be relevant to educational resilience, as well as any factors seen to differ substantially between the Kumon and Control groups.

This model used LAN2 as the dependent variable, which, with LAN1 as an independent variable and an interaction term addressing the influence of Kumon in the context of adversity, would allow to model to comment on the level of achievement children were able to achieve, when the effects of prior achievement, adversity and Kumon study (as well as other relevant factors) were statistically controlled for. The model required the inclusion of the Kumon/adversity interaction term in order to see whether Kumon had a differential beneficial effect on participants who had experienced adversity.

The factors in the original model are described in Table 8.1; the table indicates whether a factor's inclusion in the model was theory-driven or data-driven.

Table 8.1

Factors in the Exploratory Multiple Regression Model, including interaction terms, and reasons for their inclusion – First Model

Factor	How measured	Factor Name in model	Reason for inclusion
Academic achievement at second point in time	Average LAN2 Score*100 (converted to percentage points)	*Avg_Lan_2_100*	Dependent Variable
Academic achievement at first point in time	Average LAN1 Score*100 (converted to percentage points)	*Avg_Lan_1_100*	Theory-driven – initial test scores known to be strong predictors of second test scores.
Intelligence	Overall BIA score	*BIA_total*	Theory-driven – Cognitive ability known to be a predictor of resilience
Locus of control	Locus of Control score (lower scores are more internal)	*Locus_of_control*	Theory-driven – Locus of control known to be a predictor of resilience
Total Family-based Stressors	FILE score	*FILE_Total*	Theory-driven – life challenges known to be a predictor of resilience
Total child-based stressors	CEAE score	*CEAE_total*	Theory-driven – life challenges known to be a predictor of resilience

Factor	How measured	Factor Name in model	Reason for inclusion
Sex	Male = 1 Female = 2	*Sex*	Theory-driven – sex is known to be a predictor of resilience
Age	Child's age in months	*Total_age_months*	Theory-driven – age known to be a predictor of resilience
Protective factors	Total CHKS score	*CHKS_total*	Theory-driven – protective factors known to be a predictor of resilience
Poverty	Family income below the poverty line Did not experience poverty = 0 Experienced poverty = 1	*Poverty*	Theory-driven – risk factor known to be a predictor of resilience
Cultural Background	Participant-nominated cultural background: Non- Anglo-Australian = 0 Anglo-Australian = 1	*Aussie*	Theory-driven – cultural heritage known to be a predictor of resilience Data-driven – differences in proportional representation of cultural backgrounds between Kumon / Control groups

Factor	How measured	Factor Name in model	Reason for inclusion
Length of time studying Kumon	Total months of Kumon study	*Kumon_total*	Theory-driven – seeking to determine whether Kumon study is a predictor of educational resilience
Family structure	Families with a single parent Single-parent = 1 Two parents = 2	*Two_parents*	Theory-driven – availability of supportive adults known to be a predictor of resilience Data-driven – differences in proportion of one parent families between Kumon/Control groups
Family income	Income bands ranked from 1 (< $10,000 per year) to 9 (> $156,000 per year)	*Income_code*	Theory-driven – socio-economic advantage known to be a predictor of resilience Data-driven – differences in mean income between Kumon / Control groups
Family size	Total number of siblings and step-siblings	*Total_siblings*	Data-driven - differences in number of siblings between Kumon / Control groups
Maths ability	Percentage accuracy on Kumon maths diagnostic test	*DT_percent_accuracy*	Data-driven – differences in maths test scores between Kumon / Control groups

Factor	How measured	Factor Name in model	Reason for inclusion
Tests for interactions			
Interaction between Kumon and Family-based stressors	Inclusion of an interaction term	*Source_2*FILE*	Theory-driven – presence of an interaction would demonstrate that Kumon was linked to a difference in children's responses to stress.
Kumon status	Required in the model in order to test for an interaction effect Kumon = 0 Control = 1	*Source_2*	Theory-driven – if an interaction is tested, both terms of the interaction should be included individually. Likewise, since *Length of Time studying Kumon* = 0 for all Control group participants, the model performs better when it is able to account for this using a categorical variable.

The exploratory model provided a significant result ($F_{18,66}$ = 9.08, p < 0.001, *R-squared* = 0.728), but contained many variables which made only marginal contributions to an explanation of change in the dependent variable. This model was refined in successive stages by removing variables which had the least explanatory power and re-running the model, checking for mediating processes, and analysing the *R-squared* change to ensure that no vital contributors were discarded. The order of removal was determined by the size of the correlation at each stage of the model. This process is summarised in Table 8.2.

The final model contained 8 predictors in total, comprising 6 theory-driven predictors (LAN1 Score, Intelligence, Locus of Control, Sex, Family-based Stressors and Months in Kumon) and 1 data-driven predictor (Cultural background). An additional dummy variable denoting Kumon status was maintained in the model even after the relevant interaction term was removed, as removal of the dummy variable caused substantial decrease in the explanatory power of the length of Kumon study. Tests for multicollinearity were performed and a table of correlations between the variables used in the model is provided at Appendix H (see Table H1).

Table 8.2

Refining the first multiple regression model predicting LAN2 score, including predictor variables, interaction terms & R-squared change.

Model	Exploratory model	Model 2	Model 3	Final model
Predictor variables	LAN1 Score	LAN1 Score	LAN1 Score	LAN1 Score
	Intelligence	Intelligence	Intelligence	Intelligence
	Locus of control	Locus of control	Locus of control	Locus of control
	Family-based Stressors	Family-based Stressors	Family-based Stressors	Family-based Stressors
	Child-based stressors	Child-based stressors		
	Sex	Sex	Sex	Sex
	Age	Age	Age	
	Protective factors	Protective factors		
	Poverty			
	Months in Kumon	Months in Kumon	Months in Kumon	Months in Kumon
	Family structure			
	Family income			
	Family size	Family size		

Model	Exploratory model	Model 2	Model 3	Final model
	Maths ability			
	Cultural background	Cultural background	Cultural background	Cultural background
	Parent values - education	Parent values - education		
Tests for interactions	Family-based Stressors * Kumon status Kumon status	Kumon status	Kumon status	Kumon status
Resultant *R-squared*	.728	.727	.713	.706

8.2.2. First Multiple Regression Model

Considering all participants for whom full LAN data were available ($N = 106$),

a stepwise Multiple Regression was conducted, and a significant model emerged,

$F_{8,97} = 29.13$, $p < 0.0005$, *R-squared* = 0.706, *Adj. R-squared* = 0.682. Significant

variables are shown in Table 8.3. This model accounts for 68.2% of the variance in

LAN2 scores, with an extremely large effect Size ($f^2 = 2.40$).

Table 8.3

Predictor Variables in a Stepwise Multiple Regression on LAN2 scores

Predictor Variable	b	SE b	β	p
Model constant	38.9	8.408	-	-
LAN1 Score	.325	.049	.468	$p < 0.01$
BIA total	.289	.076	.281	$p < 0.01$
Locus of Control	-.779	.183	-.251	$p < 0.01$
Total months in Kumon	.215	.094	.240	$p = 0.03$
Cultural Background	-3.192	1.583	-.119	$p = 0.05$
Sex	-2.97	1.526	-.111	$p = 0.06$
FILE Total	-.125	0.066	-.110	$p = 0.06$
Kumon status	4.197	2.821	.153	$p = 0.14$

The following factors were associated with higher LAN2 scores. When the

influence of the other factors was eliminated:

- Initial LAN scores made a highly significant contribution to LAN2 scores, as

  expected. The *b* values reported in Table 8.3 indicated that a LAN1 score that

  was higher by 1 point predicted a 3 point increase in LAN2 scores. This factor

  was included in the model to control for the influence of initial scores on the

  second test.

- Higher IQ predicted better LAN2 scores, even after the initial LAN score was taken into account. The *b* values shown in Table 8.3 mean that difference in IQ of 10 points was associated with a LAN2 score that was 3 percentage points higher, suggesting that the benefits of IQ are compounding throughout primary education.

- Having an internal locus of control was associated with higher LAN2 scores – with a *b* value of -.779 (see Table 8.3), each point more internal on the Locus of Control scale was associated with approximately 1 percentage point improvement on the LAN2 test.

- Time studying Kumon was associated with higher LAN2 scores, over and above the other variables reported. The reported *b* values (see Table 8.3) indicated that every five months of Kumon study was associated with a 1 percentage point increase in LAN2 score when the influence of all other variables was taken into account.

- Kumon status was not a significant predictor of LAN2 results once the length of time studying Kumon had been taken into account (see Table 8.3). However, this variable was retained in the model to control for the fact that all Control group participants entered the model with a value of zero for time spent studying Kumon. Without the inclusion of a categorical variable to account for this issue, the predictive ability of the length of time spent studying Kumon was reduced. Interestingly, the direction of the relation between Kumon status and LAN2 achievement was opposite to what was expected: once all other factors were taken into account, Control group children tended to score 4 percentage points higher on their LAN2 tests (see Table 8.3), on average, than Kumon children. This difference did not, however, achieve significance (*p* = 0.14; see Table 8.3).

- Cultural Background was associated with LAN2 scores, in that children whose families identified as having a cultural identity other than Anglo-Australian tended to achieve higher LAN2 scores. The reported *b* values (see Table 8.3) indicated that children whose families that identified as Anglo-Australian scored an average of 3 percentage points lower on LAN2 tests.

- Sex was related to LAN2 scores, as interpretation of the *b* values reported in Table 8.3 indicate that males in the current participant group tended to get LAN2 scores that were on average 3 percentage points higher than females, when the effects of the other factors in the model were held steady. This was unexpected, as most trends for primary level mathematics achievement generally show male and female students performing at similar levels (Lachance, 2006; Fennema, 1978). This relation approached significance but was not significant at the 0.05 level (see Table 8.3).

- Cumulative family stress was negatively related to LAN2 scores. The reported *b* values demonstrate that that an increase in FILE score of eight points (reflecting eight additional family stressors) results in a LAN2 score decrease of 1 percentage point. This relation approached significance but was not significant at the 0.05 level (see Table 8.3).

For children in the present study, the following factors were significantly associated with higher LAN2 scores – higher IQ, internal locus of control, non-Anglo-Australian heritage and a longer period of Kumon study. In contrast, students with lower IQ or external locus of control, Anglo-Australian children and students who studied Kumon for a shorter period of time were more likely to show lower LAN2 scores (see Figure 14). When these factors are taken into account, the regression model explains 23% more of the variance in LAN2 score than does consideration of LAN1 test scores alone (see Figure 14).
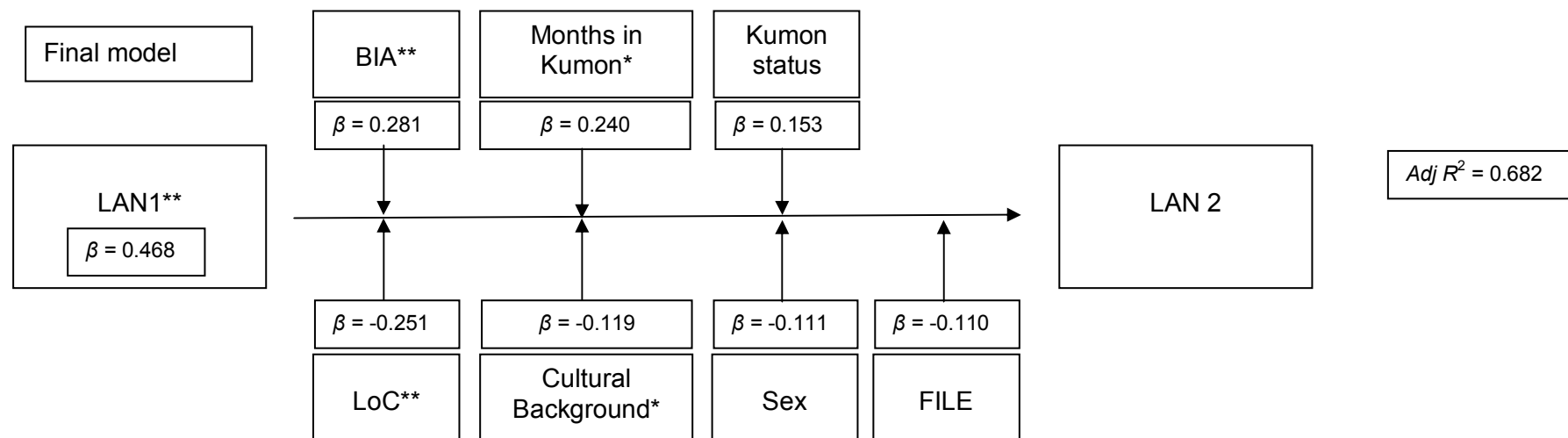
Figure 14. Relationship between LAN1 score and LAN2 score, as influenced by key variables.

* - significant at the 0.05 level   ** - significant at the 0.01 level

The interaction term added to the initial stages of the model to test whether Kumon study conferred a protective effect in the face of life challenges was removed from the model as it did not contribute strongly to the model outcome. The model as it stands suggests that when additional factors are taken into account, Kumon study does not measurably improve educational resilience by protecting participants from the impact of negative life events on their academic results.

8.2.3. *Influence of Sex on LAN Test Outcomes*

The influence of sex on the model outcomes was surprising, since current research indicates that girls and boys tend to perform at similar levels on measures of mathematical achievement in primary school (Fennema & Sherman, 1978; Lachance & Mazzocco, 2006). To investigate this further, an analysis of male and female LAN test scores was conducted (see Table 8.4). Statistical analyses demonstrated that neither the average LAN1 scores between the two genders*, t* $(104) = -1.14$, *p* $= 0.26$, nor the average LAN2 scores*, t* $(104) = 0.321$, *p* $= 0.75$, were significantly different, and even the differences between Average LAN change scores of the two genders only approached significance*, t* $(104) = 1.90$, *p* $= 0.06$, *d* $= 0.37$, outside of the model. However, as demonstrated in Table 8.4, the female participants clearly had a higher mean performance to start with, while male participants improved from a lower baseline to achieve equal performance with females by the second test. It seems that the influence of sex on LAN outcomes is most apparent when other factors, such as life challenge, locus of control, cognitive ability, cultural background and access to Kumon study, are accounted for.

Table 8.4

Mean LAN1 and LAN Change scores by sex

Group (N = 106)	N	LAN1 score $\bar{X}$ (%)	LAN2 score $\bar{X}$ (%)	Average LAN Change score $\bar{X}$ (%)
Male	47	75.5	80.1	4.6
Female	59	79.8	79.3	-0.5

8.2.4. *Summary of First Model Outcomes*

While the first model allowed us to explore interactions between educational achievement and protective factors, it was not possible to test H3 using this model due to the eradication of the interaction term during exploratory modelling. With the interaction term deleted, it was not possible to determine whether the impact of Kumon study was beneficial specifically in the context of adversity; therefore this model could not comment on the relation between Kumon study and educational resilience. However, this model did provide clear evidence of the influence of Kumon on academic achievement, which was a new finding in the Australian context.

8.3. *Second Model*

Using the method described in Chapter 3, as adapted from Kim-Cohen and colleagues (2004), a measure of maintenance of educational achievement was developed by assessing educational achievement at two points in time. The results of LAN2 tests were regressed on the results of LAN1 tests, and the deviation of standardised residuals was noted. Children whose residuals fell in the top and bottom 25% of the distribution were classified as "resilient" or "vulnerable" respectively.

Table 8.5 provides descriptive statistics for these residuals and Figure 15 demonstrates the broad normality of the distribution.

Table 8.5

Descriptive statistics for residuals of LAN1 on LAN2

Statistic	Value
Mean	-.0001
Median	.1065
SD	.99518
Minimum	-2.02
Maximum	2.24

Standardised residuals from the regression of LAN1 on LAN2
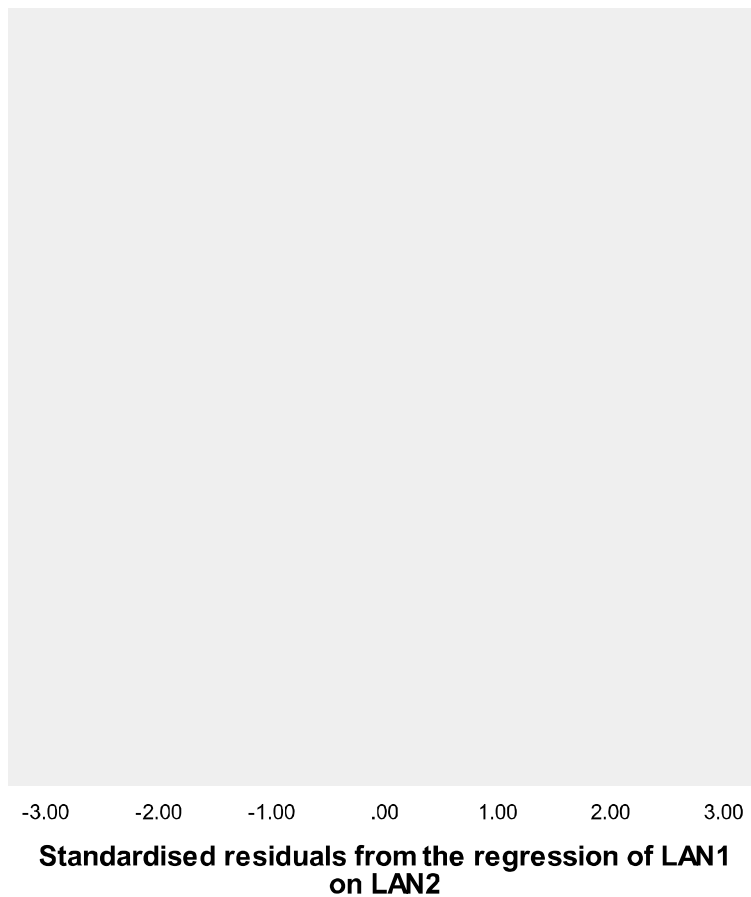
Figure 15. Histogram of Standardised Residuals from regression of LAN1 on LAN2

Figure 16 illustrates the calculation of the residuals; the line of best fit indicates the ideal or expected performance of all participants, and the distance of each point from this line indicates how well each participant exceeded, or fell below,

this expectation. Points above the line reflect participants whose score on their second LAN test improved more on their initial score, compared to all participants (maintaining academic achievement); points below the line reflect participants whose score on the second LAN test fell further short of their initial score, compared to all participants (failing to maintain academic achievement). The further the dot from the line, the greater the improvement or the failure.
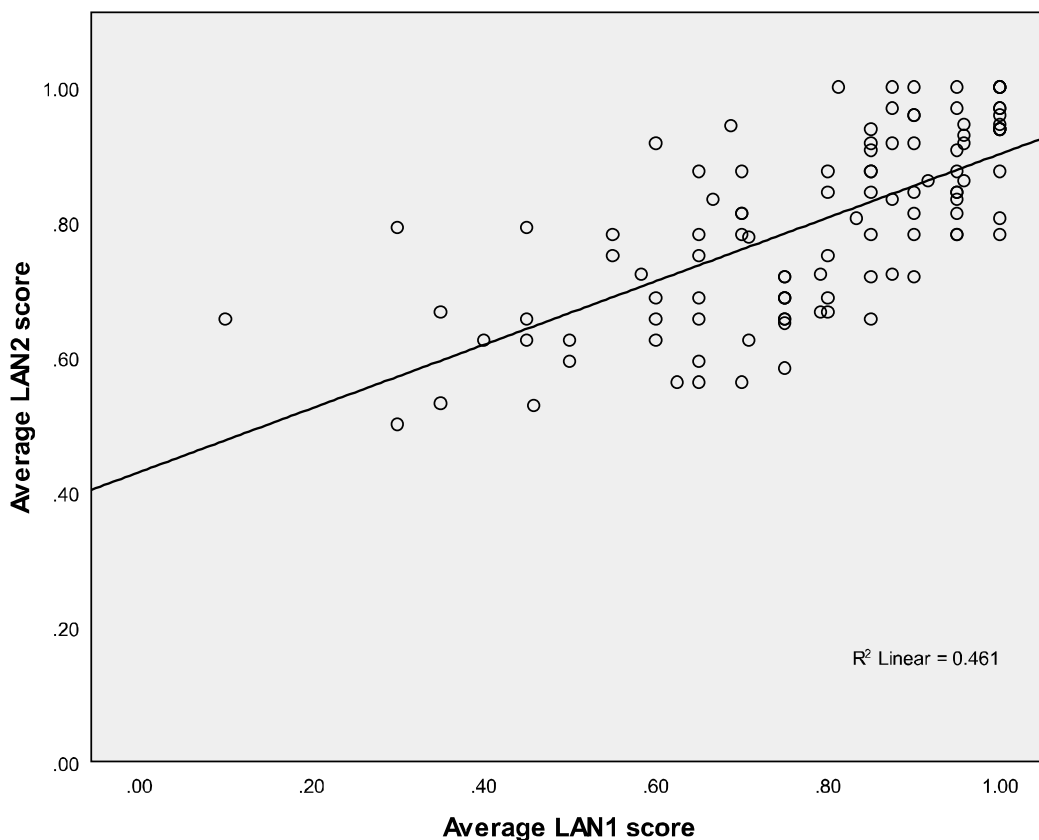
Figure 16. A scatterplot of Average LAN1 and Average LAN2 scores, with line of best fit indicating the point from which residuals were calculated.

The participant sample for this study was a relatively privileged group of children, with few respondents receiving high scores on measures of risk. While almost every member of the sample had experienced at least one challenging life event, this simply demonstrates that experience of some degree of adversity is typical within the general population. Therefore, this model can be demonstrated to

reflect educational resilience only in a general population. It may not generalise well to a more severely challenged population.

The bottom quartile of this distribution (below -0.8073) were deemed not to have demonstrated educational resilience, based on the fact that their maintenance of academic achievement over time fell well below the average maintenance of academic achievement within the participant group. The top quartile of this distribution (above 0.7058) were deemed to have demonstrated educational resilience, based on the fact that their maintenance of academic achievement over time lay well above the average maintenance of academic achievement within the participant group. Using this method, 26 students were categorised as "not having shown a resilient response" and 26 were categorised as "having shown a resilient response".

When multiple regression was used to predict the factors which best contributed to students demonstrating a resilient response (using the same variables and process as outlined in Table 8.2), the following significant model emerged, $F_{5,100}$ = 7.21, $p < 0.01$, *R-squared* = 0.265, *Adj. R-squared* = 0.228. Significant variables are shown in Table 8.6. This model accounts for 22.8% of the variance in demonstration of a resilient response, with a large effect size, f^2 = 0.36.

Table 8.6

Predictor Variables in a Stepwise Multiple Regression on high positive residuals of a regression of LAN1 scores on LAN2 scores.

Predictor Variable	b	$SE\ b$	β	p
Model constant			-	-
Locus of Control	-0.026	0.009	-0.255	$p < 0.01$
Total months in Kumon	0.009	0.003	0.317	$p < 0.01$

Likewise, multiple regression was used to predict the factors which best contributed to students demonstrating a non-resilient response (again, using the same variables and process as outlined in Table 8.2), and a significant model emerged, $F_{3,102} = 8.21$, $p < 0.01$, *R-squared* = 0.194, *Adj. R-squared* = 0.171. Significant variables are shown in Table 8.7. This model accounts for 17.1% of the variance in not demonstrating a resilient response, with a medium effect size ($f^2 = 0.21$).

Table 8.7

Predictor Variables in a Stepwise Multiple Regression on high negative residuals of a regression of LAN1 scores on LAN2 scores.

Predictor Variable	*b*	*SE b*	*β*	*p*
Model constant			-	-
BIA	-0.006	0.003	-0.170	*p* = 0.08
Locus of Control	0.021	0.009	0.206	*p* = 0.03
Total siblings	0.124	0.038	0.292	*p* = 0.01

The following factors were associated with maintenance of academic achievement. When the influence of the other factors was eliminated:

- Internal locus of control was a predictor of high maintenance of academic achievement; participants with a more internal locus of control were more likely to have improved their LAN score on their second test.

- Kumon attendance was also a predictor of maintenance of academic achievement. Attending Kumon had an even stronger effect on the increase in LAN scores between tests than did locus of control.

The following factors were associated with failure to maintain academic achievement. When the influence of the other factors was eliminated:

- Intelligence had a moderate but only marginally significant effect on maintenance of academic achievement, such that participants with lower IQs were more likely to decrease their LAN score between test sessions.

- External locus of control predicted failure to maintain academic achievement; participants with a more external locus of control were more likely to have declined on their second LAN score.

- Number of siblings was also a predictor of failure to maintain academic performance over time. A larger number of siblings predicted decreased LAN2 performance from a similar baseline.

For children in the present study, the analysis suggests that Kumon positively influences educational resilience, as it was associated with improved academic achievement over time for children who had experienced a negative life event. However, to precisely address the relation between Kumon and educational resilience, it was necessary to take into account the effect of the *timing* of negative life experiences on children's academic achievement.

8.4. Timelines of Resilience

The multiple regression models presented described the relation between risk and protective factors, and academic outcomes, over time. They predicted current and maintained academic achievement using a combination of prior academic achievement, intelligence, locus of control, and length of Kumon study. In predicting current academic achievement, one model also considered the impact of sex, cultural background and negative life events.

Any model purporting to measure educational resilience must present data demonstrating that a challenging life event has not had the predicted negative effect on academic outcomes that would be expected. However, the models described earlier in this chapter did not take into account the temporal relation between academic success and negative life events – while there was a weak relation between life challenges and lowered academic success overall, the models did not take into account the timing of these challenges in each child's life. As timing is critical in the determination of resilience, the model as it stands cannot claim to measure educational resilience. In order to assess the impact of timing on educational outcomes, participants within the study were categorised into one of four types: Early Adversity, Middle Adversity, Late Adversity or No Adversity (see Table 8.8).

Figure 17 outlines the possible timing of events for participants in the study – the lightning bolt represents an experience of adversity. The box representing commencement of Kumon study is faded to represent the fact that it applies only to Kumon participants. Not all participants could be used to measure resilience. Participants in the Late Adversity and No Adversity conditions were excluded: a child experiencing No Adversity cannot demonstrate resilience, as there is no adversity to overcome; and Late Adversity occurs after the second measurement is taken, so even if strong maintenance of academic scores was achieved, this could not be called resilience, since the measurements were taken before the experience of adversity.

Table 8.8

Adversity categories for participants, and nature of resilience demonstrated

Category	Description	Resilient response demonstrated
Early Adversity	Child experiences adversity before sitting LAN1 test	By an improvement in LAN2 score compared to LAN1 score
Middle Adversity	Child experiences adversity after sitting LAN1 test but before sitting LAN2 test	By maintenance / improvement in LAN2 score compared to LAN1 score
Late Adversity	Child experiences adversity after sitting LAN2 test	Cannot be demonstrated in this study
No Adversity	Child does not experience adversity	Cannot be demonstrated

For the present study, only participants that experienced Early or Middle Adversity could be considered as potentially able to demonstrate resilience (grey background in Figure 17). An experience of Early Adversity, before the first LAN test measurement is taken, lowers the baseline scores achieved but allows for a measurement of resilience in a recovery from a lowered baseline. Adversity at the middle stage allows participants to demonstrate a resilient maintenance of achievement across LAN tests, while a less-resilient response would be seen as a decrease in the second LAN score. Participants that experienced Late Adversity, or No Adversity, could not be considered to demonstrate educational resilience in a way that could be measured in the present study. Furthermore, to investigate the impact of Kumon on educational resilience, the commencement of Kumon studies must be after an experience of adversity but before the LAN2 test; and ideally should occur after the baseline is established at the time of LAN1 testing.
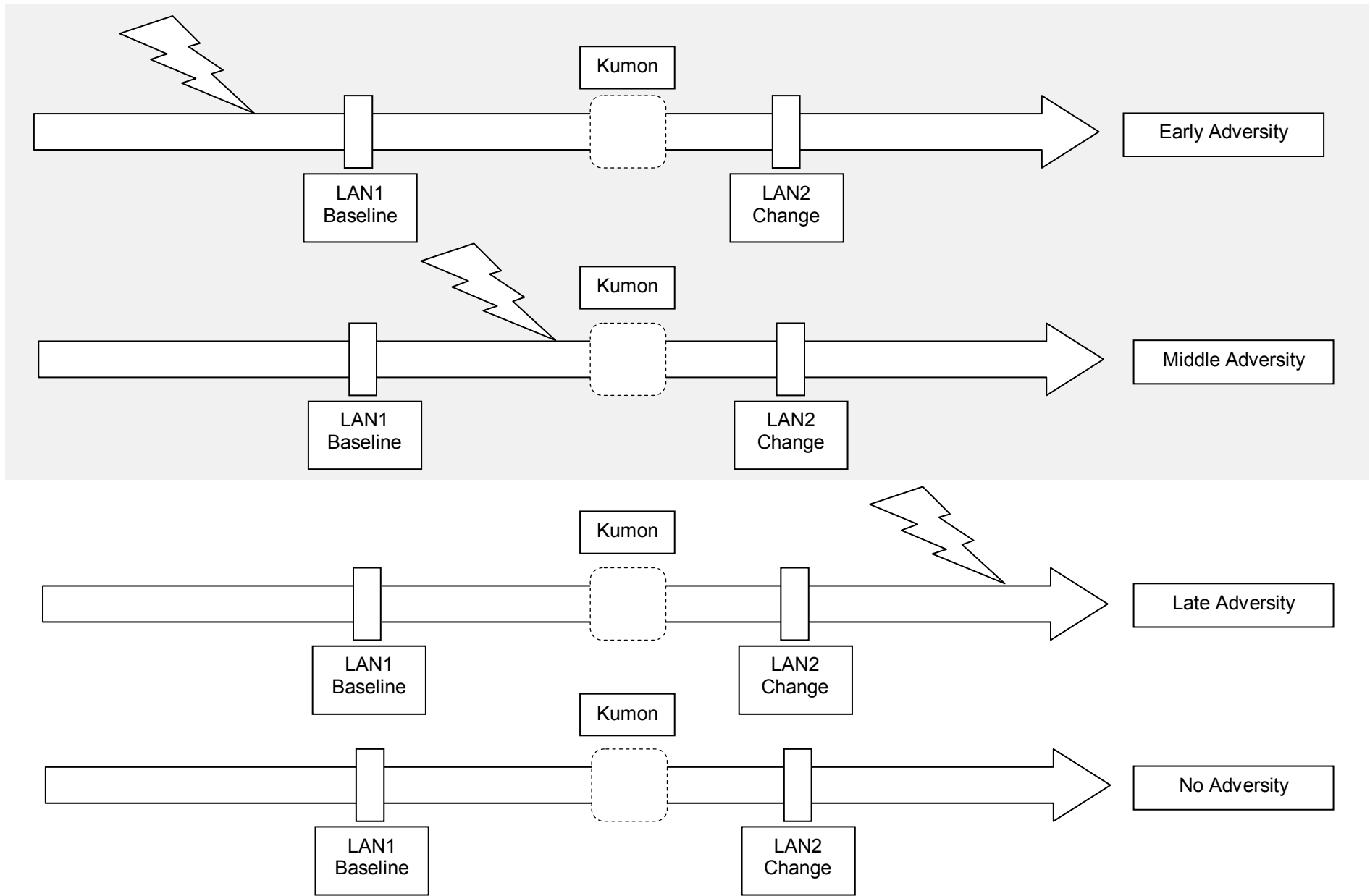
Figure 17. Relationship between timing of adversity, intervention and measurement

For a very limited sample of children ($N = 23$), data were available regarding the approximate age at which they experienced a life challenge. When these data were compared with the age at which a child completed their LAN1 and LAN2 tests, and (in the case of Kumon students) the age at which they commenced Kumon study, 17 participants corresponded with a pattern of Early Adversity, and in the case of the Kumon students, commencing Kumon studies after their LAN1 test and before their LAN2 test. No experiences of Middle Adversity were found in the dataset.

When the test scores were analysed by source for all Early Adversity participants, Kumon participants had lower LAN1scores and obtained higher LAN change scores than the Control participants (see Table 8.9).

Table 8.9

Means of predictor variables by source

Group	Kumon	Control
N	7	10
LAN1 Score $\overline{X}$	0.64	0.72
LAN2 Score $\overline{X}$	0.76	0.76
Average LAN Change score $\overline{X}$	0.14	0.04
FILE	14.9	22.3
Locus of Control	13.9	14.0
Intelligence	103.3	109.3
Months of Kumon	15.3	0.0

Although Kumon participants' adversity scores were lower than Control group adversity scores, the two groups were indistinguishable on locus of control, and the Control group had higher mean IQ scores. When the two groups were compared based on levels of family-based stress (above and below the mean score for the

whole sample), it appears that participants in the Kumon group perform better on LAN2 tests under stressful life conditions (see Figure 18).
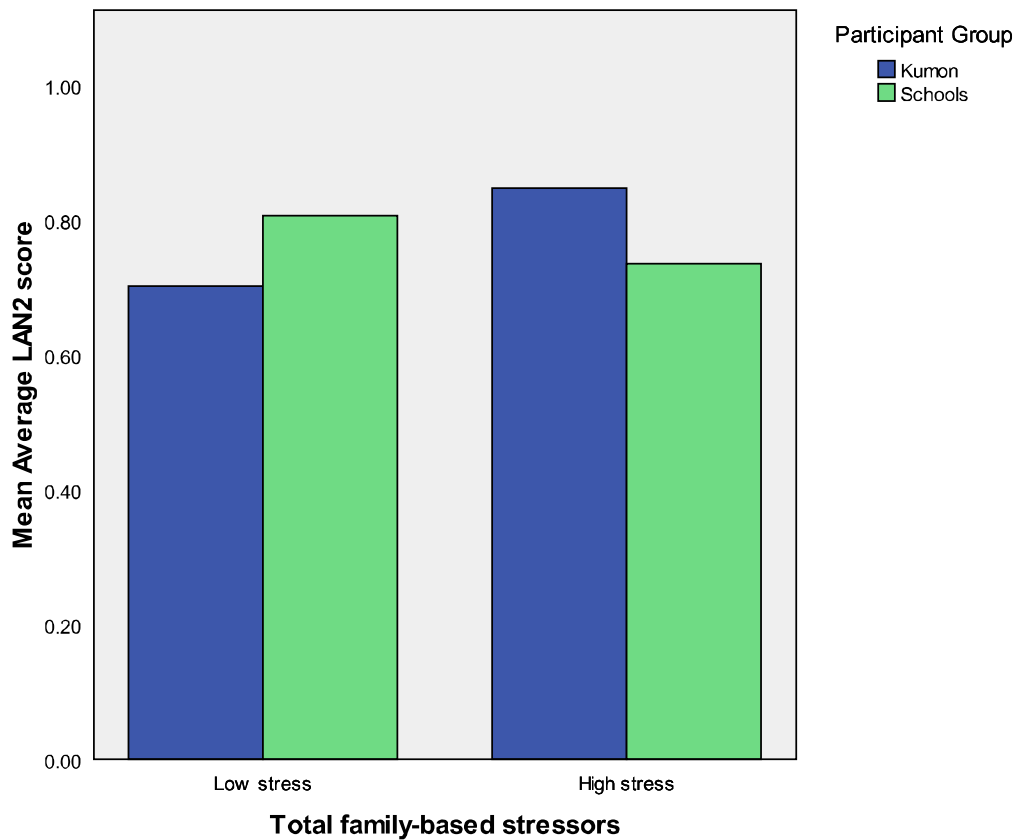
Figure 18. Performance on LAN2 test by stress levels by source

Unfortunately, due to the highly skewed distributions of the variables under consideration and the very small sample size, parametric significance testing was not feasible. This sample was between one-third and one-quarter the size required to have sufficient power to demonstrate a large difference between the groups if one existed – if the effect size was small or even medium, a substantially larger sample would have been required to determine a difference at the 0.05 level (Cohen, 1992).

It is possible to demonstrate, as illustrated in Table 8.9, that the initial LAN test scores of Kumon students in this group were lower than those of the Control participants, and the LAN2 scores identical. Obviously this required that Kumon participants improved their results to a much greater extent than Control group

participants did. Furthermore, as seen in Figure 18, under conditions of high stress, Kumon participants performed better than Control group participants. Analysis with a larger sample would enable statistical testing of this hypothesis to confirm these preliminary findings, if such an effect operates.

8.5. Summary

Work presented in this chapter summarised the development of three models assessing the relative contributions of various factors to educational resilience, as measured by the maintenance of LAN achievement over time, in the presence of challenging life events. The results from the range of models presented in this chapter do not conclusively support Hypothesis H3. The first multiple regression model did not show evidence of a significant interaction between the degree of life challenge and Kumon status. As a result, it did not allow conclusive statement of the impact of Kumon on educational resilience to be made. However, the first model did demonstrate a significant effect of Kumon on educational achievement, the first time this result has been demonstrated in an Australian sample. This model suggested that students who study Kumon achieved greater improvements in their LAN tests over time than Control group students, when the effects of other factors (including cognitive ability, locus of control, cultural background and previous test scores) were controlled for. Each five-month block of Kumon study contributed an increase of 1 percentage point to the final LAN2 score.

The second model demonstrated a link between Kumon and educational resilience and presented evidence that length of Kumon study was significantly associated with educationally resilient responses, along with internal locus of control. External locus of control and greater number of siblings were associated with non-educationally resilient responses. However, the second model did not account for the time at which the adversity was experienced, compared to the time at which Kumon study was undertaken, and the timing of participation in the study.

A smaller-scale analysis of the data available for participants who met the criteria for resilience after adversity suggested that Kumon may have a protective effect on academic achievement in the face of adversity; however, the significance of this effect was unable to be calculated due to the small size of the participant sample. It is possible that further research into this area with a larger sample size would be able to demonstrate a significant relation between Kumon and educational resilience. In summary, this chapter demonstrated that Kumon has an effect on academic achievement, and a potential link to educational resilience. The implications of these results are discussed in detail in the following chapter.

9.   DISCUSSION OF RESULTS FROM CHAPTERS 7 & 8

This section addresses the study's second Aim, by providing a discussion of the importance and implications of the results presented in Chapters 7 and 8, pertaining to comparison between Kumon and Control Group participants in the study, and the impact of Kumon study on educational resilience. It also discusses implications of the partial support these results provided for Hypothesis H3.

Aim Two – To determine whether the Kumon method influences educational resilience in Australian children
H3:   Kumon children will demonstrate greater educational resilience than Control group children, when factors that are also known to affect resilience are controlled for (including: sex, intelligence, locus of control, and life challenges)

9.1. Comparisons between Kumon participants and Control group participants

9.1.1. Non-significant Differences between Kumon and Control Groups

No significant differences were found between the Kumon and Control group participants in: Locus of control scores; Overall IQ, Verbal IQ, Conceptual IQ; LAN1 scores for reading, Spelling or Numeracy; Sex balance, student age and grade; Average number of life challenges; Average number of protective factors; Parents' relationship with school/Kumon.

9.1.2. Significant Differences between Kumon and Control Groups

Within the current study a number of characteristics, including a range of factors associated with increased likelihood of educational resilience (protective factors), were considered. Kumon and Control groups were similar on most characteristics measured; however, as outlined in Table 7.24, there were a number of differences with particular relevance to educational resilience, across individual,

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microsystem and mesosystem levels. Differences in the cultural diversity of the participant groups, in the number of single-parent families, families' mean annual income, and parental opinions on the importance of education, as well as child-specific factors such as visual matching IQ, maths ability and writing ability, may all affect the level of educational resilience participants demonstrated.

Cultural diversity

The Kumon group was more culturally diverse than the Control group, with a far lower proportion of families nominating themselves as Anglo-Australian, and concomitantly higher proportions of families who considered themselves of Asian or European extraction. Participants who claimed Aboriginal-Australian heritage were present only in School Two. This uneven distribution of cultural heritage may have had an impact on the level of educational resilience demonstrated by participants, as immigration from a non-Western country has been linked with educational resilience (see Table 2.2), meaning that Kumon participants may have already been advantaged in this regard.

Family structure

The Kumon group had nearly half the number of single-parent families compared to the Control group. In this regard, the Kumon group is likely to have been expected to show higher overall educational resilience, since belonging to a two-parent family has been shown to boost educational resilience. Coupled with this, the Kumon participants tended to come from families with fewer siblings than Control group participants, which may have provided them with an advantage in securing parental attention and resources to support their educational development when confronted with challenging life circumstances. This may have resulted in a boost in educational resilience compared to Control group participants.

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Annual income

The average annual income for Kumon families was between $10,000 to $20,000 more per year than that of the average Control group family. While income level has not been linked to educational resilience, it is true that a certain proportion of disposable income is a hurdle requirement for providing children with additional academic tuition. Indeed, 50% of Canadian families surveyed noted that they would have hired a private tutor for their child if they could afford to (Davies & Aurini, 2006); it is likely that there is a similar proportion of financially challenged families in Australia who would like to take up additional tutoring, but cannot afford it. Given the links between educational resilience and enjoyment of school, strong reading skills and family support for education, it may be that the differences in annual income between Kumon and Control group families acted as a proxy predictor for educational resilience.

Family support for education

While it was hypothesised that both parents and children involved with Kumon would rate education as more important than their Control group counterparts, this was not found to be the case, as only Kumon parents rated education as significantly more important than Control group parents. Kumon children and Control group children had very similar ratings for education on average. The result was surprising, as it was thought that Kumon students would rate education as more important than their Control group peers, as the expectancy-value model (Eccles & Wigfield, 2002) suggests that attainment value (the importance of doing well at Kumon) and extrinsic value (pleasing parents and supervisor by doing well) factors should align during the long-term study of Kumon to make Kumon a valued activity. However, it is possible that Kumon participants did not generalise from valuing Kumon to valuing education. Additionally, the education item the children ranked was coded "school and studying", so it is possible that they associated this item with school, rather than with Kumon.

Furthermore, when this information was considered in light of the typical family dynamic, where parents decide whether their children will participate in a particular activity, this result made sense: it was the parental valuing of education that was reflected in the child's enrolment in Kumon, rather than the child's desire to participate. The fact that sustained study at Kumon does not seemingly influence a child's valuing of education to be different to that of children who don't study in Kumon was interesting. It may be that the majority of Kumon participants, who had been enrolled due to a deficit in maths skills, started Kumon with a lower valuing of education as a self-protective mechanism, and the parity achieved with other students represented an increase in their own valuing of education over time. However, this proposition could not be tested in the current study and further research would be needed to assess whether this was the case.

With regard to the impact on educational resilience, once again the Kumon group appeared to have an advantage over the Control group participants, due to the level of family support for education.

Child experience of adverse events (CEAE) and family inventory of life events (FILE)

While there were no significant differences between Kumon and Control groups on the CEAE overall, the differences between scores of males and females of the two groups were notable, with males from the Control group showing markedly lower CEAE scores than all other respondents. Further exacerbating the differences, females from the Control group showed markedly higher FILE scores than all other participants. The same potential explanations as advanced in Chapter 6 may apply to these results. However, with regard to the impact on educational resilience, it seems that both male and female children from the Kumon group had adversities to overcome, while the Control group females may have had more negative life experiences than did all other subgroups, and thus had a more challenging degree of adversity to overcome with resilience.

Visual matching IQ

A measure of processing speed, or performance on simple, speeded tasks, Visual Matching scores varied significantly by group membership, with Kumon participants having noticeably higher scores than Control group participants. Given that Kumon study involves daily practice of timed pencil and paper mathematics calculations, it is possible that the Kumon group have increased their processing speed ability as a result. Previous research has demonstrated that training on processing speed tasks can improve processing speed for up to two years post-training (Ball, Edwards, & Ross, 2007), and as developmental changes in processing speed are known to have a relatively consistent pattern (Fry & Hale, 1996; Kail, 2000), it is possible that a side-effect of Kumon study is processing speed ability that is ahead of a child's expected ability for their age. However, while Kumon students had higher processing speed scores on average, there was no correlation between the length of time studying Kumon and the results of the Visual Matching task. This implies that the higher visual matching scores seen in Kumon students were not related to the length of time studying Kumon. As all Kumon participants in the study had completed a minimum of six months of Kumon study before commencing the program, this result leaves open the possibility that the first six months of study under the Kumon system increased the visual processing capacity of Kumon participants in this study by around 8 points on average. It is unknown whether this relation would generalise to the wider population. As developmental improvements in processing speed have been linked to improvements in working memory and fluid intelligence (Fry & Hale, 1996), it is possible that advanced processing speed ability may improve Kumon participants' ability to deal with challenging life situations, thus increasing their level of resilience.

Mathematics ability

When the Kumon mathematics diagnostic test results were compared on the basis of participant group, a clear pattern emerged. Kumon students were both faster and more accurate at the mathematics tests. In some regards, this result was uncontroversial, because this situation reflected a circumstance where Kumon study prepared participants well for performing on a Kumon test, while Control group participants had not had this practice or preparation. Factors such as familiarity with the materials, additional tuition and practice in timed test taking undoubtedly affected the Kumon students' ability to perform better on the tests. However, even with these factors taken into account, the tests provide a relatively straightforward assessment of age-appropriate mathematical tasks, such as single, double and triple-digit addition and subtraction, short and long multiplication sums and (for older children) fractions and decimals (See Appendix B for typical questions from the test); as such, the tests merely reflect maths problems that children in the relevant age bands should be capable of solving. Significant differences in percentage accuracy and time taken to complete the tests reflect real differences in mathematics ability between the two groups. Furthermore, the mean score ranking for Kumon students was significantly higher at 2.97 (where 1 is the highest rank); Control group students had a mean ranking of 6.14 (where 7 is the lowest rank).

When LAN2 numeracy results were correlated with mathematics ability results, the relation between these variables was both stronger and more significant for Kumon students, meaning that the relation between their measured mathematics ability and their LAN performance was clearer than that of Control group participants. One possible interpretation of this result may be that Kumon study allowed the Kumon group participants to reach their potential level of ability, while Control group participants of high potential ability may have been prevented from demonstrating this ability by a lack of automatic calculation ability, poor memory of basic number facts or problematic methodological processes. Once again, as educational resilience is linked with school enjoyment, it may be that the differences in

mathematics ability between Kumon and Control group families operate to influence resilience by making school an environment in which the child experiences success and positive outcomes. Alternatively, it may be that sound basic mathematical abilities, or the provision of additional out-of-school tuition, allow children to recover from any interruptions to their learning at school caused by challenging life experiences.

Writing ability

The one area of difference between the groups, in which Kumon students were not at the advantage, related to the lower LAN1 scores for writing achieved by Kumon students as opposed to Control group students. With an initial mean LAN writing score more than 10 percentage points lower than that of Control group participants, it may be that the higher cultural diversity of the Kumon group meant that there were more families in this group speaking English as a second language. Speaking languages other than English at home has been shown to affect reading ability due to the decreased exposure to English vocabulary, syntax and pronunciation (Carrell & Eisterhold, 1983), and it is likely that similar impacts occur with writing in English as a second language (Fitzgerald, 1993). The Kumon group eventually showed a substantial improvement in their LAN2 results, achieving parity with the Control group, so it is possible that increased exposure to English as the ESL participants grew older had a beneficial impact on writing skills. In any case, as literacy ability has been linked to educational resilience, this was one area where differences between the Kumon and Control groups was not expected to privilege the Kumon participants.

LAN test results

When LAN1 and LAN2 results were graphed against each other, the line of best fit for Kumon students was higher than that for Control group students (see Figure 12, Chapter 7). In other words, the Kumon group tended to show a higher rate

of improvement between tests. However, only LAN1 scores for Writing were significantly different between the two groups. Interestingly, although the Kumon instruction targeted mathematics ability, Kumon participants improved on all LAN2 measures, including reading, writing and spelling. In comparisons between LAN improvement for Kumon and Control group students, Kumon participants made larger improvements in all LAN subtests between test iterations, than Control group participants. The difference between the average improvement in LAN scores for Kumon and Control group participants was significant. The Kumon organisation suggests that students who learn to excel in mathematics also make improvements in literacy and other subjects (Kumon, 2007a). The organisation hypothesises that this effect is the product of several factors: the requirement for reading instructions and number problems on the maths worksheets; the improvements in confidence gained through success in maths generalising to other school tasks; and increased facility in processing printed numerals on paper through daily practice generalising to processing letter shapes. However, this explanation for a generalised improvement in academic achievement following Kumon maths study is currently only speculation.

It is also possible that the Kumon participants' lower average initial LAN1 scores for the writing tasks were the product of a higher proportion of families from non-English speaking backgrounds in this group. Kumon participants may have had less exposure to written English at the time of the first LAN test, but may have caught up with their peers two years later, through the normal processes of schooling rather than through any impact of Kumon study[8].

Further evidence of an impact of Kumon study on academic achievement was seen when the correlations between LAN1 and LAN2 test results were analysed by group. As expected, LAN1 scores strongly predicted LAN2 scores for all participants (with the exception of the writing subtest, which was weakly correlated for Control

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[8] Another possible explanation for this finding is that some students may have studied, or were concurrently studying, Kumon English; as discussed Chapter 3, no information on participants' previous enrolment in this subject was available.

group students and not significantly correlated for Kumon students). Interestingly, however, for Kumon participants, the correlations between LAN1 and LAN2 scores were weaker across all subtests and in aggregate, than were the relations for Control group students. This meant that, for Kumon students, their subsequent performance was influenced by another factor than simply their level of ability – presumably, their Kumon study.

This weaker correlation for Kumon students was also reflected in the higher LAN change scores seen in the Kumon group. These large change scores were the result of Kumon participants' lower initial scores – on average, Kumon study operated to bring participants with lower LAN1 scores up to the level of their Control group peers by the time of the LAN2 test, rather than allowing them to do better on the second test from a similar baseline. However, analysis of individual change scores suggested that the higher average change scores for Kumon participants were being driven by a small group of students who improved greatly (25-60% improvement), with the remainder of the Kumon participants achieving more modest improvements. This result was particularly marked for LAN scores relating to numeracy, and suggests that perhaps Kumon study was most useful for a small proportion of children with unrealised potential to achieve in mathematics, which was developed following sustained Kumon study.

9.1.3. *Impact of Protective Factors and Self-selection Bias*

With regard to most forms of protective factors, the Kumon and Control groups were quite similar. The areas where Kumon students had higher levels of protective factors were LAN2 reading skills, family support for education and Asian cultural background. This may be an artefact of self-selection bias, since the types of families who are likely to enrol their child in an additional educational program are likely to value education, and, as demonstrated in Table 9.1 below, parents who identified as being from an Asian cultural background had the highest mean ranking

of the importance of education. However, Kumon students were more likely to come from two-parent families than Control group students. Once again, perhaps this is a self-selection issue; single parents may be consumed with the requirements to provide and care for their families alone, or have lower family incomes, and thus may not have the time or financial resources to seek outside support for additional tutoring. Control group students had marginally higher levels of self-rated social competence, which may result from having increased exposure to social or sporting activities at the times when Kumon students were studying.

Table 9.1

Mean ranking of educational importance by cultural background

Cultural Background Group	Education ranking $\overline{X}$	SD
Asian	2.21	1.584
Other	2.33	1.528
European	2.65	1.323
Aboriginal-Australian	2.67	.577
Anglo-Australian	3.03	1.235

9.1.4. Summary of Key Differences and Impact on Educational Resilience

The results obtained partially supported the view that Kumon and Control group participants were not significantly different from one another with regard to factors which have been linked to educational resilience. Certainly there were differences in a number of key demographic factors, the implications of which were discussed in this chapter. As indicated in Table 9.2, however, the differences relevant to the prediction of educational resilience were all located at the family level: Kumon families were more likely to rate education as an important value, and have Asian

heritage than Control group families, which predicted increased educational resilience; equally, they were less likely to come from two-parent families than Control group participants, which predicts reduced educational resilience. Other systematic differences between the groups which appeared to favour the Kumon participants (fewer siblings, higher family income, faster processing speed and higher maths ability) have not been demonstrated to affect educational resilience, although the experience of success in a particular domain has been linked to general resilience (Newman, 2002).

The fact that there were some systematic differences between Kumon and Control groups meant that in order to test Hypothesis H3, it was necessary to account for some of the pre-existing differences between Kumon and Control group participants before comparing their level of educational resilience. This was achieved in two ways – through a paired samples comparison, and using multiple regression analysis.

To address some of the differences seen between Kumon and Control group participants, a paired samples test was conducted with a subset of the participant group[9]. Fifty-four participants, half of whom were from the Kumon group, were matched on sex, grade, parental income and IQ score. When LAN change scores for this subset of participants were compared, the size of the difference was even more pronounced. This suggested that it would be fruitful to undertake comparisons which accounted for differences in key variables between the Kumon and Control groups, in order to provide an adequate test of Hypothesis H3.

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[9] A subset of the full group was used as it was not possible to find suitable matches for the entire participant group.

Table 9.2

Factors linked with demonstrations of educational resilience, and participants' levels of protective factors, as measured in the current study, comparing Kumon and Control groups (relevant differences are highlighted)

Relevant Factor	How measured	Measurement details	Respondent results		
The Environment			Overall Sample	Kumon	Control
Support from other non-parental adults	*CHKS B15-20*	Score/24	20.9	20.4	21.2
Opportunities to participate and contribute to the life of the school	*CHKS B12 13 14*	Score/12	9.0	9.0	9.0
The Family			Overall Sample	Kumon	Control
Two-parent family	Family structure measure	% single parent families	13.0%	8.9%	17.6%
Immigrated from non-Western country	Cultural background	% Asian families	18.3%	29.0%	11.8%
Family support for education	Parent rating of education importance	1 = top rank, out of 7	2.80	2.33	3.85

Relevant Factor	How measured	Measurement details	Respondent results		
			Overall Sample	Kumon	Control
The Child					
Female	Sex	% Female	51.2%	51.6	51.0
Socially Competent	*CHKS B1*	Score/5	3.98	3.86	4.05
Internal locus of control	*LOC*	Lower scores = internal	14.53	14.34	14.64
Sense of purpose; goal-direction; goal-setting;	*CHKS B24, 25, 26, 39*	Score/16	13.9	13.8	13.9
Strong reading skills	*LAN2 Reading* results;	Score/100	79.5	82.0	77.6
Strong reasoning skills	*BIA Concept formation* results	100 is average	106.7	106.8	106.6
Good interactions with teacher	*CHKS B6-11*	Score/24	20.4	20.3	20.5
Satisfied at school; enjoys school; engaged at school	*CHKS B2, 3, 5*	Score/15	13.3	13.2	13.3

(Sources: Benard, 1993, 2000; Floyd, 1997; Gonzalez & Padilla, 1997; Luthar, 1991; Masten & Coatsworth, 1998; Nettles, et al., 2000; Padron, et al., 1999; Reyes & Jason, 1993; Spencer, et al., 2005; Werner, 1989; Wright & Masten, 2006)

9.2. Testing the Effect of Kumon on Educational Resilience

In order to test Hypothesis H3: that children who do Kumon will demonstrate greater educational resilience than similar children who do not do Kumon, when factors that are also known to effect resilience are controlled for (including: sex; student age and grade; child intelligence and locus of control; cultural diversity; family structure; family income level; parents' relationship with school/Kumon; average number of risk and protective factors), a series of multiple regression equations were constructed, as described in Chapter 8.

The first model presented used LAN2 scores as the dependent variable for a model containing an interaction term (between Kumon study and adversity) to test whether Kumon study was buffered educational achievement in the context of adversity. The second model included educational resilience as the dependent variable and looked at factors associated with high and low maintenance of academic achievement. The third model more thoroughly addressed the relation between the timing of adversity, the length of Kumon study and the outcomes of educational resilience.

9.2.1. First Multiple Regression Model

Preliminary analysis was completed for all variables known to be relevant to educational resilience, any variables which had proved to differ significantly between the two groups, as well as an interaction factor. From this starting point, the model was revised three times, eliminating any variables which did not appear to contribute substantially to the model's explanatory power.

The first model predicted more than two-thirds of the variance in LAN2 outcome based on initial LAN score, cognitive ability, locus of control, months of Kumon study, cultural background, sex, Family-based negative life events and participant group membership. The latter three variables did not contribute significantly to the model, but their removal from the model led to reduced

explanatory power, so they were retained as suppressor variables (Tabachnick & Fidell, 2007).

This model was constructed to determine whether Kumon improved educational resilience; in other words, was Kumon study protective of educational achievement in the context of adverse life experiences? Unfortunately, with regards to the effect of Kumon on educational resilience, the model offered little support to Hypothesis H3. The interaction term (Family-based stressors*Kumon status), which would have indicated whether Kumon offered protection against stressful life experiences, was eliminated from the model in the first round of development, so this model cannot be said to provide evidence that Kumon study supports educational resilience by protecting participants from the impact of negative life events on their academic results. However, the model as constructed provided support for Kumon's positive impact on academic achievement, and also revealed a number of other interesting findings.

The regression model indicated that Kumon has a weak positive impact on academic achievement, with each five-month block of Kumon study predicting a 1% improvement in LAN scores. Given that the average length of enrolment in Kumon study is between 24 and 28 months (Kumon, 2008; Ukai, 1994), the average improvement in LAN results would be expected to be around 5% after this length of time. Interestingly, the model suggested that when all other factors were taken into account, Control group participants tended to achieve higher LAN2 test scores than Kumon group participants. This may be an effect of the fact that most parents enrolled their children in Kumon due to concerns about their academic achievement, and it may be that without the months of Kumon study undertaken, that these Kumon students would have scored worse on their LAN2 tests.

As expected, initial LAN scores predicted LAN2 scores. In line with the Matthew effect (the idea that advantage and disadvantage cumulate over time, so-named for the bible verse Matthew 13:12 ""To all those who have, more will be

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given, and they will have an abundance"; cited in Shaywitz, et al., 1995, p. 894),

students who scored 1 percentage point higher on their LAN1 tests scored 3

percentage points higher on their LAN2 tests – the advantage indicated by the

marginally higher score at initial testing was capitalised on over the ensuing two

years and resulted in a larger advantage. This effect has been demonstrated in

many areas of academic achievement (Shaywitz, et al., 1995). Interestingly, no

Matthew effect was observed in the direct relation between LAN1 and LAN2 scores.

It was only when the effect of Kumon on the relation between LAN test results was

statistically removed that the Matthew effect was evident (see Table 8.3 in Chapter

5/8). This seems to provide further evidence for the impact of Kumon study on

academic achievement.

The impact of sex on LAN2 outcomes was likewise apparent only when all

other factors in the regression model had been taken into account. The results,

which indicated that male students tend to perform better on their LAN2 tests than

female students, were unexpected inasmuch as previous research generally

suggests that female students have the academic advantage in standardised tests

of verbal ability (D. F. Halpern, 1996; Nowell & Hedges, 1998; Stumpf, 1995), which

comprised three of the four scores used to calculate the Average LAN2 score for all

participants. It may be that the Kumon method of mathematics education has a

differential effectiveness on male compared with female students, or it may be that

by assisting male students who were behind in mathematics to experience success

in a traditionally "male" field, the increase in confidence enhanced performance in all

areas of academic endeavour. The current study does not provide enough

information to make a judgement as to why this result was found.

In order to fully examine the effect of Kumon on academic achievement in

Australia, a longitudinal study of a single cohort of children over time would be

required. Opportunities for future research are discussed further in Chapter 11.

9.2.2. Second Multiple Regression Model

A further test of Hypothesis H3 was undertaken using an adaptation of the method of analysis described by Kim-Cohen and colleagues (2004). A measure of the maintenance of academic achievement was constructed by regressing each student's LAN1 results on their LAN2 results, and the regression residuals were saved. Participants with residuals in the top quartile were deemed to have demonstrated resilient maintenance, while those in the bottom quartile were deemed not to have responded resiliently. Using the same approach as described for the previous multiple regression equation to determine the relevant factors which predicted either a resilient or non-resilient response to life challenges, two models (the "resilient" and "non-resilient" models) were tested. The first, which predicted 22.8% of the variance in the relation between LAN1 and LAN2 scores where a resilient response had been shown, found that internal locus of control and a greater number of months of Kumon attendance both significantly predicted a resilient response. The second, which predicted 17.1% of the variance in the relation between LAN1 and LAN2 scores where a resilient response was not shown, found that external locus of control and a greater number of siblings both significantly predicted a non-resilient response, with lower IQ additionally contributing to the model, albeit non-significantly.

The "resilient" model was the first to provide support for Hypothesis H3, in suggesting that Kumon study predicted a better maintenance of academic results over time, in conjunction with internal locus of control. This implies that all other things being equal, students who demonstrated a resilient response in their maintenance of educational achievement were more likely to study Kumon than not. The "non-resilient" model brought consideration of the impact of family size on educational outcomes, with participants from families with a large number of siblings comparatively disadvantaged in the maintenance of academic achievement, compared to participants from smaller families. This effect may be due to several

reasons. In a larger family, parental time and attention is divided amongst a greater number of children, meaning that individual offspring who are struggling academically may be required to "fend for themselves" with regard to gaining additional academic support and maintaining an optimistic outlook regarding their own academic efficacy.

In a large family, too, financial resources must divided between a larger number of siblings, so even where parents are concerned about the academic achievement of their children, they may not have the financial wherewithal to provide external tuition. In this way, there may be an interaction between the study of Kumon and the size of the family in predicting resilient responses, in that participants from larger families may not have the opportunity to study Kumon, as their parents either cannot afford to pay for additional study for some or all of their children, or cannot spare the time required to attend additional classes and mark extra homework. Findings from the Longitudinal Study of Australian Children support this, indicating that amongst both infants and children, young people from families with 3 or more children do worse on measures of problem outcomes than do those with no or one sibling (Wake, et al., 2008).

While the "resilient" model provided a stronger degree of support for Hypothesis H3, in that Kumon participants were more likely to demonstrate high maintenance of academic achievement over time, the critical factor of experiencing life challenge was not considered in this model, and so once again, it is not possible for the model to provide firm support for the notion that Kumon improves educational resilience. Any program which claims to affect academic resilience must demonstrate that the program has prevented a difficult life experience from negatively affecting academic outcomes, as would typically be expected in the absence of the program. However, the regression model described was not structured to take into account the relation between the timing of negative life events

and academic success. As timing is critical in the determination of resilience, the model as it stands does not effectively measure educational resilience.

9.2.3. Timelines of Adversity

A final test of Hypothesis H3 was provided with the development of a third model. The definition of a series of "adversity groupings", which categorised participants according to the timing of life challenge events, resulted in comparisons between the LAN1 and LAN2 scores of a small group of Early Adversity participants. Educational resilience following Early Adversity was demonstrated by an improved LAN2 score when compared with the initial LAN1 score. Kumon participants had a greater average improvement between their LAN1 and LAN2 scores than did the Control group, and this outcome was particularly noticeable under conditions of higher stress. While the sample size for this group was not large enough to apply significance testing, it is possible a larger study might allow future researchers to investigate this relation more deeply. These results offered the strongest support for Hypothesis H3 seen in this study, although a larger study would be required to conclusively demonstrate whether Kumon has an effect on educational resilience.

9.2.4. Summary of Models

Ultimately, this study provides support for the notion that Kumon study has a positive effect on academic achievement, and on the maintenance of academic achievement over time, albeit with a small effect size. Additionally, there is tentative support for the idea that Kumon study acts as a protective factor promoting educational resilience, buffering children from the expected impacts of difficult life circumstances. It is unknown at this stage whether this effect will be replicated if the research was repeated with a larger sample, and the size and mode of action of the effect are likewise unknown. However, it is likely that if such an effect is seen in a larger group, the effect will operate through one of several channels currently known

to influence educational resilience. As discussed in Chapter 2, these potential modes of operation are as diverse as:

- development of strong reading and/or reasoning skills through completion of Kumon worksheets, leading to reduced propensity to fall behind during challenging times;

- goal-direction through setting goals for daily, monthly and yearly study targets, ensuring that children are familiar with the concept of working hard to achieve an end result, which would be a useful skill in overcoming academic delay;

- family support for education manifested through enrolment in the Kumon program, resulting in parents who are more likely to provide additional support for education if required;

- positive relationship with a non-parental adult (the Kumon supervisor) allowing the child to maintain a positive interaction with one trustworthy adult, even if their parents are the cause of their life stressors;

- Kumon study resulting in success at schoolwork leading to a greater enjoyment and engagement with classwork, giving the child a reduced propensity to fall behind during challenging times;

- completing work correctly resulting in praise and positive interactions with class teacher, allowing the child to maintain a positive interaction with one trustworthy adult, even if their parents are the cause of their life stressors; or

- some synergistic combination of all these factors.

Given that sound reading and reasoning abilities have been linked with educational resilience (see Table 2.2), it may be that the Kumon contribution to educational resilience operates purely through improved academic ability. However,

since the Kumon method appears to influence so many different factors relating to educational resilience, it is likely that it is some cluster of these factors that may result in Kumon study causing an increase in educational resilience. Further investigation of the Kumon method's potential effect on educational resilience is warranted. Confirming the impact of the Kumon study on educational resilience, understanding the effect size and the nature of any such impact, and analysing the mode of operation through which Kumon study affects resilience, will be important to the educational outcomes of the 4 million students currently studying Kumon around the world.

9.3. Summary

This chapter highlighted the similarities and differences between Kumon and Control group participants, with reference to the factors which were relevant to educational resilience. It also addressed the implications of the partial confirmation of the study's main hypotheses, in assessing whether Kumon study was associated with greater educational resilience. The Kumon and Control groups were similar on many of the demographic and protective factors which were measured, but differed significantly with respect to other factors, including cultural diversity, family structure, annual income, and parental rating of the importance of education, as well as in child-specific factors such as visual matching IQ, maths ability and writing ability. Kumon students were comparatively advantaged as regards educational resilience by their cultural backgrounds and parental support for education, compared to the Control group students.

With regard to their lower scores on writing ability, the Kumon participants were predicted to show a decrement in educational resilience compared to the Control group. When the level of improvement from LAN1 to LAN2 was measured, Kumon students showed a greater mean percentage improvement than Control group students, across all domains of reading, writing, spelling and numeracy. While

LAN1 scores predicted LAN2 scores for all students, they explained less of the variance in LAN2 scores for Kumon students, suggesting that something else was influencing the final outcomes for Kumon students – presumably, Kumon study. However, much of the large scale improvement in LAN scores came from a smaller subgroup of the Kumon participants, suggesting that Kumon's effect on academic achievement may be most potent for those students with unrealised mathematics potential. These results did not yet indicate whether Kumon affected educational resilience.

In order to assess the impact of Kumon study on educational resilience in the context of differences between the two groups, a multiple regression analysis was conducted. The final model used initial LAN score, cognitive ability, locus of control, months of Kumon study, cultural background, sex, Family-based negative life events and participant group membership to predict more than 2/3 of the variance in LAN2 outcome. Kumon study had an effect on academic achievement, with five-months of Kumon study associated with a 1% increase in LAN2 scores, but the model did not provide support for the hypothesis that Kumon increased educational resilience. Further models directly investigating the prediction of resilient and non-resilient patterns of response indicated that internal locus of control and Kumon study were associated with resilient patterns of response, while external locus of control and a larger family group were associated with non-resilient patterns of response. However, these models did not take into account the relation between timing of adversity and timing of Kumon study, and as such were not able to demonstrate that the program had supported resilience by preventing adverse effects on academic outcomes following difficult life experiences.

Some support for the educational resilience function of Kumon was provided by analysis of the results of a small subgroup of participants, for whom the timing of adversity and Kumon study was known. When these results were inspected, it was clear that of participants who had experienced adversity, the Kumon subgroup

showed greater improvements in their LAN2 scores than did the Control subgroup. Unfortunately, the sample size was insufficient to enable firm conclusions on the impact of Kumon study on educational resilience, but a larger study may be able to demonstrate conclusively whether Kumon has an effect on educational resilience. Further study is also warranted to investigate the size of any effect, and to determine the mode of operation through which the effect influences educational resilience. Suggestions for structuring future research to address these issues are provided in the concluding chapters. Chapter 10 provides an integration of the study's quantitative and qualitative findings and analyses the implications that can be drawn from the results presented and discussed in Chapters 4-9, while Chapter 11 presents conclusions on the topic of educational resilience in the context of current thinking.

SECTION C

INTEGRATION AND CONCLUSION

Structure of Integration and Conclusion Chapters

The two chapters of Section C provide an integration of the findings of the entire research program, and a conclusion to the thesis. Chapter 10 integrates the findings of the qualitative and quantitative aspects of the current study, and locates the findings within the current literature on resilience, educational resilience, and Kumon. Chapter 11 provides a review of the study's research findings, including consideration of work still to be completed in this area. It presents an analysis of the limitations and strengths of the current study, as well as challenges for research in this field. The findings are examined with reference to implications for educators and policy makers. Future directions in resilience research are examined.

10. INTEGRATION OF RESEARCH RESULTS WITH FINDINGS FROM PREVIOUS RESEARCH

This chapter provides an integration of the qualitative and quantitative components of this study, and compares the findings of the present study to previous research findings in the field of resilience, educational resilience and the impact of Kumon study.

10.1.   Integration of Qualitative and Quantitative results

Many factors known to influence educational resilience in children were raised by parents and children in qualitative interviews done during the research. Children's views about the importance of some factors differed from parent's views, and these differences highlight the ways in which factors can influence children's resilience outcomes in ways that are unexpected or unpredictable to adults.

Some of the differences that existed between Kumon and Control group students, and some of the factors that were found to be relevant to improved academic outcomes, and may be relevant to educational resilience in the current participant group, were also identified by parents and children as relevant to resilience (see Table 10.1 below). Table 10.2 in Section 10.2.3 further summarises the relations between the themes identified in the qualitative research and key factors related to resilience in the literature. However, there are a number of areas that have a distinct impact on children's educational outcomes, with respect to both academic achievement and educational resilience, about which both parents and children appear to be unaware: cultural background, sex, family income and attendance at Kumon. Likewise, there are many areas that parents and children saw as relevant to general resilience that were either not measured in the present study (Behaviour of the child; displayed emotion; opposite of "doing OK"), or were neither systematically different between the groups, nor used in the model explaining academic achievement (Friendship and social interaction). These differences

between the areas perceived as relevant by participants and the outcomes obtained

may be due to several possible issues.

Table 10.1

Integrating the qualitative and quantitative aspects of the research findings

Theme identified in qualitative research as relevant to resilience	Systematically different between Kumon and Control groups	Relevant to increased LAN2 score, and possibly to educational resilience
Friendship & Social Interaction		
Behaviour of child		
Parents & Family	Proportion of Single-parent families Mean number of siblings Parental ranking of the importance of education	FILE Total
Success, Failure & Competence	Mathematics Diagnostic Test score LAN1 Writing subtest	LAN1 Score
Displayed Emotion		
School	Mathematics Diagnostic Test score LAN1 Writing subtest	LAN1 Score
Psychological Characteristics	Visual Matching IQ	BIA total Locus of Control
Behaviour of others to child		FILE Total

Theme identified in qualitative research as relevant to resilience	Systematically different between Kumon and Control groups	Relevant to increased LAN2 score, and possibly to educational resilience
Life Events	Proportion of Single-parent families	FILE Total
Noticeable absences	Proportion of Single-parent families	
Physical Health Opposite of "doing OK"		FILE Total
Factors not mentioned in qualitative interviews	Cultural Diversity Family Annual Income	Cultural Background Sex Total months in Kumon Kumon status

Firstly, it is possible that parents were aware of the impact of factors like cultural background, sex, and family income, but chose not to mention them due to an awareness of these topics as sensitive issues in mainstream middle-class Australia. Chew-Graham, May and Perry (2002) refer to the issue of the qualitative researcher as "judge" and note that, for some participants, there is an implicit awareness of respondents seeking to give the "right" answer, noting that "respondents who feel they are being judged will be likely to be cautious in the conversation they have with any interviewer...the data obtained may also need to be treated with caution" (p. 288). Likewise, Corbin and Morse (2003) acknowledged that participants have greater control over the qualitative interview, being able to refrain from discussing topics if they wish. Secondly, both parents and children were asked about resilience generally, rather than with specific reference to educational outcomes, and so the presence of factors not linked with educational resilience is

not unexpected. Finally, the present study's ability to measure predictors of educational resilience has not been as complete as would be desirable, and so it is possible that some factors that did not seem relevant in the current model may have real-world relevance, as recognised by participants in the study.

The differences in parent and child views of resilience are also important to consider when interpreting the quantitative outcomes of the present study. Since only parents reported on children's experience of adversity, it may be that adversity measures such as the CEAE and FILE do not adequately capture children's experience of adversity, either through privileging consideration of the home and family domain over the effects of adversity in the school domain, or by overemphasising the negative impacts of adversity and underestimating children's sense of their own agency in dealing with adversities. If the measured adversities do not reflect children's own perceptions of adversity, this may affect the reliability of the findings. Parents may not have understood, or reported, the impact of difficult life experiences in the school domain, underestimating children's level of adversity.

Alternatively, by focusing on the impact of negative experiences and underestimating children's sense of agency and coping resources, parents may have overestimated the degree of adversity to which their children were exposed. Lazarus (1999) emphasised that the impact of stressful life experiences is mediated by the individual's appraisal of the events, and influenced by person and environment factors including optimism, personality factors and coping styles. This research has therefore demonstrated that it is important to use developmentally appropriate methods of data collection to include the views of children regarding their own experiences of adversity and resilience, to account for the influence of each child's own personality and coping style on perceived life challenges. Using only external perceptions of children's experience of adversity will result in a higher degree of measurement error when calculating the extent of adversity in each individual's life. Children's own appraisals of the difficult life events they experience

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should be sought in research relating to resilience, as recommended by Howard and colleagues (S. Howard, et al., 1999), particularly when assessing the degree of adversity assigned to each participant. However, it is likely that such appraisals will still need to be balanced against parental contributions, especially for young children, as some events may have occurred when they were too young to recall, or lay beyond the scope of their present focus of attention.

10.2.   Findings of the Present Study in Context

10.2.1. Educational Resilience

There have been, to date, few experimental interventions aimed at improving educational resilience (Condly, 2006; Waxman, et al., 2003), partly due to the longitudinal nature of such research and also due to the difficulty in operationalising educational resilience predictors and outcomes. Furthermore, the fact that many of the factors currently believed to be linked to educational resilience (see Table 2.2) relate to child- and family-based factors that are resistant to adjustment (e.g., sex, age, family structure and parental education level) or are proxies for unknown factors (e.g., immigrated from a non-Western country, some education in a non-Western school system), means that it is difficult to design an appropriate experimental intervention that would conclusively demonstrate an impact on educational resilience. Indeed, one of the reasons that the design of the current study relied on LAN data from two separate years was to gauge appropriately the time-bound nature of educational resilience, relying as it does on the maintenance of academic achievement, rather than the level of achievement per se. In this, the current study took a step beyond much previous research in educational resilience, which predominantly relied upon measurement of academic achievement at a single point in time (e.g., Floyd, 1997; Gonzalez & Padilla, 1997; Nettles, et al., 2000; Reyes & Jason, 1993; Spencer et al., 2005; Waxman & Huang, 1996).

The majority of studies of educational resilience have dealt with minority populations from the United States (e.g., Floyd, 1997; Gonzalez & Padilla, 1997; Krishnakumar & Black, 2002; Reyes & Jason, 1993), the impact of low socio-economic status (Borman & Overman, 2004) or aspects of the classroom learning environment, as well as teacher and student behaviour and characteristics (Benard, 2000; Dryden, et al., 1998; Martin & Marsh, 2006; Nettles, et al., 2000; Waxman, et al., 2003). The current study differentiated itself from previous research through investigating a mainstream, multi-cultural sample in Australia, with participants drawn from a range of different socio-economic backgrounds, and by focussing on the impact of an after-school study program.

With regard to the proportion of students that can be considered to demonstrate resilient responses in the education domain, the current study defined educational resilience as the pattern of achievement maintenance shown by the top quartile of the participant sample. This contrasts with other approaches, which suggest that the educationally resilient responses could be found in 6% of Hispanic students (Gonzalez & Padilla, 1997), or up to 57% of high academic achievers (Spencer, et al., 2005). As the current figure was defined statistically, rather than by external criteria, the present research has taken the field no closer to an expected population average of educational resilience amongst school students.

Recent research investigating the relation between adversity and school performance in mainstream Australia suggests that while educational resilience confers benefits on students who experience a significant degree of distress and disorder in their lives, this concept may be less valuable in explaining differential responses to stress amongst students whose life challenges are more mainstream (Martin & Marsh, 2008). Instead, Martin and Marsh (2008) investigated psychological outcomes within the healthy majority to propose the concept of "academic buoyancy", which comprises measures of anxiety, uncertain control, self-efficacy, academic engagement and teacher-student relationships. Data on two of

these characteristics, (aspects of academic engagement and teacher-student relationships) were available within the current study[10], but it is difficult to determine whether an academic buoyancy framework would provide a more productive explanation for the findings of the present study.

It is expected that Kumon study would affect a number of the factors associated with academic buoyancy (Martin & Marsh, 2008). The increased mathematics skills conferred by Kumon study could be supposed to decrease anxiety about mathematics performance at school (Wittman, et al., 1998), and the experience of repeated practice of concepts leading to mastery of challenging material may increase a student's sense of self-efficacy and improve their self-perceived level of control. Likewise, academic engagement and teacher-student relationships may improve following a student's changing attitude towards maths, from something they "hate" to something they can succeed in and thus enjoy. As no data regarding these factors were collected in the study it is not possible to determine whether Kumon improves the ability of mainstream students to cope with everyday stressors, but further study may shed some light on this interesting area.

Martin and Marsh (2006) have previously suggested that educational resilience can be boosted through programs that increase academic self-efficacy through habituating students to the processes of planning and persistence, and by internalising the student's locus of control. Simultaneously decreasing the fear of failure through:

> reducing links students make between their achievement and their worth as a person, reducing the sting of fear in competitive environments, promoting a constructive view of poor performance, and shifting students' focus onto controllable elements such as effort and strategy and away from elements

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[10] Questions on the CHKS-B related to these characteristics.

students believe are less controllable or are more threatening to

their self-worth; (Martin & Marsh, 2006, p. 278)

was likewise suggested to increase levels of educational resilience. The Kumon

program, as described in Chapter 2, addresses many of these issues through:

individualising the program of study, developing skills in goal setting, promoting

persistence in the face of difficult concepts, providing clear requirements for the

amount of homework required as well as the time and accuracy goals that indicate

success, requiring parental involvement in checking homework accuracy, providing

consistent and specific feedback, as well focussing on the role of effort, strategy and

practice as the pathway to success. Preliminary evidence from the current research

program is that the Kumon program has a positive impact on educational resilience,

particularly in higher stress situations.

10.2.2. Kumon Study

With regard to the impact of Kumon study, the current study replicated

previous international findings that Kumon study leads to academic improvement

(McKenna, et al., 2005; Medina, 1989; Oakley, et al., 2003; Oakley, et al., 2005;

Thijsse, 2002). Previous research had shown improvements ranging from increases

of 6 percentile points on standardised tests (Medina, 1989), increases in the number

of students exceeding required educational standards, from 39% to 89% of students

tested (Oakley, et al., 2005), and scores on standardised tests that were 13-16%

higher than those of students who did not receive Kumon instruction (McKenna, et

al., 2005). The current study's findings of improvements across the numeracy,

reading, writing and spelling domains between 6% and 9% fit well within the range

of academic improvements reported in other studies. The present study also goes

beyond consideration of academic improvement in providing some support for the

view that Kumon study may support educational resilience in the context of

adversity, a new finding. The practical implications of this finding relate to the

demonstrable benefits associated with a program which requires a substantial investment of time and money from both children and their parents; this is the first time that improved academic achievement has been formally linked with Kumon study in an Australian setting, and the first time that Kumon study has been linked with educational resilience in a global context.

10.2.3. Qualitative Findings Compared with Previous Research into Resilience

The results of the qualitative research conducted as part of the present study align with previous research on factors that are associated with resilience. Table 10.2 summarises these factors, and indicates how the current results relate to the existing literature. It is clear that although parents and children have a sound understanding of many of the factors that contribute to, or are characteristic of, the child success that is a pre-requisite of resilience, they are also unaware of other important factors associated with resilience. For example, no respondent mentioned the impact of a child's sex when thinking about a child who was "doing OK" or not "doing OK" – neither parents nor children differentiated their responses between the things that would mean a girl was "doing OK" and those that would mean a boy was "doing OK". Likewise, there was little consideration of "the child in time" – only one respondent described a difference between what you would expect to see in an older child compared with a younger one ("they also can see the needs of others, not just themself, *that's more in the older age bracket rather than the young ones*…" – 0021, Mo, emphasis added), while a second parent explicitly noted a "stage" in her child's life ("Morag's the oldest, she's 12, and *I think at this stage what I've seen*..." – 0035, Mo, emphasis added).

While the results show similarities to previous research in the field of resilience, particularly in terms of the themes identified by participants as relating to children's success, there were some notable exceptions – no participant mentioned the roles of sex, development in time, the interaction between age and sex, or

religious participation, in affecting a child's ability to "do OK" in life. Similarly, no

respondent in this study ranged beyond Bronfenbrenner's (Bronfenbrenner, 1979b)

meso- and micro-system levels for explanations about a child's success in life,

mainly focussing their attention on factors relating to the child him- or herself, as well

as the family and school milieux.

Table 10.2

Findings of the current study and links with factors demonstrated to be linked with

resilience (from Newman, 2002)

10.2.4. Qualitative Findings Compared with the Results of Johnson, Howard, Dryden

and Johnson (1997)

There was considerable agreement between the findings of the current study
and the results of Johnson, Howard, Dryden and Johnson's (1997) original research.
The original research reported results in the categories "Relationships", "Beliefs",
"The family", "School" and "The Community", across three separate papers (Dryden,
et al., 1998; S. Howard & Johnson, 2000; B. Johnson, et al., 1997). Children in both
the original and current studies noted the importance of relationships with peers and

parents in supporting a resilient approach to life (Dryden, et al., 1998). With regard

to family-based factors, all respondents in both studies noted the importance of

supportive relationships, attention, and encouragement (S. Howard & Johnson,

2000). However, parents and children in the present study were more strongly

focussed on the importance of family harmony and unconditional love, while

respondents in Johnson and colleagues' (1997) study noted the importance of

parents talking and listening to their children, and helping them with school work (S.

Howard & Johnson, 2000). This latter element was present in the current study only

as a noted absence, in that children thought it likely that those who had parents who

were inattentive or absent would be "not doing OK"; they did not specifically note

that parents who talked and listened with their children promoted "doing OK".

However, the present study demonstrated some blurring of the themes reported by

Howard and Johnson (2000) – the original study separated "supportiveness" and

"helping with school work", while in the present study the ideas of "help" and

"support" from parents were conflated during analysis. As in the present study,

children in Johnson and colleagues' (1997) study spoke more frequently about the

potential impact of the death of a loved one than did adults.

With regard to school, both studies found that "inability to achieve or keep up

in relation to school work was seen as a major problem" (S. Howard & Johnson,

2000, p. 331) by all respondents. Children in the original study specifically noted that

falling behind at school was highly likely to influence a child's overall success:

"they...see very clearly that success in school is very important in making the

difference between 'doing O.K.' and 'not doing O.K.'" (S. Howard & Johnson, 2000,

p. 334), and this theme was also noted in the present study. There was recognition

of the importance of teacher's abilities to "either make life 'tough' for children by

'picking' on them and ignoring their requests for help, or to make a difference for

children who are having difficulties" (Dryden, et al., 1998, p. 24) in both studies.

Likewise, children in both studies seemed more cognisant of the impact of bullying

on a child's ability to succeed – this theme was mentioned more frequently by children than by adults in both data sets. The importance of teachers in reducing the incidence of bullying was also noted by children in the original study, but not mentioned by children in the present study.

Children in Johnson and colleagues' (1997) research commented explicitly on the tendency for children who demonstrated resilience to grow into adults who demonstrated resilience, and noted the importance of perseverance and a 'good attitude' (Dryden, et al., 1998). These themes were not noted as strongly by children in the present study, although some elements of these factors were observed in the contributions of parent respondents, specifically in the category "Psychological Characteristics of the child".

Respondents in Johnson and colleagues' (1997) study focussed on the role of the community – children's extra-curricular activities and the need for a "friendly" community where the child's safety is attended to by all adults present, not simply those charged with a particular responsibility for the child (parents, teachers) (S. Howard & Johnson, 2000). Respondents in the present study did not focus explicitly on this aspect of resilience when deciding whether children were "doing OK" or "not doing OK".

Finally, respondents in both studies concentrated their attention on the mesosystem and microsystem levels of Bronfenbrenner's (Bronfenbrenner, 1979b) ecological model, focussing on child, family and school related issues when considering whether children were "doing OK". Few respondents addressed exosystem or macrosystem level considerations such as the impact of social class, ethnicity, government policies, cultural customs or laws, on resilience in children (B. Johnson, et al., 1997).

10.3.   Summary

This chapter has provided an integration of qualitative and quantitative results, as well as locating the findings of the current study within the framework of the greater resilience literature. When parents' and children's responses to the issue of resilience were compared with factors that differed systematically between Kumon and Control group participants, and with factors that were linked with academic achievement and potentially educational resilience, some interesting similarities and differences emerged. Respondents identified some areas, like Friendship and Social interaction, the Behaviour of the Child, Displayed Emotion and Behaviour of others towards the Child, which did not significantly predict educational or resilience outcomes, and likewise, seemed unaware of, or chose not to mention, issues like sex and cultural background, which were related to educational outcomes. Likewise, the qualitative research outcomes indicate that the present study may have underestimated the degree of adversity experienced by children by relying solely on adult reports of children's adversity. Future research will need to incorporate children's perspectives on adversity and resilience.

The present research has identified some important differences between parent and child expectations of success in children, which will be important to take into account in interpreting the implications of the present study and developing forthcoming resilience interventions.

Broad similarities between the results of this research with the study it partially replicated (B. Johnson, et al., 1997) were noted, but differences included a greater focus on family harmony and unconditional love, conflation of the concepts of parental support and parental assistance, and less attention to the role of a supportive community, and the developmental program of resilience unfolding throughout an individual's life. Participants in both studies focussed primarily on the microsystem and mesosystem levels of Bronfenbrenner's bio-ecological model, with little consideration of the role which social class, ethnicity, government policies,

cultural customs or laws may play in supporting or inhibiting resilient responses in children. Nevertheless, the findings of the present study align with the perspective of resilience as a time-bound interaction between a person and their environment, which occurs in response to adversity, rather than a personality trait or characteristic of an individual.

With regard to efforts to improve life outcomes for children, this chapter has also located the results from the current study within a framework of prior research and current thinking on educational resilience. While previous studies have predominantly measured resilience at a single time point, used academic achievement as a proxy for educational resilience, and dealt with minority populations in the United States, the present study differentiated itself by measuring maintenance of academic achievement over two time points, focussing on a mainstream, multi-cultural, middle-class population in Australia, and by investigating the impact of Kumon study on educational resilience. In line with prior research, Kumon study was linked with academic improvement, and also appeared to provide some benefits with regard to educational resilience. The Kumon program shares some conceptual similarities with approaches designed to increase "academic buoyancy" in individuals experiencing normative life challenges rather than extreme adversity, but may also provide benefits to individuals experiencing higher levels of life stress. In terms of resilience generally, parents and children understood many of the factors that characterised and contributed to children's success in life, but also did not mention other factors, such as sex, developmental stage, social roles and religious faith membership that have been linked with resilience in prior research.

Chapter 11 reviews the strengths and limitations of the present study, and draws on the findings of the current research program to suggest directions for future research into educational resilience, analyse core challenges within the field of resilience research, and outline new approaches to understanding resilience.

11. CONCLUSION

This chapter provides a review of the relevance of the educational resilience findings to Australian society. The study's research findings are summarised, and an overview of work still to be completed in this area is provided. An analysis of the limitations and strengths of the current research, and comparisons of the study's findings with current theoretical models, are presented. Core challenges within the field of resilience are examined, including an analysis of practical, conceptual and ethical challenges in conducting research into resilience. Current issues in the fields of resilience and educational resilience are discussed. Recommendations for future directions in resilience research, with particular reference to the genetic bases of resilience, are examined.

11.1. Relevance of Research into Educational Resilience

Goldstein and Brooks (2006, p. 5) pointed out that research into intervention effectiveness overwhelmingly supports the effectiveness of programs designed to "reduce the numbers of youth with certain emotional and psychiatric problems through an understanding of the forces that shape life outcomes" – in other words, using resilience research to improve outcomes for individuals at risk is already effective and only becoming more so. Interventions designed to improve educational resilience allow individuals at risk of prematurely leaving the school system to continue in education. Increased time in education has been shown to deliver benefits to individuals, in terms of increased lifetime earnings (Card, 1999; Rumberger & Lamb, 2003), increased labour force participation and lower divorce rates (Long, 2010) and better health (Ross & Mirowsky, 1999). Johnson and Howard (2007, p. 13) note that "schools... can often disrupt negative chain events in children's lives and teach new, more constructive ways of behaving". Benefits to society of a more educated populace include economic development (De Meulemeester & Rochat, 1995) and increased cultural tolerance and harmony, with

researchers noting that "increasing years of education were part of a learning process that enhanced cognitive skills, cultural knowledge, and cognitive flexibility" (Bobo & Licari, 1989, p. 287).

Australia currently ranks eighth out of thirty-six Organization of Economic Cooperation and Development (OECD) countries, for the percentage of the population aged 25-34 that has attained at least tertiary education (41%; OECD, 2010). This ranking has increased from 12th of 36, at 28%, in 2000 (Centre for Educational Research and Innovation, 2000). Participation in post-compulsory education has increased in all developed countries in recent years, as well as in many developing countries (Lamb, 1996; Long, 2010; Rumberger & Lamb, 2003; I. Walker & Zhu, 2003). Australia, the United States and the United Kingdom all had dramatic increases in the rate of participation in post-compulsory education in the last four decades. In Australia the proportion of people aged 20-24 participating in formal education was 36.9% in 2006 (Australian Bureau of Statistics, 2007a), an increase of nearly 12% since 1991 (Australian Bureau of Statistics, 2002). Clearly, access to education has increased for Australian citizens in the last 30 years, in line with international trends.

As the rate of participation in education at a secondary and tertiary level increases, and the targets for further improvements continue to grow (Bradley, Noonan, Nugent, & Scales, 2008), information about factors that can support and maintain participation in educational programs increases in relevance. Forces beyond individual control (parental divorce, illness, bereavement, bullying, poverty) can derail educational opportunities, but approaches that enhance individual robustness in the face of these disruptions increase the likelihood that individuals can fulfil their educational potential and access the resultant economic, social and personal benefits. Similarly, society benefits through gaining functioning, productive members who make net positive contributions to the community and the economy. Ensuring that students who experience adverse circumstances receive the support

required during primary and secondary schooling to allow them to reach tertiary education will require a nuanced and sophisticated understanding of the factors that may interrupt a smooth progression through the education system. When confronted with students at risk of educational disruption, a deeper and more systemic awareness of the approaches that can be put in place to prevent or assuage the impact of such a disruption will increase the number of students who are able to achieve academically in the face of adversity.

Educational resilience research seeks to find these approaches and evaluate the most effective way to apply them in order to preserve opportunities for the fulfilment of human potential. In line with resilience research's focus on the strengths and protective factors available to support resilient development in the face of adversity, the research presented in this thesis has provided a small but significant contribution regarding factors that contribute to educational resilience in Australian children.

11.2.   Summary of Findings

The fundamental question addressed in this research program was whether the Kumon programme of study had a positive impact on educational resilience. This study differed from previous research in that it contained qualitative components, focussed on Australian participants rather than North American or British students, and investigated educational resilience as well as achievement. The results of this study have threefold relevance to the field of educational resilience.

Firstly, the study replicates international findings that Kumon study leads to increased academic achievement, in an Australian context. This may be important to educational resilience findings because improved academic achievement may support educational resilience, as strong reading and reasoning skills, educational aspirations and school engagement have all been associated with educational

resilience (Finn & Rock, 1997; Waxman, et al., 2003; Waxman, et al., 2008). This provides educators, parents and children with an assurance that Kumon study can be undertaken when needed, with most children able to achieve at least modest improvements in educational achievement; some students will be capable of making substantial improvements using the method. Furthermore, the findings go beyond consideration of achievement to suggest that the Kumon program of study may lead to greater levels of educational resilience to lifetime adversity – however, data limitations relating to the timing of adversity experienced by the participant group made it difficult to demonstrate conclusively that Kumon had an effect on educational resilience. Further study in this area is needed before a conclusive connection can be drawn between Kumon and resilience.

Secondly, this research indicated that the majority of children in the study had many protective factors, and comparatively few risk factors, affecting their lives. The lack of a truly representative sample means that these results cannot be generalised to all populations within Australia; however, for urban middle-class families with children in public and private schools, these findings provide an estimate with regard to educational resilience. It appears, at least for the current sample, that current social and educational policies are working as intended. In generalising these findings to mainstream Australia, it is necessary to note the issues raised in Chapters 6 and 9, regarding possible selection biases amongst the participant group, which may mean that the families with a greater exposure to risk are under-represented in the sample. The current study cannot shed light on the risk and protective factors operating in the lives of people from lower socio-economic backgrounds in Australia, and further research is required in this area. It is likely that more resources will be required to support the social and educational outcomes of these groups.

Finally, the current study assessed the views of child participants in the research, as recommended by Howard and colleagues (1999), a direction that is

predicted to become increasingly common in future research. The addition of a qualitative strand of research provided a deeper and broader perspective on the similarities and differences between parents and children with regard to non-specialist understandings of the resilience concept. While both groups identified similar categories of concern, children were more likely to focus on visible displays of emotion and the school environment, while parents placed more emphasis on psychological characteristics and the impact of home and family events. Parents and children both tended to focus more on the factors that resulted in vulnerabilities, rather than the factors that led to resilience, although this trend was stronger in parents. Future work can build upon these findings to develop a clearer understanding of the field of educational resilience, as will be discussed in Section 11.6. The information gained in this study has thus contributed towards the field of educational resilience in Australia.

11.3. Comparison of this Research with Other Models

The outcomes of this research program align with previous research done in the field, supporting a view of educational resilience as an interaction between a person and their environment which occurs in a time-bound fashion in response to adversity, rather than existing as a characteristic of an individual. In this, the findings align with the theoretical approach of many researchers, including Egeland, Carlson and Sroufe (1993), Zimmerman and Arunkumar (1994), Rouse, Longo and Trickett (1999b), Luthar, Cicchetti and Becker (2000), Masten (2001), Harvey and Delfabbro (2004), Condly (2006), Goldstein and Brooks (2006), Rutter (2006), Schoon (2006) and Werner (2006), who consider resilience to be "a dynamic process encompassing positive adaptation within the context of significant adversity…the achievement of positive adaptation despite major assaults on the developmental process" (Luthar, Cicchetti, et al., 2000, p. 543). This view of resilience means that some children exposed to adversity will achieve competence as teens and adults,

although they will need support and care from the adults and teachers in their lives to do so.

There is a reasonably straightforward assumption that, especially in educational contexts, children who have been exposed to adversities can be assisted to overcome negative life outcomes through the application of attention and assistance from parents and educators. However, there is a substantial discrepancy between the intuitive simplicity of educational resilience as a concept, and the difficulty in measuring all of the factors which contribute to variance in this area. Certainly the findings of the present study align with previous research that has indicated that contributory factors like cognitive ability, locus of control, cultural background and exposure to lifetime adversities are important influences of educational resilience. Nevertheless, it is notable that there remains a large degree of unexplained variance in models aiming to predict resilience outcomes, and until these unexplained factors are more deeply analysed, our understanding of resilience can be partial at best.

For the present study, it is important to consider not only how much of the unexplained variance was due to factors that were not included in the model. For example, given Condly's (2006) view that IQ and temperament seem to have primacy in determining the extent of children's resilient responses to adversity, to what extent may the unmeasured impact of temperament have affected the outcomes seen in Chapters 5, 7 and 8? Temperament may even interact with Kumon status, given the rigorous and repetitive study habits required to achieve success in Kumon study, further complicating the picture. Perhaps a temperamental tendency to optimism or pessimism affects the efficacy of protective factors in a child's life, with more pessimistic individuals less able to recognise, appreciate or take advantage of protective factors which are hypothetically available to them. Furthermore, recent investigations into the neurobiological and genetic bases of resilience (Curtis & Cicchetti, 2003; W. Johnson, et al., 2006; Kim-Cohen, et al.,

2004) undoubtedly have relevance for the models derived from the present study, as these predispositions affect the impact of environmental risk and protective factors. Further consideration of the role of biological factors in resilience is provided in Section 11.8.

11.4. Strengths of this Study

The present study possessed a number of merits, and applied innovative approaches to the study of educational resilience, compared with other research in the field. Firstly, the study filled a niche with regard to research into educational resilience within Australian populations, an under-represented area in the resilience field. Secondly, this research appears to be the first in the world to formally investigate the impact of Kumon study on educational resilience, with implications for the 4 million students worldwide who study using this method. Thirdly, the study had numerous methodological strengths. It was one of few studies to deliberately define resilience in terms of the maintenance of achievement, rather than using achievement at a single point in time as a proxy for resilience, an improvement suggested by previous researchers (Waxman, et al., 2003). Using a novel method for calculating resilience and vulnerability, as adapted from a method described by Kim-Cohen and colleagues (2004), this study conceptualised resilient outcomes as above-average maintenance of educational outcomes when compared with all participants. This method of defining resilience according to the maintenance of academic outcome, rather than assessing academic achievement at a single point in time, provided a substantial improvement over previous studies by considering the essentially time-bound nature of resilience as a process within development. The robustness of the findings were supported by a three-pronged approach to analysing which factors supported resilient outcomes, using multiple regression to analyse academic achievement and maintenance of academic achievement, and using a small-scale intensive analysis of participants with clearly defined adversity

experiences. Additional recommendations from previous researchers that were incorporated in the current study include Howard, Dryden and Johnson's (1999) and Winbourne and Dardaine-Ragguet's (1993) suggestion that all research into child resilience should take into account children's perspectives on resilience. Furthermore, the study integrated qualitative and quantitative methods in investigating resilience, an approach that added the richness and depth of qualitative analysis to the information provided using quantitative methods. Future researchers should take the advantages of these approaches into consideration when planning research into educational resilience.

11.5. Limitations of this Study

There were a range of issues with the present study, both practical and conceptual, that have may have affected the outcome of the study. Practical issues, including data collection, data variability, participant composition and participant conformity to the Kumon method, are presented first. Limitations of the scope of the current research, and limitations relating to the qualitative aspects of the study, are then considered. Finally, conceptual challenges within the field, such as defining resilience, and the ethics of research into adversity, are addressed.

11.5.1. Practical Limitations

Practical issues in completing this study primarily revolved around data collection, data variability and data quality. Data collection in real-life settings presents the researcher with a number of well-known challenges. Participant recruitment took longer than anticipated, with the result that additional planned studies were unable to be completed[11]. The time taken to conduct participant interviews was in line with expectations. Less consideration had been given to the time required to organise participant interviews and data packs, a process which

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[11] This included the inclusion of a third participant group, and more detailed analysis of the relationship between Kumon study and specific categories of adversity (e.g., learning disabilities, divorce, long term illness).

often required multiple telephone calls and emails, as well as the time required for travel to and from Kumon participant's homes, which in many cases were up to 45 minutes from the CBD. Within the context of a PhD, this time impost presented a significant challenge to the speed of research, and should be considered by future researchers planning a similar research approach.

Data quality presented many challenges. While a single researcher was responsible for all data collection and analysis, which simplified many aspects of data quality assurance, many other issues arose in this area. Most significantly, the full data set was not available for all 164 participants, with 58 participants disqualified from the main analyses due to issues with the timing of their Kumon instruction, or the absence of a full set of LAN test results. In a particularly unfortunate circumstance, children who had changed school more than once were far more likely to have missing LAN data than children with a more consistent schooling history. This means that the study was unable to capture information regarding children with experiences of disruption in their academic and social worlds, which may have had an influence on the results.

A further issue of quality arose when, halfway through the data collection period, the format for literacy and numeracy testing within South Australia changed substantially. Students from the initial period of testing had completed either the SALAN or WALNA tests, but from 2008 onwards, the nationally-designed NAPLAN came into use across all schools, requiring the study to create a method of drawing comparisons between these different tests. The compromise of calculating approximate percentage achievement from categorical data for each test meant that, inevitably, a level of inaccuracy crept in when these estimations were made. Furthermore, structural differences between the SALAN, the WALNA and the NAPLAN meant that a certain leap of faith was required to undertake comparisons between tests named "numeracy", "reading", "writing" and "spelling" on each test, with no guarantee that the tests were psychometrically equivalent. In addition, the

results on these four sub-tests were arithmetically combined to form an estimate of "overall LAN achievement", used in the main analyses. This meant that any patterns of difference across the four sub-tests were not considered in the regression models. Addressing such data collection and comparison challenges should be a goal of future research.

A further challenge relating to the data was that when "parent" information was collected, it was primarily, but not exclusively, collected from mothers rather than fathers. Research suggests that mother and fathers interpret and explain the impact of life events on their children rather differently (Bird & Berman, 1985; Parsons, Adler, & Kaczala, 1982; Seligman, et al., 1984). Thus, it may be a misrepresentation to say that "parents" held certain values about education, or "parents" reported that their children had experienced bullying or severe illness, given that most adult respondents were mothers. These parental differences should be taken into account in future studies.

Finally, while all Kumon students had been enrolled in the Kumon study program for a minimum of six months, the research undertaken did not include a measure assessing how rigourously each child's course of study followed the strictures of the Kumon method, either at home or in the Kumon classroom. It is possible that some participants may have pursued an approach to study that was not strictly in line with the details of the method, reducing the relevance of the findings. However, given that the Kumon method is used in the real world rather than under laboratory conditions, it is likely that some families who study Kumon do deviate from the strict letter of the method. If so, minor deviations from the method by participants of this study would serve to enhance the ecological validity of the study.

11.5.2. Scope of the Present Study

While the present study made contributions to the field of educational resilience research, the limitations of time and budget imposed by the constraints of a PhD research programme, as well as the difficulty in finding the required number of participants, meant that several planned components of the research programme was not able to be completed. It was initially hoped that comparisons would be drawn between three groups of participants – the Kumon and Control groups, and a third group of participants who undertook additional out-of-school-hours tutoring in Maths using methods other than the Kumon method (e.g., one-on-one tutoring, parent-directed study, workbooks or other study programmes). This would have allowed the study to make stronger claims about the specific benefits of Kumon study; the current design leaves the study open to the criticism that any academic benefits accrued by students were simply the result of the additional 70-140 minutes of mathematics study completed each week (potentially more than 60-120 additional hours per year), rather than a benefit resulting from the Kumon method of study in particular. Ideally, it would have been possible to draw comparisons between the effectiveness of Kumon vs other methods of study, and possibly even to assess whether Kumon was more effective than other methods of study in protecting school achievement against the impact of adversity. However, the time and budget available made it impossible to complete this arm of the study – future researchers should take this option into account when designing studies to assess the benefits of a particular educational method. Future research could also fruitfully investigate whether additional study using other tuition methods (one-on-one tuition, textbook study, computer-aided learning or other branded tuition programs) has a similar effect on educational outcomes.

The second component of the study that was not able to be completed was a more detailed analysis of the protective impact of Kumon study on different types of adversity – for example, it may be the case that Kumon has a strong protective

effect in cases of learning disability and repeated changes of school, but is less effective in supporting academic performance when a child experiences extreme poverty, parental divorce or a significant bereavement. The challenges in recruiting participants to the research meant that the sample size in the present study was insufficient to allow analyses such as these to be undertaken. Further investigation of some of the sex-based differences in achievement and the influence of Kumon would also be interesting – a more detailed assessment of the impact of Kumon study on males as opposed to females may lead to information regarding the differential effectiveness of this method of study for boys and girls, or it may indicate that the minor differences seen in the present study are merely sampling artefacts.

Finally, while endeavours were made to ensure the participant sample was appropriately representative of the South Australian population, the practicalities of data collection in real-life settings meant that families from lower socio-economic groups, as well as families in which members had experienced particular types or degrees of hardship or adversity, were not well-represented in the study. This sampling issue limits the extent to which these results can be generalised to other groups. The resulting data challenges also affected the study's ability to address all the planned Hypotheses thoroughly, particularly Hypothesis H3, regarding the impact of Kumon study on educational resilience. As there was generally a low level of adversity found in most participants' lives, and information about the timing of the adversities was not available in many cases, it was difficult to demonstrate conclusively that children exposed to adversity who then did Kumon study showed more resilient responses than would be otherwise expected. Adjustments to the design of future research in this area would address this issue.

11.5.3. Limitations of the Qualitative Aspects of the Study

The qualitative aspects of the study were undertaken as a component of a larger body of work relating more specifically to educational resilience in children. As

such, there was limited availability of resources to fully replicate Johnson, Howard, Dryden and Johnson's (1997) work on resilience in South Australian children using a sample of parents and children. If resources permitted, longer interviews that more deeply explored the participant's views of the full resilience relationship (what causes difficulties, what constitutes 'success', what makes the difference between children with difficult lives who attain success and those who do not), would have been preferred.

With regards to methodology, there was some possibility that within-subjects effects of fatigue, motivation change and priming may have influenced the answers of the parent respondents, and hence future studies should ensure to alternate the order in which questions were presented to control for these effects. In terms of sample bias, the fact that participants were all attendees at an after-school education program suggests there may have been a higher degree of homogeneity among the families who participated in the study with regards to opinions on the value of education, and the importance of scholastic success and hard work, compared with a sample drawn from the general population. Similarly, as demonstrated in Chapter 6, families of higher socioeconomic status were over-represented in this study, compared to the wider population. As these factors all have the potential to influence beliefs about the definitions of children's success and failure, they may have affected the applicability of the results to the wider population of South Australia.

11.5.4. Conceptual Challenges in Resilience Research

Researchers in the field of resilience must grapple with several key conceptual challenges, including: definitional instability; variations in adversity, outcomes and adaptation; the cost of further research versus the cost of intervention; the impact of biology; and the ethical challenges inherent in research with children and adversity.

Defining and operationalising the resilience concept

An ongoing issue within resilience research lies in the definition and operationalisation of resilience itself. There is broad agreement within the field that resilience can be said to exist where an individual who has experienced adversity is less negatively affected by that adversity than would be otherwise expected. However, questions that are still unanswered, both within the current study, and the field more generally, include the following:

- Is resilience a personal characteristic (like cognitive ability, or locus of control) or an active transactional process between an individual and his or her environment? Recent interpretations of resilience, including this study, have tended to view resilience through an ecological, transactional lens (e.g., (Bosworth & Earthman, 2002; Harvey & Delfabbro, 2004; S. Howard & Johnson, 1999; J. L. Johnson & Wiechelt, 2004; Luthar, Cicchetti, et al., 2000), but many researchers still refer to "the resilient child" rather than "a child who demonstrates a resilient response in a given situation".

- How far can an individual's resilient response vary across domains or across time and still be considered "resilient" (Masten & Obradovic, 2006)? Luthar, Cicchetti and Becker (2000) note that many research results are unstable in time, and suggest that the assessment of individuals as resilient in one field but not resilient in other areas of life may threaten the cohesiveness of the resilience construct. Certainly, development of resilience subspecialities such as educational resilience could operate to fragment the field.

- A number of questions surrounding the nature, timing and interaction of adversities are still to be addressed within the literature.

  - What degree of adversity (extent, severity, intensity) is required to have a negative effect?

- How do different forms of adversity compare in severity and the nature of the resulting impact?

- How do different adversities interact during development, or with different developmental stages, to create different outcomes?

- How do different protective factors operate to generate resilience in different areas (Olsson, et al., 2003)?

There is evidence that single incidents (of, e.g., accident, illness, abuse or experience of criminal activity; Felitti, et al., 1998; Kessler, et al., 1997) can have an impact on long term outcomes, but likewise, long term exposure to other factors (eg environmental toxins, parental drug abuse or mental health problems; Grant, et al., 2003; Kessler, et al., 1997; Werner, 1996) have also been shown to cause problems in later development. It does not seem feasible to propose a strict "cutoff" point below which adversities "do not count". Investigating the relations between the intensity of the adversity, the developmental stage of the individual, and the length, breadth and depth of the resulting life impact will increase predictive ability. Adversities are not necessarily comparable or additive (S. Goldstein & Brooks, 2006), although the current best practice approach has been to treat them as if they are (Kessler, et al., 1997). It is not known whether it will one day be possible to analyse the nature, timing and length of exposure to an adverse experience and estimate the expected impact, as a baseline for assessing whether a more resilient response was then demonstrated by an individual; the current state of the field does not allow for this fine-grained level of analysis at present.

- To what extent is potential resilience constrained by early biological programming or neural damage (Rutter, 2006)? To what extent is it constrained by environmental conditions (Sameroff & Rosenblum, 2006)?

Are there circumstances – biological or environmental – that cannot be overcome regardless of the number of protective factors and developmental assets subsequently put in place? How do recent findings of the ability for biological systems to be "reprogrammed" (Masten, 2007) fit with the outcomes of studies showing irrevocable effects of adversity?

- How do researchers distinguish between "factors that indeed place the individual at risk, and factors that happen to distinguish between good and poor outcomes but have no causal significance?" (Kaplan, 2006, p. 45) – that is, can risk factors be defined according to clear criteria and can the causal linkages between risk factors and negative outcomes be elucidated? Work in this area is continuing, but it is a faulty assumption to consider that a person exposed to a risk factor has been exposed to adversity (Feinstein & Peck, 2008).

- Who decides the criteria that constitute positive adaptation, and can a global set of meaningful criteria be developed given the variation that exists across cultures and generations (Masten & Obradovic, 2006; Ungar, et al., 2007)?

- How can researchers incorporate an appreciation of cross-cultural perspectives to ensure that resilience is not defined solely in terms of Western middle-class values and norms (Kaplan, 2006; Masten & Obradovic, 2006; Ungar, et al., 2007)? With the increases in the immigration of children from the developing world into Western countries, researchers and institutions will have to take account of the impact of the extreme biological and psychosocial risks experienced by such children, in accounting for resilience outcomes into the future (Werner, 2006).

- What is the relation between outcomes following adversity and tendency to internalising or externalising behaviours? How does temperament influence not only resilient responses but also the types of non-resilient responses

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seen? Temperament has long been known to influence resilience, with "easy" infants more likely to gather the skills and support necessary to demonstrate a resilient response to adversity; other infants may develop internalising or externalising tendencies in response to adversity. Luthar (1991) noted that some children classed as demonstrating resilient responses may instead be internalising their responses, with the resultant depression and anxiety overlooked as attention is given to children who are more visibly distressed.

- Can researchers strike a balance between investigating resilience processes more deeply and allocating time, funds and attention to the assessment and improvement of programs already known to be effective (Luthar, et al., 2006; Masten & Obradovic, 2006)?

- When assessing a technique for improving resilience, what ratio of costs incurred to benefits experienced would be required to make the technique worthwhile? An analysis of effect size provides only half of the equation; collaboration with economists and policy developers is required to understand how resilience-supporting techniques can be implemented in ways which assist the maximum number of individuals (Luthar & Brown, 2007).

- Does the concept of resilience only apply to a specialist section of the population that experiences severe levels of adversity, or does the concept also have relevance in a mainstream population (similar to Martin & Marsh's [2008] "academic bouyancy")? Resilience research, from its very earliest beginnings, has focussed on the range of outcomes possible for children born into difficult life circumstances. It may be that the concept cannot be fruitfully applied to children born into more mainstream situations, and that

for those who do not experience "enough" adversity to require a resilient response, another concept would be more useful.

Very large longitudinal studies will be required to address these questions satisfactorily. However, along with the normal challenges relating to time, funding, participant followup, and managing a large dataset, that go along with all large scale longitudinal research projects, the study of resilience presents additional challenges. Since so many of the factors that influence resilience are themselves influenced by social mores and customs that change generationally, by the time a generation of participants have lived through a longitudinal study on resilience, the conclusions about relations between events and outcomes may be out of date; at the very least, there will be a new range of factors (technological, structural, social, educational, environmental) operating on normal developmental processes that the generational research cannot comment on. The Longitudinal Study of Australian Children (LSAC; Gray & Smart, 2008), is presently attempting to address many of these questions with regard to outcomes for the current cohort of children within Australia. Researchers with access to the LSAC data will be able to draw good conclusions about the relations between events, outcomes and factors operating for this current generation of children, over the next decade.

Ethics of investigating adversity and resulting methodological restrictions

The investigation of adverse events, and their impact on the unfolding of a child's life, is made challenging by the ethical constraints that rightly surround such work. While the usual experimental method of "measure, change, measure again" is suitable for many fields of research, in psychology, such a research approach is often prohibited by the primary ethical requirement of scientific research: "scientists ought not to do research that causes unjustified risks to people" (Rosenthal, 1994; Shrader-Frechette, 1994). This imposes an obvious ban on prospective research on adversity, as any proposal for a study which deliberately imposed adversities on

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children for the purposes of research would never receive approval from the relevant ethics committee. This creates two issues: one methodological and one relating to sample size and selection. Due to ethical restrictions, research into adversity must, perforce, use either retrospective or longitudinal methodologies, with all the issues and costs associated with these methods (Bergman, Eklund, & Magnusson, 1989; Henry, et al., 1994). Retrospective research has been criticised as fallible because people: forget events from the past; misplace events in time, remembering them as occurring earlier or later than they actually occurred; or distort or re-invent the past to fit their current perspectives (Henry, et al., 1994). Longitudinal research, in contrast, is demanding in terms of time and resources, requires careful theoretical, organisational and administrative planning, and cannot provide results rapidly (Bergman, et al., 1989).

Similarly, the requirement to measure adversity only where it is already present means that the experimenter has little control over the timing or types of adversity within a sample, unless the adversity itself becomes the defining criterion of the sampling frame. Even this solution has its challenges, as depending on the timing and specificity of the adversity sought, a very large sample may have to be screened in order to secure a sufficient number of adversity-affected participants. Once this is done, the experimenter may find that the sample gathered is so specific that comparisons with other groups cannot be made, or results from a single study cannot be generalised to a larger population.

The ethical challenges inherent in studying adversity in a real-life setting have impacts on the choice of study methodology and the sample selection process.

11.5.5. Dealing with Ethical and Conceptual Challenges to the Research

The present study attempted to address some of the limitations described above – methodological and sampling – in the following ways. The structure of the research design fused aspects of qualitative, retrospective and quasi-longitudinal

designs. The qualitative work added an extra dimension of information to the analysis. The speed and efficiency of the retrospective interview allowed for the inclusion of many participants within a short timeframe. To reduce some of the challenges inherent in retrospective research, the use of a structured list of potential adversities (with provision for the addition of "other" adversities not covered by the list) acted as a prompt to assist recall of events from the past, and the division of timing for these adversities as "within the last 12 months" or "before 12 months ago" was an attempt to reduce the impact of misremembered timing. A quasi-longitudinal strand was brought into the methodology through the inclusion of LAN tests, taken over a two year period. This allowed a consideration of maintenance of achievement over time, a factor which is not often considered in the resilience literature, outside of longitudinal studies. The structure of PhD research makes the execution of a longitudinal research project difficult (or perhaps impossible!) and so the compromises required as a result of the constrained timeframe meant that the methodology could only be quasi- and not fully- longitudinal.

The sampling challenges were addressed through a deliberate decision to make the sampling frame as wide as possible with respect to the nature and the timing of adversities experienced, in order to both increase the overall sample size, and to make the overall adversity experience of the sample comparable to the wider population. However, the result of such a strategy (in common with many other studies into resilience) was to have a sample with many different types and timings of adversity experience. In such cases it is not necessarily possible to directly equate individual experiences of adversity to say, for example, that *three years of chronic asthma* is equal to *an acrimonious parental divorce* is equal to *one incident of bullying plus the chickenpox* (S. Goldstein & Brooks, 2006). Most studies in this area have found that the preferred method for addressing the non-comparable nature of adversities was to measure the cumulative impact of all adversities across

the lifespan to gain an understanding of the degree of adversity experienced (Felitti, et al., 1998; Flaherty, et al., 2006; Furstenberg, et al., 1999; Kessler, et al., 1997).

The present study employed several techniques to address the impacts of these challenges; some of these challenges can only be addressed with the execution of larger, longitudinal studies, while others require replications and generalisations of the current research.

11.6.   Suggestions for Future Research

Following on from the limitations of the present study are several suggestions for further research relating to educational resilience and Kumon. As noted previously, the most valuable research in the broader area of resilience has been done in the context of large-scale longitudinal studies, which follow a cohort of participants over time to examine links between their life experiences and the outcomes achieved in later childhood, adolescence and adulthood (Werner, 2006). The field of educational resilience needs research of this nature to more deeply understand the relations between risk and protective factors, family values, school experiences, and subsequent educational resilience, as well as to elucidate the causative mechanisms underlying these relations. Feinstein and Peck (2008, p. 5) note the need for such longitudinal research in the case of educational resilience, suggesting that:

> educational theory and social policy would benefit from tracking risk and protection over time, taking explicit account of the substantial discontinuity that exists in human development, and responding constructively to it, rather than making excessively rigid judgments based on normative snapshots at particular times that may be important in the organization of schools and colleges but have less resonance or importance as developmental moments in the lives of students.

Previous researchers have noted that few studies assessing contributions to the resilient adaptation of at-risk children have replicated their findings in follow-up studies, or analysed whether the findings can be generalised to children of different developmental stages or socio-economic backgrounds (Morales, 2008; Wright & Masten, 2006; P.A Wyman, et al., 1991). Such replications and generalisations "are important both to establish a sound knowledge base about childhood resilience and to differentiate universal risk and resource factors from those that operate in specific age or socio-demographic contexts" (P.A. Wyman, et al., 1999, p. 655). A replication and extension of the present study would ideally involve a larger participant pool, followed from before enrolment in Kumon study through a two year period[12], matched on key demographic variables (age, sex, SES, cultural background, cognitive ability) to a control group who were followed for the same time period. Restricting inclusion of participants to those who had experienced a given degree of lifetime adversity would ensure that the study could comment accurately on educational resilience, rather than simply maintenance of achievement (P.A Wyman, et al., 1991). Quarterly updates with families to ascertain any changes that had occurred in the lives of the participants, as well as standardised achievement tests administered at 0, 12 and 24 months, would address the present study's concerns with data acquisition and the impact of the timing of adversity experiences. Deliberately seeking a broader range of ages and socio-economic backgrounds in both Kumon and Control groups would also strengthen the generalisability of the findings of future research.

While the present study compared educational resilience outcomes between a "Kumon study" condition and a "no Kumon study" condition, it could also be argued that the study simply compared an "additional tuition" condition with a "no

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[12] This time period is the minimum period of study recommended by the Kumon organisation, to ensure that all students develop the ability to study mathematics above their current grade level, so that grade-level mathematics is not difficult to complete at school (Russell, 1996).

additional tuition" condition. Without explicitly testing the outcomes of a Kumon group against those of a group who undertook additional tuition using a different educational method, the reliability of claims about the impact of Kumon study specifically (rather than the impact of additional tuition generally) is limited. Conducting a replication and expansion of the present study, which compared academic achievement and educational resilience outcomes for three groups (Kumon study, Other study and Control), would provide a more reliable test of the findings of the present study.

Future research may also focus more narrowly on parental reasons for enrolling their children in Kumon, which in the present study ranged from remedial assistance, to a need for academic extension, to dissatisfaction with perceived low Australian expectations around mathematics education, to allowing or encouraging a child to do Kumon because their sibling was already enrolled. Clearly, the motivation and engagement of a family who have searched for a solution to their children's educational challenges for a long time are likely to differ from those of a family who are enrolling their children simply because many other families from their school are enrolled, and will differ again from families who have wanted to enrol for a period of time but have only recently been able to afford it, or from those who have immigrated from countries with a more rigorous mathematics curriculum. These background and motivational factors may influence parental and child expectations and commitment to the program, as well as family values around education that may affect the degree to which Kumon study has an impact on educational outcomes, both achievement and resilience.

Furthermore, parental values around education may affect whether children who need additional assistance are enrolled in external tuition programs at all. The present study raised a series of unanswered questions in this area. Kumon parents in this study rated education as more valuable than Control group parents – was this difference causal to their decision to enrol children in an out-of-school study

program, or was it a post-hoc effect following the decision to enrol? In contrast, studying Kumon did not appear to result in increased valuing of education for children. Was there an interaction between Kumon participants' lower initial level of achievement and an initial low valuing of education, such that parity demonstrated with Control group students at the time of testing actually represented an increase in Kumon participants' valuing of education over time? The present data do not permit answers to these questions, but future research may be able to shed some light on these issues.

Another area that may benefit from additional research is the qualitative section of the study, with two main foci. Firstly, there may have been an impact of parental sex on responses. The majority of parents who participated in the present study were mothers, and fathers' views were significantly under-represented in the response set. Future work should aim to have equal representation from parents of both sexes, or even expand the scope of the interviews to gain the opinions of all adults significantly involved in the child's family life. Furthermore, research elucidating any differences between mothers and fathers regarding children's educational outcomes, resilience and experiences of adversity would add to the understanding of the field. It may be the case that mothers and fathers tend to have different opinions about the significance of children's experiences of adversity, or the impact of educational struggles, that will have relevance to investigations in this area. Secondly, the questions used in the qualitative interview tapped some of the "what" of child resilience (Wright & Masten, 2006), asking "what factors, personal qualities, life skills or characteristics of the child's environment may help or hinder the development of resilience?". However, the questions were not designed to provide insight into the "why" or "how" of resilience: respondents were not asked to comment on the processes underlying resilience or the interactions between the factors. Gaining a deeper understanding of parents' and children's beliefs about *why* some children attain an agreed measure of success in the face of difficult life

circumstances, while other children do not, will add greater depth and richness to research in this area, and may have implications for the design and implementation of programs aimed at increasing resilience in children (Luthar & Brown, 2007), particularly those programs attempting to enlist parental support.

Ultimately, future research into educational resilience is likely to take advantage of the new techniques emerging from biological studies of resilience, to address the influences of genetics and heritability on the maintenance of consistent academic achievement. More information about these emerging trends in resilience research is provided in Section 11.8.

11.7.   Current Issues in the Field of Resilience

The field of resilience research faces a number of challenges. Solutions to some issues are within our grasp, while others will require ongoing engagement and research over the coming decade to address. The challenges include: drawing clearer definitions of resilience that are widely agreed amongst researchers; making families and educators aware of the benefits of using an educational resilience lens when considering child development; strengthening the boundaries that distinguish resilience research from other closely related fields; developing research designs that adequately address the challenges of data-collection and analysis in an interaction-heavy field; and delving more deeply into the genetic and biological bases of resilience.

11.7.1. Conceptual Challenges in the Field

As noted in Chapter 2, a variety of definitions have been used within the resilience field. Since the early days of investigating "invulnerability" (Garmezy & Neuchterlien, 1972) and "hardiness" (Kobasa, 1979), researchers converged on "resilience" as a descriptor that captured the quality of "bouncing back" from adversity on "trajectories that reflect unusually positive adaptation, given what usually occurs within the adversity under consideration" (Luthar, Cicchetti , et al.,

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2000, p. 575). Most modern researchers agree that resilience represents an interplay between an individual and the systems, processes, personal qualities and life circumstances in which they exist (Deater-Deckard, et al., 2006; S. Goldstein & Brooks, 2006; Harvey & Delfabbro, 2004; Rouse, et al., 1999b; Schoon, 2006); that it changes over time (Luthar & Cicchetti, 2000; Luthar, Cicchetti, et al., 2000; Luthar & Zigler, 1991); may vary across domains (Harvey & Delfabbro, 2004; Zimmerman & Arunkumar, 1994); and is best conceptualised as a triarchic structure, encompassing variables existing within the child, variables existing within the family, and variables existing within the wider socio-cultural environment (Condly, 2006; Garmezy & Devine, 1985; S. Howard, et al., 1999; Luthar, Cicchetti, et al., 2000; Luthar & Zigler, 1991; Masten & Obradovic, 2006; Newman, 2002; Schoon, 2006; Werner, 1989, 2006; Werner & Smith, 1982, 1992; Wright & Masten, 2006).

Current work aims to integrate biological and genetic approaches to resilience with the ecological model that presently provides the best understanding of resilience (e.g.Deater-Deckard, et al., 2006; W. Johnson, et al., 2006; Kim-Cohen, et al., 2004; Suomi, 2006). The underlying assumptions outlined in Chapter 2 raise questions that are not satisfactorily answered by current definitions of resilience and suggest that more rigourous work is required to refine the conceptual underpinnings of not only "resilience" but also of "protective factors", "risk factors", "adversity", and "vulnerability" (Kaplan, 2006). Wright and Masten (2006) have made a creditable attempt to consolidate a set of definitions of these key terms but only time will tell if they are taken up by researchers in the field. A strong consensus surrounding the definition and communication of key concepts in resilience is vital to the ability of researchers within the field to integrate findings across studies, domains and disciplines (Masten, 2007). Only with a consistently agreed definition of resilience applied widely throughout investigations in the field can researchers develop a common and effective understanding of the way resilience operates in the world today, as well as agree on the proportion of children who can be expected to

demonstrate resilient outcomes (Masten & Obradovic, 2006). Such shared understanding is required to improve the explanatory power of the resilience concept, to provide details not only of what factors are associated with increased resilience, but to describe the mechanisms through which they operate, and integrate research findings across multiple disciplines (Cowen, et al., 1996; Masten, 2007; Schoon, 2006).

The field faces a further conceptual challenge in that the definition of "success" against which individuals are judged is necessarily defined by normative judgements relating to what constitutes a positive outcome (S. Howard, et al., 1999; Schoon, 2006). Ensuring that minority views relating to life success are not discounted in resilience research will require qualitative investigation within minority populations to include alternative voices in the field. Ensuring these alternative voices are heard without diluting the usefulness of the "success" concept in research (or indeed, in everyday life) is one of the challenges faced by researchers working in fields characterised by multiple perspectives, such as resilience. Researchers in this field should interact more closely with workers in the prevention and intervention programs – teachers, educational support staff, child health workers, social workers and clinical psychologists – to share the outcomes of current research, so that these programs can be of the greatest possible benefit to children and families (Robinson, 2000; Small & Memmo, 2004).

Increased collaboration will also be required between researchers in the disciplines of genetics, neurobiology, economics, psychology, psychiatry, developmental science, imaging, ethnography, community services, intervention research, computer science, family studies and statistics, as the fourth wave of research builds on new advances in technology for studying biobehavioural processes and assimilates earlier work to arrive at new integrations and explications of the processes underlying resilience at multiple levels – molecular, cellular, bio-systemic, organismic, familial, social, cultural and global (Luthar & Brown, 2007;

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Masten, 2007; Masten & Obradovic, 2006; Rutter, 2006). Targets for cross-level, integrative research can be sensibly drawn from the "short list" outlined at Table 2.1 (Masten, 2007; Masten & Obradovic, 2006).

Current research has already begun to investigate the biological bases of factors well known to be associated with resilience, such as the relation between coping and the activation of the hypothalamus-pituitary-adrenal axis, between optimism and mesolimbic dopamine pathways, and between social competence and oxytocin levels (Feder, et al., 2009). Future investigation into the genetic variance underlying individual differences in these factors will shed further light on the processes by which these biological systems operate to affect developmental outcomes in the face of adversity (Suomi, 2006). While most researchers are energised by the possibilities of transdisciplinary biological and genetic investigations, there are also cautions that the significant role which psychosocial factors continue to play in resilient development should not be ignored (Masten, 2007; Sameroff & Rosenblum, 2006). Nor should researchers be distracted from a focus on developing and testing creative interventions directed at those psychosocial factors that have already been proven to be effective in supporting resilient development (Luthar, et al., 2006; Masten, 2007). While findings from biology provide compelling "objective evidence" of resilience, resilience researchers in psychology should ensure that the impact of environmental factors on healthy development remains at the forefront of public consciousness of resilience promotion, since these are the factors most amenable to effective and efficient interventions (Luthar & Brown, 2007).

Finally, several researchers, including Luthar (1993) and Olsson and colleagues (2003) have suggested that research in the field of resilience may be better served by narrowing its focus onto specific areas of resilience, such as educational resilience, social resilience and emotional resilience, "as these may yield more detailed insights into development" (Olsson, et al., 2003, p. 8).

11.7.2. The Educational Resilience Lens

The lack of clarity around definitions of educational resilience, and the challenges in operationalising resilience concepts do not negate the relevance of this concept to schools and parents, when thinking about children's education. In many ways, an educational resilience lens provides a richer and deeper perspective on children's degree of success in academic life than does simple consideration of academic achievement, considering as it does the maintenance of such achievement over time, as well as the risk and protective factors that operate to support or threaten such achievement. In contrast with a straightforward measure of academic achievement, the educational resilience framework also provides families and educators with concrete recommendations for enhancing a child's ability to deal with the stressors in life and continue to succeed at school.

Increasing the relevance of the educational resilience perspective will require agreement throughout the field on definitions of resilience, educational resilience, the nature of risk, and the manner in which protective factors operate to alleviate or reduce these risks. Similar to the work conducted by Blum, McNeely and Nonnemaker (2002) who illustrated the relative influences of various risk and protective factors on health risk behaviours and resilience, work that outlines the comparative impact of life stressors, the inter-relations between risk and protective factors, and the protective efficacy of various environmental and individual factors in addressing different life stressors to promote educational maintenance or success, will be necessary to move the field forward. An agreed measure of educational resilience – one which measures both maintenance of achievement and level of life stress in a standardised, replicable format – will support the international comparison of educational resilience factors and allow for the preparation of meta-analyses to resolve some of the issues that are currently controversial (Rosenthal, 1994).

11.7.3. Resilience and Interactions

The study of educational resilience, indeed of resilience in general, is in many ways defined by the study of interactions. Interactions between characteristics of individuals and their environments, interactions within and across these environments, interactions between type and timing of adversities, and interactions between risk and protective factors, all operate to affect the outcomes achieved in development. While not discounting the importance of main effects findings in resilience research, Luthar and colleagues (2000) noted that "interaction effects are undoubtedly of great importance: they sensitize researchers to the fact that many so-called protective or vulnerability processes can be highly potent in the context of particular risk conditions, even though their effects are trivial in the absence of adversity" (Luthar, Cicchetti , et al., 2000, p. 575).

Roosa (2000) highlighted some of the difficulties these interactions create for researchers, noting that some of the most commonly used research designs in the field (analysis of variance and regression analysis) may not be appropriate for revealing and explicating the interactive effects relevant to resilience. Studies in this area must address issues of sample size, as well as the methodological restrictions involved in investigating adversity and the challenges imposed by the requirement to undertake measurement over time that are inherent in resilience research. Researchers must meet the challenge to improve the reliability of measurements, increase sample sizes and conduct multiple replications, as well as apply research designs that support the identification of mediators and moderators (e.g., logistic regression, structural equation modelling; Tabachnick & Fidell, 2007) in understanding the processes that affect resilient development (Roosa, 2000). Improved appreciation of the effect of interactions on individual outcomes will result in a more sophisticated view of development, beyond the strictly linear, and support parents, educators, development researchers and prevention scientists in creating

and adjusting childhood environments to promote maximum possible levels of human flourishing in the social, educational and emotional domains (Roosa, 2000).

11.7.4. Resilience and Prevention Research

Resilience as a field of research overlaps many areas, most notably the discipline of prevention research. The focus on development unfolding through time, and attention to the influence of individual and environmental factors, are common to both fields. Prevention research shares further similarities with resilience research in its concern for the welfare of those experiencing adversity, in identifying risk and protective factors through epidemiologic research, and by "identifying and promoting pathways to positive adaptation among risk groups" (Robinson, 2000, p. 570). However, since the inception of the field, research into resilience has distinguished itself from prevention research in two ways. Firstly, resilience research has maintained a consistent focus on "positive indicators among groups typically thought of in terms of their problems" (Luthar, Cicchetti , et al., 2000, p. 574). From the earliest days of resilience research with Werner (1971, 1977, in Werner, 1989) and Garmezy (1971), it has been the unexpectedly positive outcomes achieved by some children living in adverse circumstances that have provided the rationale for the field. As a result of research into resilience, the attention directed to strengths, protective factors and competent development as opposed to deficits, risk factors and negative outcomes, has revolutionised the field of child development (Luthar, Cicchetti, et al., 2000; Luthar, Cicchetti , et al., 2000).

Secondly, through attending to the interactions between risk and protective factors, individuals and their environments, and adversity type and timing, resilience research has provided a more sophisticated understanding of the course of development than that which was previously available. Linear perspectives on development have been superseded by an understanding of development as a reciprocal, dynamic process (Schoon, 2006), in which characteristics of the

individual and the environment exist in a finely tuned feedback loop which can be destabilised in either positive or negative directions by changes to the system. These two differences combine to make resilience stand alone as a field which focuses on the promotion of maximum wellbeing, rather than on eliminating dysfunction to allow performance within the average range, as is more typical in prevention research (Luthar, Cicchetti , et al., 2000). Goldstein and Brooks (2006, p. 10) discuss the need for a "clinical psychology of resilience [that] will allow for the examination of the means by which biological, environmental and related factors interact". This field would essentially unite the resilience and prevention fields under a single aegis of clinical treatment, utilising the strengths of both fields to both eliminate dysfunction and promote optimum functioning in individuals, families and society. Findings from future research in this field can be used to advise policymakers in creating comprehensive, universally accessible programs to support resilient development in all children (Wright & Masten, 2006).

11.8.   The Future of Resilience Research

11.8.1. The Integration of Multiple Disciplines

Future research in the field of resilience requires the application of a wide range of research strategies, incorporating techniques from genetics, biology, neurology, psychiatry, various disciplines within psychology, economics and developmental science, including functional imaging of brain activity, neuroendocrinology, investigations of mental models and the use of animal models (Masten, 2007; Rutter, 2006). It will undoubtedly take into account work that is currently occurring between the fields of psychology and genetics, exploring the epigenetic interplay of heritability and environment. It will consider the extent to which a particular genetic endowment influences not only an individual's reactions to their environment (individual level), but also affects the extent to which parents are able to create a supportive child-rearing environment due to their own genetic

heritage, their lifetime experiences (microsystem) and the interplay between these two factors (Deater-Deckard, et al., 2006; Sameroff & Rosenblum, 2006; Serbin & Karp, 2004).

11.8.2. Genetic Influences on Resilience

The interaction between genetic and environmental contributions to educational attainment has been hypothesised to underlie the inter-generational transmission of inequality (P. Miller, Mulvey, & Martin, 2001). Miller and colleagues (2001) investigated the proportion of genetic and environmental contributions to academic attainment in a large sample of Australian twins, and concluded that from 50% to 65% of the variance in their educational achievement could be attributed to genetic endowments, with between 25-50% of this variance explainable by environmental factors. With regard to resilience, researchers have investigated the influence of neural plasticity, neuroendocrine function and genetics to resilience in children (Curtis & Cicchetti, 2003; W. Johnson, et al., 2006; Kim-Cohen, et al., 2004; Suomi, 2006), as well as measuring the contribution of genetics to population variance in resilience-promoting factors such as adaptability, activity level, effortful control, negative affectivity and sociability (Deater-Deckard, et al., 2006). All note the importance of understanding the contribution of individual genes to development as a contributor to the reciprocal, dynamic processes of the development of resilience (Deater-Deckard, et al., 2006; Schoon, 2006; Suomi, 2006), rather than as a straightforward fatalistic guarantee of negative outcomes:

> Although the form of a gene within an individual may not change, its function and effects on the individual can, and this can depend entirely on changes in the function of other genes and changes in environments. (Deater-Deckard, et al., 2006, p. 57)

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It may be that the research currently being done into genetic and neurobiological contributions to resilience will eventually supersede present considerations of an individual differences model, so that instead of discussing cognitive ability, locus of control, cultural background, temperament and sense of humour as contributory factors, researchers will instead analyse the biological bases of these factors as contributors to resilience. Alternatively, as with the construct of resilience itself, it may be that qualities such as IQ, temperament and locus of control are themselves such finely balanced epigenetic interactions of biological and environmental influences that they remain useful proxies for patterns of helpful and unhelpful inheritance and upbringing, and cannot be disassembled into constituent genes.

Most genetic research into resilience has focussed on identifying genes that confer an increased risk of negative outcomes, including mood, psychiatric and personality disorders (Feder, et al., 2009; Suomi, 2006). The underlying assumption of this research is that inheritance of the "risky" gene variants increases individuals' susceptibility to developing "depression, anxiety, attention-deficit hyperactivity disorder, heightened risk-taking, and antisocial, sociopathic, or violent behaviours, and other problems—if, and only if, the person carrying the variant suffers a traumatic or stressful childhood or faces particularly trying experiences later in life" (Dobbs, 2009, p. 2). This early gene-environment interaction model views negative life outcomes as a product of the "risky" genes and an adverse environment during development (Suomi, 2006; Werner, 2006). Initial understandings of this process suggested that genes that coded for "risky" outcomes survived in the population when they also confer protection against other risks; Deater-Deckard and colleagues (2006) provided the example of the gene for sickle-cell anaemia, which provides protection against malaria when it is inherited from only one parent, but causes life-threatening disease when inherited from both parents. More recent

research into the genetic bases of vulnerability, however, has described a different pattern.

11.8.3. Novel Approaches to the Genetic Underpinnings of Resilience

This research suggests that these "risky" gene variants, rather than simply conferring a liability, may be particularly sensitive to environmental context. This may result in more challenging outcomes after developmental experiences of adversity, but can cause a higher level of adaptation and achievement in individuals who experience sensitive and nurturing environments in childhood. Boyce and Ellis (2005) described the impact of biological sensitivity to context as resulting in two types of children – dandelion children, who are "resilient" and do relatively well regardless of their developmental experiences, and orchid children, who struggle in challenging circumstances, but do exceptionally well when provided with positive developmental experiences. The mechanism proposed to underlie this understanding of genetic predispositions is an increase in sensitivity to environmental experiences for children in both highly stressful and highly nurturant environments (the former as a protective mechanism, increasing their readiness to deal with dangerous situations, the latter to "experience and absorb more fully the beneficial, protective features of supportive, predictable environments"; Boyce & Ellis, 2005, p. 289). This is coupled with a corresponding down-regulation of sensitivity for children growing up in more typical moderate-stress environments, where the decrease in sensitivity allows for improved coping with the everyday range of stressors. This U-shaped curve of sensitivity interacts with genetic predispositions to environmental sensitivity, with the majority of children receiving the "dandelion" heritage, which supports robust development within the normal range, and some children inheriting the "orchid" genes, which push them to the extremes of high or low performance, depending on the influence of their environment.

The essential difference of this viewpoint from traditional genetic perspectives on resilience is simply to emphasise that environmental factors can have positive as well as negative influences on the expression of genetic predispositions and ultimately on life outcomes. However, Boyce and Ellis (2005) argued that this kind of conditional adaptation provides a novel way to think about resilience and human behaviour. Genetic risk is reconceptualised as risk/opportunity. The same sensitivities that make children susceptible to negative outcomes in challenging environments predispose them to positive outcomes in supportive surroundings. In conjunction with a larger proportion of "dandelion" children, who provide population stability by achieving predominantly resilient outcomes regardless of their development environment, orchid children are evolution's gamble – they are at a greater risk of failure, but when they succeed, they achieve at a far higher level than the dandelion children (Dobbs, 2009). Boyce and Ellis (2005, p. 284) postulated that "parents have been selected to "hedge their bets" against an uncertain future by producing both types of offspring". They caution that further research is necessary to provide evidence for this theory outside the realm of biological sensitivity to context, but provide preliminary findings that offer further support for the theory (Ellis, Essex, & Boyce, 2005). Additional research has also provided support for this approach, demonstrating that children who are genetically susceptible to developing ADHD improve more following a parenting intervention, than their non-susceptible peers (Bakermans-Kranenburg, Van IJzendoorn, Pijlman, Mesman, & Juffer, 2008). It is likely that future findings in this area will also demonstrate the relevance of the orchid/dandelion concept in understanding the relation between risk and resilience.

11.8.4. Educational Resilience and the "Orchid" Gene

The application of this concept to educational resilience and Kumon study provides some interesting avenues for future consideration and investigation but at

this stage, it raises more questions than it answers. If the majority of children can be expected to "muddle through" the education system regardless of what goes wrong in their lives, but a smaller proportion are at risk of catastrophic educational failure under the wrong circumstances when they could be high achievers, do we need screening programs to find these children and offer them the appropriate kinds of educational support? What are the ethical implications around the provision of support to "orchids", if such support comes at the expense of helping "dandelions"? Can Kumon study be considered the supportive educational environment needed for orchid children? Do we see an illustration of this theory in cases like that of the Queensland Kumon student Kirsty Vernon? Disruptions in Kirsty's early schooling led to struggles in mathematics. Her parents enrolled her in Kumon study in primary school, after which she accelerated her progress to such an extent that she completed high school at the age of 15, finished a science degree at 19, and went on to study for a PhD in nanotechnology (Kumon, 2007b). Kirsty seems to provide a textbook example of the orchid pathway for development: she struggled academically under adverse conditions, but when the correct educational supports were provided, she was able to flourish well beyond the expectations of her parents and teachers. Further research into this area is needed, but it is likely that future understandings of resilience will take into account the new perspective that environmental inputs can influence the expression of genetic outcomes, and therefore development, in both positive and negative ways.

11.8.5. Resilience Research Applied

As the field of resilience defines itself more precisely, possibly by splitting into more specific areas of research (such as educational resilience and emotional resilience) and incorporating perspectives from minority groups, it will become increasingly distinct from related fields such as prevention research. However, as a fundamentally applied and multidisciplinary field, resilience research must provide

policy makers with findings that allow the establishment of programs to support child development which are both effective and efficient (Luthar & Brown, 2007). Integrating the findings from new genetic studies will provide a deeper understanding of the mechanisms underlying resilience and move the field towards a true bio-psycho-social model of resilience, with implications for intervention and recovery from adversity. Finally, as Masten and Obradovic (2006, p. 23) remind us, "it is important to remember that many sources of threat to child development are preventable...and far less costly to prevent than to address once they begin to erode development and the adaptive tools for life".

11.9.   Summary and Conclusions

This chapter has summarised the findings of the research programme and identified key areas within the field of resilience research that require further consideration, conceptualisation, or research. In line with previous research, the present study found that factors like cognitive ability, locus of control, cultural background and exposure to lifetime adversities are important influences of educational resilience. However, a large degree of unexplained variance may come from factors that were not considered in the present study, such as temperament, and biological predispositions. Limitations of the study included some aspects of: data collection, data variability, intervention control, and sampling challenges; restrictions on the scope of the studies conducted; and conceptual issues relating to the definition of resilience, and the ethics of research into adversity. Further limitations of the current research included the lack of a third participant group to compare the impact of another form of tutoring on resilience outcomes, and an inability to test the impact of Kumon study on a variety of different adversities. More detailed analysis of the impact of Kumon study on educational resilience is required to determine whether it plays a conclusive role. Researchers could also profitably consider parental values and motivations for enrolment in Kumon, the impact of

parental sex on the reporting of adversity, and gaining a deeper understanding of parent and child beliefs around mechanisms of resilience. Future research should address these limitations through the execution of large scale, longitudinal studies, or through replications, extensions and generalisations of previous research to validate and confirm previous findings.

Despite the limitations listed above, the present study contained several innovations and strengths in the study of resilience that should be replicated or extended in future work, including: investigating resilience in mainstream, multi-cultural Australian populations; investigating the Kumon method's influence on educational resilience; defining resilience in terms of maintenance of academic achievement over time; operationalisation of the concepts of resilience and vulnerability using a method adapted from Kim-Cohen and colleagues (2004); incorporating children's perspectives on their own resilience; and integrating qualitative and quantitative research designs to allow both breadth and depth of study.

Educational Resilience is an intuitively appealing idea, bounded by many complexities – clearly, while the models provided measure some of the factors that impact on resilience and achievement, there are unknown or unmeasured factors that also play a role, given the large amount of variance left unexplained. The sheer volume and complexity of contributors to resilience, as well as the challenge of fitting theoretical constructs onto real life, on-the-ground data, means that this area is in need of an update on the kind of longitudinal research that the resilience construct was built on. Future research will require a blend of these longitudinal studies with carefully structured cross-sectional studies that work to account for the many unknown factors and the many challenges of educational resilience research.

As education becomes increasingly important to individuals' and societies' ability to achieve important benefits (such as increased personal income, economic growth, better health and improved levels of tolerance and harmony), understanding

the key issues relating to educational resilience enhances our ability as researchers, parents, educators and citizens to support every individual to fulfil their educational potential. The present study contributed to this outcome in three ways: by replicating international findings that Kumon enhances academic achievement and indicating that it may enhance educational resilience; by codifying a range of the risk and protective factors that appear to operate within the lives of mainstream Australian children; and by considering the perspectives of child participants in the study outcomes. Further study is required in the area of genetic contributions to resilience, particularly in the light of recent findings which extend the potential impact of "risky" genes into positive outcomes in the right environments.

Current issues in the field include the lack of consensus around definitions of resilience and related terms (including adversity, risk, protective factors and vulnerability), the criticism that "success" is ultimately a normative concept, and the trend to splitting resilience into narrower topics, such as educational resilience and social resilience. The perspective of educational resilience supports diagnosis and intervention for individuals who are struggling academically, but further work is needed to understand the mechanisms through which educational resilience operates to support ongoing academic success in the face of adversity. The impact of interactions between individuals and their environments, types of adversity and outcomes, and risk and protective factors, mean that more complex research designs are required to study this field effectively. As resilience researchers address these issues, the distinctions between resilience and other closely related areas will become clearer. The fourth wave of resilience research, currently building speed, is likely to focus on the integration of processes studied at multiple levels (Masten & Obradovic, 2006), concentrating on the development of individuals within a bioecological framework (S. Goldstein & Brooks, 2006). While it is unlikely that research will yield a single, ultimate solution that will confer positive adaptation on every child in every situation, developing awareness of the inter-relations between

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individuals and the systems within which they develop means that we continue to develop better matches between complex problems and appropriate interventions. As a field, resilience continues to hone understandings of the relations between challenge and development, between adversities and outcomes, between strengths and opportunities, to support an improved chance of success for every child, regardless of the situation into which they are born.

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APPENDICES

Appendix A – Information Sheets and Consent Forms

Appendix B – Questionnaires used in the Study

Appendix C – Literacy and Numeracy Tests

Appendix D – Calculation of New Variables in SPSS from Raw Data

Appendix E – Final Dataset Specification

Appendix F – Qualitative Results – Large Figures

Appendix G – Tests on the Effect of Including Participants who had Undertaken

Additional Tutoring

Appendix H - Correlations Between Variables Used in the Multiple Regression Model

Described in Section 8.2.2

Appendix A – Information Sheets and Consent Forms

Several information sheets and consent forms were used in the study. These are reproduced overleaf. They include:

- Information sheet for Kumon families

- Information sheet for Control group families

- Consent form for participation on the study

- Consent form for accessing Kumon records

- Consent form for accessing LAN records

Information Sheet – Educational Resilience & Kumon

SCHOOL OF PSYCHOLOGY

ADELAIDE UNIVERSITY SA 5005
AUSTRALIA
TELEPHONE +618 8303 5693
FACSIMILE   +618 8303 3770

Dear Parent,

My name is Jordan Roberts and I am a PhD/Masters student within the School of Psychology at the University of Adelaide, training to become a Clinical Psychologist. I am currently conducting research towards the completion of my PhD, investigating the links between Kumon and Educational Resilience.

This information is being provided to you because your family is eligible to participate in this study, as your child is studying Kumon maths, and is in Year 4, Year 5, Year 6 or Year 7 in 2008. Families that choose to participate will receive information about their child's IQ. Your participation is voluntary and information gained through the study will be kept confidential – your child's Kumon supervisor will not be informed of the results.

This sheet outlines purpose and benefits of the research that I am undertaking. If you have any questions after reviewing this information, please contact me: **0411 407 205** or **jordan.r.roberts@student.adelaide.edu.au**.

Study Background

Resilience is a measure of how easily children recover from difficult situations (such as bullying, the death of a family member or a serious illness). Educational resilience measures this recovery ability in a school context, assessing how well children "bounce back" from troubles and trauma to achieve at their previous academic level after the difficult situation has passed. The qualities of children, schools and families which promote educational resilience have been studied overseas, but little work has been done in an Australian context. Issues like a person's intelligence, locus of control (a person's tendency to look for explanations in themselves or in the environment) and the number of adverse events they have experienced, can all influence educational resilience.

The Kumon Method of mathematics instruction aims to teach students a range of life skills, such as independence, self-discipline and confidence, while improving their skills in mathematics. International research has shown that Kumon can definitely improve children's mathematical ability, but no research has yet been done on Kumon's impact on children's educational resilience.

A measure used in this study relies on comparing information from your child's previous Literacy and Numeracy (LaN) tests in 2005/2006/2007 (depending on current school grade) with the results of the LaN to be undertaken in 2008/2009, and so participants will be contacted again in late 2008/2009 for a follow-up interview.

Why do this study?

This study is being undertaken to see whether the Kumon Method of instruction has an impact on children's educational resilience. The study will also provide important information for the application of resilience research from overseas to Australian children and schools.

What are the potential benefits of the study?

Participants in the study will receive information about their child's IQ. Participants may also elect to be notified about the outcome of the research if they wish.

The outcomes of this study will provide information about educational resilience in Australia, and specifically, whether the Kumon Method can contribute to increased educational resilience in Australian school children.

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What form does the study take?

If you wish to participate, the interview will take the form of a questionnaire that will be completed by your child (Brief Intellectual Ability scale; Locus of Control; Resilience scale; Kumon Diagnostic Test); and a questionnaire that will be completed by you (Family Inventory of Life Events; Child experience of Adverse Events; Demographic questions; provision of LaN information). The interview will take about 90 minutes in total, and can be conducted at your home, or at The University of Adelaide, depending on your preferences.

You will also be asked to sign a release form giving me access to your child's Kumon history, which will be obtained from Kumon head office in Sydney.

If you do not have a copy of your child's LaN results from 2005/6/7, you will be asked to sign a release allowing me to access them from your child's school records.

You will be asked for your agreement to be contacted in November 2008/9 for details of your child's LaN results from that year.

You are free to withdraw from the study at any time without consequences. Your child's school teacher and Kumon supervisor will not be contacted, nor will they be notified of the results of any of the tests.

There are few foreseeable risks or discomforts associated with the study. The Family Inventory of Life Events asks questions about a range of difficult or uncomfortable situations which families may have experienced in the past 24 months, and you will be provided with an envelope within which to seal your completed response, if you wish.

How will my family's confidentiality be maintained?

The information that you provide is strictly confidential. Please note that your confidentiality will be strictly maintained, and you will not be identified in any way through your involvement with this interview. All responses will be identified only by number, and material linking your family name to the results returned will be maintained solely by the lead investigator in order to allow for follow-up. The data will be stored securely in locked filing cabinets (as required for seven years).

The results of this study are part of a research project. These results may be published in an aggregated form, but will not personally identify you.

If you agree to participate in the study, you will be asked to sign a consent form.

For more information, or to register your interest in participating, and to book a time for an interview, please call <u>Ms. Jordan Roberts</u> on 0411 407 205.
email: jordan.r.roberts@student.adelaide.edu.au

Further questions

Any questions or concerns about this project can be directed to Dr. Lisa Kettler, School of Psychology, ph. 08 8303 5737. This project has been approved by the School's Human Ethics Committee (Approval # 06/107) and any questions about the ethics of the project can be directed to the Chair of the School Human Ethics Committee, Dr Paul Delfabbro, ph 08 8303 5744.

Information Sheet – Educational Resilience in SA

SCHOOL OF PSYCHOLOGY

ADELAIDE UNIVERSITY SA 5005
AUSTRALIA
TELEPHONE +618 8303 5693
FACSIMILE +618 8303 3770

Dear Parent,

My name is Ms. Jordan Roberts and I am a PhD/Masters student within the School of Psychology at the University of Adelaide, training to become a Clinical Psychologist. I am currently conducting research towards the completion of my PhD, investigating the links between Kumon (an out-of-school tuition program) and Educational Resilience.

Families are eligible to participate in this study if they have a child in Year 4, Year 5, Year 6 or Year 7 in 2008, who does not participate in any additional out-of-school tuition. Families that choose to participate will receive information about their child's IQ, and broad mathematical ability. There is no cost to participate in the study. Your participation is voluntary, and information gained through the study will be kept confidential – no-one except you will be informed of the individual results your child achieves. The researcher interviewing the children has a National Police Clearance certificate.

If you are interested to participate, please read this information sheet, then fill in and return the tear-off response to [NAME] by Monday 16th June 2008.

This sheet outlines purpose and benefits of the research that I am undertaking. If you have any questions after reviewing this information, please contact me: **0411 407 205** or **jordan.roberts@adelaide.edu.au**.

Study Background

Resilience is a measure of how easily children recover from difficult situations (such as bullying, the death of a family member or a serious illness). Educational resilience measures this recovery ability in a school context, assessing how well children "bounce back" from troubles and trauma to achieve at their previous academic level after the difficult situation has passed. The qualities of children, schools and families which promote educational resilience have been studied overseas, but little work has been done in an Australian context. Issues like a person's intelligence, locus of control (a person's tendency to look for explanations in themselves or in the environment) and the number of adverse events they have experienced, can all influence educational resilience.

The Kumon Method of mathematics instruction aims to teach students a range of life skills, such as independence, self-discipline and confidence, while improving their skills in mathematics. International research has shown that Kumon can improve children's mathematical ability, but no research has yet been done on Kumon's impact on children's educational resilience.

A measure used in this study relies on comparing information from your child's previous Literacy and Numeracy (LaN) tests in 2005/2006/2007 (depending on current school grade) with the results of the NAPLAN (National Assessment Program - Literacy and Numeracy) undertaken in 2008, and so participants will need to provide permission for the school to release these records.

Why do this study?

This study is being undertaken to see whether the Kumon Method of instruction has an impact on children's educational resilience. The study will also provide important information for the application of resilience research from overseas to Australian children and schools.

What are the potential benefits of the study?

Participants in the study will receive information about their child's IQ, and broad mathematical ability. Participants may also elect to be notified about the outcome of the research if they wish.

The outcomes of this study will provide information about educational resilience in Australia, and specifically, whether the Kumon Method can contribute to increased educational resilience in Australian school children.

What form does the study take?

If you are willing to participate, the interview will take the form of a questionnaire that will be completed by you at home, and posted to the researcher (Family Inventory of Life Events; Child experience of Adverse Events; Demographic questions; provision of LaN/NAPLAN information), followed by a questionnaire that will be completed by your child at school (Brief Intellectual Ability scale; Locus of Control; Resilience scale; Kumon Diagnostic Test).

The questionnaires for children include questions about the meanings of words, puzzle-solving, basic mathematical calculations, questions about how they feel about school and about the future, and questions about the reasons they believe different things happen (eg "Does cheering help a sports team to win?"). These questions have all been tested extensively on children to ensure that they are suitable. It is unlikely that any of these questions will be upsetting to children, but if they experience distress during the testing session, they may withdraw at any time. The researcher would return the child to class and follow-up as necessary with parents.

If you wish to participate, you will be asked to sign a consent form, agreeing to your child's participation in the study and allowing me to access your child's LaN and NAPLAN results in 2005, 2006, 2007 or 2008 from school records. You will also be asked to complete and post back a questionnaire about your family, and a pre-paid envelope will be provided. Once the parent questionnaire has been returned, IQ test results will be sent to you via post.

You are free to withdraw from the study at any time without consequences. Your child's school teacher will not be notified of the results of any of the tests.

There are few foreseeable risks or discomforts associated with the study. The Family Inventory of Life Events asks questions about a range of difficult situations which families may have experienced in the past 24 months, but your results will be maintained in strict confidence.

How will my family's confidentiality be maintained?

The information that you provide is strictly confidential. Please note that your confidentiality will be strictly maintained, and you will not be identified in any way through your involvement with this interview. All responses will be identified only by number, and material linking your family name to the results returned will be maintained solely by the lead investigator in order to allow for follow-up. The data will be stored securely in locked filing cabinets (as required for seven years).

The results of this study are part of a research project. These results may be published in an aggregated form, but will not personally identify you.

If you agree to participate in the study, you will be asked to sign a consent form.

For more information please call <u>Ms. Jordan Roberts</u> on 0411 407 205.

email: <u>jordan.roberts@adelaide.edu.au</u>

If you wish to participate, please complete the attached consent form and return it to [NAME]. Once you have provided your consent, your child will be added to the roster for testing at school, and questionnaires will be sent out to you.

Further questions

Any questions or concerns about this project can be directed to Dr. Lisa Kettler, School of Psychology, ph. 08 8303 5737. This project has been approved by the School's Human Ethics Committee (Approval # 06/107) and any questions about the ethics of the project can be directed to the Chair of the School Human Ethics Committee, Dr Paul Delfabbro, ph 08 8303 5744. This project has been approved by the Department for Education and Children's Services (DECS).

NB - Early plans to provide families with feedback on a broader range of results, such as Locus of Control and Mathematics Ability, were discontinued, as participants appeared to find it challenging to correctly interpret the results as reported.

THE UNIVERSITY OF ADELAIDE HUMAN ETHICS COMMITTEE

Consent form
For research to be undertaken on a child
To be completed by the Parent or Guardian

1. I, …………………………………………… consent to allow *(print parent's name)*

   ………………………………………… *(print child's name)*

   to take part in the research project entitled "Educational resilience in South Australian School Children" (School of Psychology Human Ethics Committee Approval #06/107).

2. I acknowledge that I have read the attached Information Sheet entitled "Educational Resilience & Kumon" and have had the project, as far as it affects

   ………………………………………… *(print child's name)*
   fully explained to me by the research worker. My consent is given freely.

   IN ADDITION, I ACKNOWLEDGE THE FOLLOWING OF BEHALF OF

   ………………………………………… *(print child's name)*

3. Although I understand that the project is to improve knowledge about resilience in children, it has been explained to me that involvement may not be of any benefit to him/her.

4. I have been given the opportunity to have a friend/family member present while the project was explained to me.

5. I have been informed that the information he/she provides will be kept confidential.

6. I understand that he/she is free to withdraw from the project at any time and that this will not affect his/her education.

7. I am aware that I should retain a copy of this consent form, when completed, and the attached information sheet.

   ………………………………… Parent/Guardian   ……………………
   (please sign and indicate relationship)   *(date)*

WITNESS

I have described to …………………………………. *(name)*
the nature of the procedures to be carried out. In my opinion, he/she understood the explanation.

Status in project: …………………………………………………..

Name…………………………………………………………………

………………………………………………   …………………………..
(signature)   *(date)*

Consent to Access Records from Kumon Australia Head Office

1.   I, …………………………………………… consent to allow *(print parent's name)*

Jordan Roberts, a researcher from The University of Adelaide School of Psychology, to access Kumon Australia Head Office records relating to

……………………………………………'s   *(please print child's name)*

Kumon studies, including tests results, length of study and other information that may be relevant. I understand that this information will be used for research purposes only.

2.   I understand that my child's Kumon Supervisor will not be asked to provide this information.

3.   This information will be used for a research project entitled "Educational resilience in South Australian School Children" (School of Psychology Human Ethics Committee Approval # 06/107).

…………………………………… Parent/Guardian   ……………………
(please sign and indicate relationship)   *(date)*

Ref No…………………..

Consent to Access LAN Records

1.   I, …………………………………………… consent to allow *(print parent's name)*

Jordan Roberts, a researcher from The University of Adelaide School of Psychology, to access records from

………………………………………………   *(print name of school)*

relating to

………………………………………………   *(please print child's name)*

results on the Literacy and Numeracy Tests undertaken in ……………….… *(year/s)*

2.   I understand that this information will be used for research purposes only.

3.   This information will be used for a research project entitled "Educational resilience in South Australian School Children" (School of Psychology Human Ethics Committee Approval # 06/107).

…………………………………… Parent/Guardian   ……………………
(please sign and indicate relationship)   *(date)*

Ref No…………………..

Appendix B – Questionnaires used in the Study

All questionnaires used in the study are listed below. References and sources are provided for those tests which are readily available, or proprietary; full details are provided for tests that are in the public domain, or that were developed for this study. The Kumon Diagnostic Test, which is both proprietary and non-commercially available, is described, and sample questions, similar to those in the tests, are provided.

Woodcock-Johnson III Brief Intelligence Assessment

Woodcock, R. N., McGrew, K. S, & Mather, N. (2001). *Woodcock-Johnson III Tests of Cognitive Abilities.* Itasca, IL, Riverside Publishing.

Locus of Control Scale for Children

Nowicki, S. and B. R. Strickland (1973). "A locus of control scale for children." *Journal of Consulting and Clinical Psychology* **40**: 148-154.

California Healthy Kids Survey Module B: Resilience

Kumon Diagnostic Tests

Family Inventory of Life Events

Child Experience of Adverse Events

Demographic Questions

Adult and Child Values in Life

Adult and Child Qualitative Questions

Appendix B – Questionnaires used in the Study

Child Experience of Adverse Events Scale (CEAE)

Developed for the present study.

Child experience of adverse events

Section 1 – Child's health background
1. Does your child have a chronic health condition? Y / N

If Y:
What is the nature of the chronic health condition? _____

How old was your child when this condition was diagnosed? _____ yrs

Has your child been held back a grade, or disadvantaged, at school because of their health condition? Y / N
If Y, please provide details.

_____

_____

Other impacts of the chronic health condition on your child's life – eg social, emotional, issues with siblings.

_____

_____

2. Has your child experienced a serious acute illness which prevented him/her from attending school and participating in normal activities, for four weeks or more? Y / N

What was the nature of the illness? _____

How old was your child when this illness occurred? _____ yrs

Has your child been held back a grade, or disadvantaged, at school because of their illness? Y / N
If Y, please provide details.

_____

_____

3. Does your child have a physical or sensory disability (NOT a specific learning disability, which will be dealt with in Section 3)? Y / N

If Y:
What is the nature of the disability? _____

How old was your child when this condition was diagnosed? _____ yrs

Has your child been held back a grade, or disadvantaged, at school because of their disability? Y / N
If Y, please provide details.

_____

_____

Other impacts of the disability on your child's life – eg social, emotional, issues with siblings.

_____

_____

Section 2 – Social issues
4. Has your child experienced bullying at school that was severe enough to require adult intervention? Y / N

If Y, please provide details.

_____

_____

_____

5. Has your child had difficulty making or keeping friends (in or out of school)? Y / N

If Y, please provide details.

_____

_____

Section 3 – Education issues

6. Does your child have a specific learning disability/ies (SLD)?

Dyslexia	Y / N	Mild / moderate / severe
Dyscalculia	Y / N	Mild / moderate / severe
CAPD	Y / N	Mild / moderate / severe
Autistic Spectrum Disorders	Y / N	Mild / moderate / severe
ADHD	Y / N	Mild / moderate / severe
Physical disability	Y / N	Mild / moderate / severe
Sensory disability	Y / N	Mild / moderate / severe
Other ………………………	Y / N	Mild / moderate / severe

If Y, please provide details:

How old was your child when this issue was diagnosed? _____ yrs

Has your child been held back a grade, or disadvantaged, at school because of their SLD? Y / N
If Y, please provide details.

_____

_____

_____

Other Impacts of the SLD on your child's life – eg social, emotional, issues with siblings.

_____

_____

_____

8. Has your child undertaken private tutoring of any kind? Y / N
If Y, please provide details.

_____

_____

_____

9. Has your child been educated under a non-mainstream educational approach/es (eg Waldorf, distance education, home schooling, Steiner school, Other)

Y / N   If Y, please provide details

What kind of non-mainstream schooling was chosen?_____

Why did you choose this method?

_____

_____

How old was your child when they commenced this method? _____ yrs

Is the child currently enrolled in this method of schooling? Y /N

If N, How old was your child when they stopped this method? _____ yrs

What were the reasons for stopping?

_____

_____

10. I would classify my relationship with my child's school as (please circle one):

Excellent   Good   Average   Poor   Dreadful   Non-existent

11. Please circle the response that best describes your feelings about your child and school.

I am happy / satisfied / unhappy with my child's progress at school.

Please provide details

_____

_____

I am happy / satisfied / unhappy with my child's experiences at school.

Please provide details

_____

_____

For Kumon families only

12. My child has been studying with Kumon for _____ years / _____ months

13. I would classify my relationship with my child's supervisor as (please circle one):

Excellent   Good   Average   Poor   Dreadful   Non-existent

14. Why did you choose to enrol your child in Kumon?

Please provide details

_____

_____

_____

_____

15. Please circle the response that best describes your feelings about your child and Kumon.

I am happy / satisfied / unhappy with my child's progress at Kumon.

Please provide details

_____

_____

_____

I am happy / satisfied / unhappy with my child's experiences at Kumon.

Please provide details

_____

_____

_____

Demographic Questions

Child's birthdate	/ /
Child's gender	M / F

Family structure (tick all people that live in this household)

Biological mother ☐

Biological father ☐

Step-mother ☐

Step-father ☐

Adoptive female parent or guardian ☐

Adoptive male parent or guardian ☐

Biological siblings   Number of male siblings:_____

Number of female siblings:_____

Step- or adopted siblings   Number of male siblings:_____

Number of female siblings:_____

Other relatives – living in this household   Please list

Other non-related persons – living in this household   Please list

Does the child spend more than 3 nights per month at another location on a regular basis?   Yes ☐   No ☐

If Yes, please provide details.

Location
Carer's relationship to child
Frequency of visits per month

Cultural background

Aboriginal-Australian ☐
Anglo-Australian ☐
Chinese ☐
Greek ☐
Italian ☐
Vietnamese ☐
Other ☐ Please specify _____ Ref Number………………

Household adults' working conditions

Adult (male) working outside the home
Full Time (FT) ☐   Part Time (PT) ☐ N/A ☐

Adult (female) working outside the home
Full Time (FT) ☐   Part Time (PT) ☐ N/A ☐

No adult working outside the home   ☐

Typical hours spent at work outside the home

Adult 1   N/A ☐
____am – ____ pm ____ days per week

Adult 2   N/A ☐
____am – ____ pm ____ days per week

Family income
Please tick the box which corresponds to your weekly/annual family income from all sources.

Weekly Income		**Annual Income**
Negative/Nil income	☐	Negative/Nil income
$1 - $199	☐	$1 - $9,999
$200 - $399	☐	$10,000 - $20,999
$400 - $599	☐	$21,000 - $30,999
$600 - $799	☐	$31,000 - $41,999
$800 - $999	☐	$42,000 - $51,999
$1,000 - $1,499	☐	$52,000 - $77,999
$1,500 - $1,999	☐	$78,000 - $104,999
$2,000 - $2,999	☐	$105,000 - $155,999
$3,000 or more	☐	$156,000 or more

Adults were asked to rank their values on a table similar to that presented in Figure B1.

Parental Values
Please rank the following areas in order of their importance to you, when you think about your child (1 = Most important; 7 = least important)

	Importance Rank (1 – 7)
Artistic Expression - music, art, drama, creative writing	
Education	
Exercise and Sport	
Enjoying time together as a Family	
Happiness	
Informal play and relaxation – alone or with friends	
Volunteer work or Religious responsibilities	

Figure B1. Table of parental values

Children were asked to arrange the following items, provided on individual cards, from most important to least important (see Figure B2).

School and studying
Outside games and Sport
Feeling Happy
Helping people or spending time with God
Doing music, art, drama or story writing
Just mucking around
Spending time with family

Figure B2. Table of Child values

Adult and Child Qualitative Interview

Adults and children were asked parallel versions of the relevant questions, as outlined in Figure B3.

Child questions	Adult questions
There are lots of things that can make kids feel like they are "doing OK" or "not doing OK" in their lives. Thinking about all the kids you know (including yourself):	There are lots of things that can make children feel like they are "doing OK" or "not doing OK" in their lives. Thinking about all the children you know (not just your own):
• How would you know if a kid was "doing OK" in life?	• How would you know if a child was "doing OK" in life?
• How would you know if a kid was "not doing OK" in life?	• How would you know if a child was "not doing OK" in life?
• What are the things that make some kids feel like they are "doing OK" in life?	• What are the things that make some children feel like they are "doing OK" in life?
• What are the things that make some kids feel like they are "not doing OK" in life?	• What are the things that make some children feel like they are "not doing OK" in life?

Figure B3. Qualitative questions used in the study

NOTE:
This appendix is included on pages 433-435 of the print copy
of the thesis held in the University of Adelaide Library.

Appendix D – Calculation of New Variables in SPSS from Raw Data

Table D1

New variables calculated from raw scale data (Italics – variable was not used in final analyses)

New Variable name	How calculated	Rationale
Total_age_months	(Age_years*12)+Age_months	Months is easiest age frame to work with
DT_percent_accuracy	(DT_score/DT_out_of)*100	Allows comparison between DTs of different levels
Values_compare_artistic	Parent value-child value	Difference score – 0 equals identical, negative = child thinks it's less important; positive, adult thinks it's less important
Values_compare_education	Parent value-child value	Difference score – 0 equals identical, negative = child thinks it's less important; positive, adult thinks it's less important
Values_compare_sport	Parent value-child value	Difference score – 0 equals identical, negative = child thinks it's less important; positive, adult thinks it's less important
Values_compare_family	Parent value-child value	Difference score – 0 equals identical, negative = child thinks it's less important; positive, adult thinks it's less important
Values_compare_happiness	Parent value-child value	Difference score – 0 equals identical, negative = child thinks it's less

		important; positive, adult thinks it's less important
Values_compare_freeplay	Parent value-child value	Difference score – 0 equals identical, negative = child thinks it's less important; positive, adult thinks it's less important
Values_compare_religvol	Parent value-child value	Difference score – 0 equals identical, negative = child thinks it's less important; positive, adult thinks it's less important
Parent_MH_issues	Score on FILE 3a or 3b	This is the only measure of parent mental health in the study (0-2)
Parent_alc_drug_use	Score on FILE 4a or 4b	This is the only measure of parent substance use in the study (0-2)
Famly_discord	Score on FILE 5a, 5b, 6a, 6b, 7a, 7b, 19a, 19b, 20a, 20b, 21a or 21b	Measure of conflict between family members (0-12)
Parental_divorce_seperation	Score on FILE 18a or 18b	Measure of divorce or separation (0-2)
Phys_Sex_abuse_Dom_viol_ in_home	Score on FILE 69a or 69b	Measure of sexual abuse or violence within the home (0-2)
Crim_bhvr_in_home	Score on FILE 67a, 67b, 68a, or 68b	Measure of jail or police involvement (0-4)
Fin_strain	Score on FILE 27a, 27b, 33a, 33b, 34a, 34b, 35a, 35b, 36a or 36b	Measure of welfare, family financial strain (0-8)
Poverty	Family income below 31,000 per annum	Best estimate of poverty line in Australia in 2009 based on standard

		methods of calculation
CEAE_total	Sum of all scores on CEAE	Cumulation seems to be the best method of assessing the impact of multiple stressors on a child's life.
LANgap_grade	Lan_grade2 – Lan_grade1	Checking it's been 2 grades between tests for people (yes except for N=2)
LANgap_year	Lan year2 – Lan_year1	Checking it's been 2 years between tests for people (yes except for N=5 – kids who repeated?)
Tough_Life	Sum of Parent_MH_issues, Parent_alc_drug_use, Famly_discord, Parental_divorce_seperation, Phys_Sex_abuse_Dom_viol_in_home, Crim_bhvr_in_home, Fin_strain, Poverty	As per rationale described under "Total Life Challenges" above
Int_resil_SC	Self-concept	As defined by Sharkey et al, 2008
Int_resil_IS	Interpersonal Skills	As defined by Sharkey et al, 2008
Int_resil_GA	Goals & Aspirations	As defined by Sharkey et al, 2008
Ext_resil_SclC	Feelings about school	As defined by Sharkey et al, 2008

Ext_resil_SFA	School & Family Assets	As defined by Sharkey et al, 2008
Ext_resil_total	Sum of School & Family Assets and Feelings about school	As defined by Sharkey et al, 2008
Int_resil_total	Sum of Self-Concept, Interpersonal Skills and Goals & Aspirations subfactors of the Internal Resiliency Scale.	As defined by Sharkey et al, 2008
Resil_total	Sum of the External and Internal Resiliency subscales	
Total_Siblings	Sum of Male_sibs, Female_Sibs, Male_stepsibs and Female_stepsibs	Impact of family size
Kumon_total	(Kumon_years*12)+Kumon_months	Total months in Kumon
Cult_bground_limit	Cultural background summary using categories: Aboriginal-Australian, Anglo_Australian, European, Asian & Other	Allows clearer comparison between source groups
LAN1_Numcy_percent	(LAN1_Numeracy_score/LAN1_Numeracy_outof)*100	Allows comparison between LAN tests of different kinds and years

LAN1_Read_percent	(LAN1_Read_score/LAN1_Read_outof)*100	Allows comparison between LAN tests of different kinds and years
LAN1_Write_percent	(LAN1_Write_score/LAN1_Write_outof)*100	Allows comparison between LAN tests of different kinds and years
LAN1_Spell_percent	(LAN1_Spell_score/LAN1_Spell_outof)*100	Allows comparison between LAN tests of different kinds and years
LAN2_Numcy_percent	(LAN2_Numeracy_score/ LAN2_Numeracy_outof)*100	Allows comparison between LAN tests of different kinds and years
LAN2_Read_percent	(LAN2_Read_score/ LAN2_Read_outof)*100	Allows comparison between LAN tests of different kinds and years
LAN2_Write_percent	(LAN2_Write_score/LAN2_Write_outof)*100	Allows comparison between LAN tests of different kinds and years
LAN2_Spell_percent	(LAN2_Spell_score/LAN2_Spell_outof)*100	Allows comparison between LAN tests of different kinds and years
Source_2	Kumon = 0; School 1 = 1; School 2 =1	Dichotomous source variable
LAN2subLAN1_Num	LAN2_Num – LAN1_Num	Change score for Numeracy
LAN2subLAN1_Read	LAN2_Read – LAN1_Read	Change score for Reading
LAN2subLAN1_Write	LAN2_Write – LAN1_Write	Change score for Writing
LAN2subLAN1_Spell	LAN2_Spell – LAN1_Spell	Change score for Spelling
Num_LAN_Change_miss	Missing data = 0	Check for missing data
Read_LAN_Change_miss	Missing data = 0	Check for missing data
Write_LAN_Change_miss	Missing data = 0	Check for missing data

Spell_LAN_Change_miss	Missing data = 0	Check for missing data
LAN_Change_missing_ dummy	Sum of Num_LAN_Change_miss, Read_LAN_Change_miss, Write_LAN_Change_miss, Spell_LAN_Change_miss	Use as a filter to remove cases with missing data
Average_LAN_Change	Mean of LAN2_Num – LAN1_Num, LAN2_Read – LAN1_Read, LAN2_Write – LAN1_Write, LAN2_Spell – LAN1_Spell	Mean change score across all subtests for use in MR
Private_Tutor_NonK	Non-Kumon students with a private tutor = 1	Use as a filter to remove cases with additional tutoring
CEAE_any_disability	Sum of CEAE disability subscales	Total experience of disability
CEAE_total_without_disability	CEAE_Total – CEAE_any_disability	CEAE total without disability
DisabilityLAN_filter	CEAE disability = 1	Use as a filter to remove cases with disability
Two_parents	Sum of Mother, Father, Step-mother, Step-Father, Adoptive mother, Adoptive father	Number of parents in the home
Age_at_problem	Age at first problem listed on CEAE (years)	
Age_at_problem_months	Age at first problem listed on CEAE (months)	

Age_preKumon_months	Age at start of Kumon	
Tutoring_Dummy_KandnK	Private tutoring = 1; Kumon = 1	Ever received any form of tutoring
Avg_LAN1_score	Mean score on LAN1_Num, LAN1_Read, LAN1_Write, LAN1_Spell	For entry into the Regression Equation to control for LAN1 score's impact on change score
LAN2_month	Month of LAN2 test	When in year LAN test was taken (changed partway through testing)
LAN2_yr_month	Year and month of LAN2	For calculation of age at LAN2
Birthday	Day, month, year	Birthdate – for calculation of age at LAN2
Age_at_LAN2	LAN2_yr-month – birthday	Age at time of taking LAN2 test
Months_Kmn_b4_LAN2	LAN2_yr_month – age at start of Kumon	How much Kumon study completed before LAN2
Total_life_stress	Sum of CEAE and FILE	As per rationale described under "Total Life Challenges" above

Table E1

Final dataset specification

Dataset condition	*N in sample*	*N* removed
Original dataset	164	
Adjusted outliers	164	-
Removed Kumon participants who had studied Kumon for less than 6 months	162	–2
Removed Kumon participants who had studied Kumon less than 3 months before sitting their LAN2 tests	161	–1
Removed Kumon participants who had commenced Kumon study after sitting their LAN2	157	–4
Screened out all participants with no LAN change score	106	– 51
Final Dataset for Multiple Regression	106	

Appendix F – Qualitative Results – Large Figures

The following four figures present data from the qualitative analyses reported in Chapter 4.

Figure F1 presents the detail of themes in parent's responses when considering a child who was "doing OK", while Figure F2 illustrates the detail of themes parents reported when they thought about a child who was "not doing OK". Figure F3 provides detail relating to the themes reported by children when they considered a child who was "doing OK." Figure F4 provides similar detail reported by children when they thought about a child who was "not doing OK".

Themes in all Figures are categorised by whether they were predominantly considered as contributors to, characteristics of, or both contributors to and characteristics of, child success. The number of time each sub-theme was mentioned is presented. A detailed discussion of the similarities and differences between parent and child responses is provided Chapter 4.

Figure F1. Adult-reported themes categorised as Contributors to, or Characteristics of, "Doing OK"

Doing OK

Contributors

Theme 1 – Friendship & Social Interaction

N = 32

Have/maintain friends 13
Social Interaction 7
Friends – Quantity 5
Accepted by peers 5
Friends – Quality 2

Theme 3 – Parents & Family

N = 36

Family harmony 14
Child feels loved 5
Good relationship with parents 4
Parents help and support the child 4
Child feels safe/secure at home 4
Activities shared as a family 3
Child's needs are met 2

Theme 6 – School

N = 25

Academic Success 10
Willing/happy to go to school 7
Academic competence 6
Having a good teacher 2

Theme 8 – Behaviour of Others

N = 26

Being praised 8
Positive interactions with adults 5
Accepted by peers 5
Parents help and support the child 4
Being rewarded 3
Provided with excess love or gifts 1

Theme 9 – Life Events

N = 6

Life is all-around good 2
"It's easy to tell" 1
Religious observance 1
Good events happening 1
Stability in life 1

Contributors/Characteristics

Theme 4 – Success, Failure & Competence

N = 42

Success
N = 19

Academic Success 10
Child recognises own achievements/ progress 6
Child gets what they want 1
Child meets a challenge 1
Success in sport 1

Competence
N = 23

Participation in sports 9
Academic competence 6
Good at "something" 4
Well-rounded 2
Competence experiences 1
Natural abilities are recognised 1

Theme 10 – Noticeable Absences

N = 0

Theme 11 – Health

N = 4

Healthy 4

Characteristics

Theme 2 – Behaviour of Child

N = 45

Talkative / communicative 11
Well-behaved or obedient 7
Body language & facial expression 7
Eating well 5
Helpful 4
Engaged in an interest/hobby 3
Sleeping well 2
Maintaining normal behaviour 2
Content and form of speech 2
General behaviour 1
Child shows loving behaviour 1

Theme 5 – Displayed Emotion

N = 27

Being Happy 26
Overall mood 1

Theme 7 – Psychological Characteristics of the Child

N = 29

Confident / High Self-esteem 9
Resilient to stressors 5
Outgoing 4
Good attitude 3
Hardworking & motivated 2
Calm 2
Carefree or playful 2
Content 1
Comfortable 1

445

Figure F2. Adult-reported themes categorised as Contributors to, or Characteristics of, "Not doing OK"

Not Doing OK

Contributors

Contributors/Characteristics

Characteristics

Theme 1 – Friendship & Social Interaction

N = 66

Withdrawn 15
Teasing, name calling & Bullying 13
Troubled friendship or fights 10
Isolation 7
Poor social skills 5
Feelings of exclusion 4
Friends – Few or none 3
Not wanting to socialise 3
Bad influence of friends 2
Being a bully 2
Peer pressure 1
Social comparisons 1

Theme 3 – Parents & Family

N = 59

Family disharmony 27
Parent separation/ Divorce 8
Parental abuse or neglect 6
Death or illness in family 5
Family circumstances 4
Lack of communication by parents 3
Single parent / blended families 2
Parental drug/alcohol abuse 1
Being an only child 1
Lack of stability of care 1
Feeling unloved 1

Theme 6 – School

N = 26

Academic failure 26
Not happy / willing to go to school 5
Problems with teacher 1
Need to do extra study 1

Theme 8 – Behaviour of Others

N = 25

Teasing, name calling, bullying 13
Parental abuse or neglect 6
Being criticised 2
Being told off 1
Being punished for misbehaviour 1
Performance pressure from parents or friends 1
Needs and talents ignored 1

Theme 9 – Life Events

N = 18

Parental separation or divorce 8
Death/Illness in the family 5
Influence of external events 1
Moving house 1
Change (in and of itself) 1
Loss 1
Child is told "No" more often than "Yes" 1

Theme 4 – Success, Failure & Competence

N = 33

Failure
N = 27

Academic failure 19
Poor general performance 3
Feelings of failure 3
Poor sporting performance 2

Competence
N = 6

Not fulfilling potential 3
Performance pressure from parents or friends 1
Needs or talents ignored 1
Not coping 1

Theme 10 – Noticeable Absences

N = 0

Theme 11 – Health

N = 6

Ill Health 5
Headaches 1

Theme 2 – Behaviour of Child

N = 50

Misbehaviour to attract attention or express distress 9
Body language and facial expression 8
Change from normal behaviour 7
Poor eating habits 6
Doesn't participate in activities 6
Poor sleeping 3
Crying 3
Tantrums 3
Use of language 2
Catastrophising 1
Violent behaviour 1
Too much screen time 1

Theme 5 – Displayed Emotion

N = 22

Sad/miserable 10
"Bad" mood or "bad temper" 5
Angry 3
Expressed emotions 2
Frustration 1
Easily upset 1

Theme 7 – Psychological Characteristics of the Child

N = 42

Quiet, reserved 11
Lack of confidence or low Self-esteem 11
Aggressive 3
Shy 3
Uncommunicative 3
Agitated/ impulsive 2
Argumentative 2
Disrespectful/ Rude 2
Resentful/ Jealous 2
Unmotivated 1
Distractible 1
Insecure 1

Figure F3. Child-reported themes categorised as Contributors to, or Characteristics of, "Doing OK"

Doing OK

Contributors

Theme 1 – Friendship & Social Interaction

N = 34

Friends – Quantity 10

Friends – Having fun 7

Social Inclusion 5

Friends – play with 3

Social competence 3

Recognition from peers 2

Friends – quality 3

Popularity 1

Theme 3 – Parents & Family

N = 13

Parental support 4

Praise & Recognition from parents 4

Family harmony 2

Loving parents 1

New family member 1

Child is treated well at home 1

Theme 6 – School

N = 26

Academic Success 13

Working hard 4

Academic competence 3

Supportive teachers 2

Child does required work 1

Positive attention from the teacher 1

Opportunity to learn from mistakes 1

Happy to attend school 1

Theme 8 – Behaviour of Others

N = 10

Encouragement 5

Physical needs are met 1

Safe 1

Kindness from others 1

Being listened to 1

Free to determine own actions 1

Theme 9 – Life Events

N = 10

Material possessions 2

Good things in life outnumber the bad 1

New family member 1

Pets 1

Celebrations 1

Money – qty 1

Treats 1

Enjoying media 1

Good luck 1

Good events happening 1

Contributors/Characteristics

Theme 4 – Success, Failure & Competence

N = 31

Success
N = 15

Academic success 13

Sporting success 1

General success 1

Competence
N = 16

Demonstrating competence 5

Good at their work 5

Academic competence 3

Social competence 3

Theme 10 – Noticeable Absences

N = 10

Not getting into trouble 3

Absence of bad things 2

Not being bullied 1

Not crying 1

Not sad 1

Not angry 1

Not bossy 1

Theme 11 – Health

N = 0

No children gave responses which could be categorised under this topic

Characteristics

Theme 2 – Behaviour of Child

N = 33

Prosocial behaviour 7

Smiling 6

Working hard 4

Normal behaviour 4

Body language – upright posture 3

Playful locomotion – dancing or skipping 2

Well behaved at home 2

Obedient 1

Helpful 1

Child does required work 1

Theme 5 – Displayed Emotion

N = 26

Happiness 25

Joy 1

Theme 7 – Psychological Characteristics of the Child

N = 11

Confidence 3

Intelligence 1

Friendliness 1

Good humour 1

Flexibility 1

Positive thinker 1

Focussed 1

Engaged 1

Respects others 1

Not Doing OK

Contributors | **Contributors/Characteristics** | **Characteristics**

Theme 1 – Friendship & Social Interaction

N = 51

Bullying	15
Fight with a friend	6
Friends – few	5
Put-downs	4
Teasing	4
Social exclusion	4
Isolation	4
Friends – none	3
Name calling	2

Theme 3 – Parents & Family

N = 22

Divorce	8
Death in the family	6
Angry parents	2
Mean parents	2
Inattentive or absent parents	2
Parental expression of disappointment	1
Family disharmony	1

Theme 6 – School

N = 27

Academic failure	9
Needing help	5
Not completing tasks	5
Truancy or unwillingness to attend school	2
Mean teacher	2
Negative attention from the teacher	2
Disliked teacher	1
Busy teacher	1

Theme 8 – Behaviour of Others

N = 9

Being told off	3
Unfair treatment	2
Punishment for misbehaviour	2
Parental expression of disappointment	1
Being yelled at	1

Theme 9 – Life Events

N = 30

Bullying	15
Divorce	8
Death in the family	6
Moving house a lot	1

Theme 4 – Success, Failure & Competence

N = 20

Failure	
N = 10	
Academic Failure	9
Failure in other domains	1
Competence	
N = 10	
Needing help	5
Lack of competence	3
Bad at work	1
Struggling	1
Lack of knowledge	1

Theme 10 – Noticeable Absences

N = 7

Not seeking pleasurable activities	4
Lack of recognition	1
Feeling like no-one cares about you	1
Poverty	1

Theme 11 – Health

N = 1

Illness	1

Theme 2 – Behaviour of Child

N = 48

Change from normal behaviour	5
Not completing tasks	5
Looking sad	5
Getting into trouble	5
Inactive	5
Not seeking pleasurable activities	4
Crying	4
Aggressive or anti-social behaviour	4
Disobedient	3
Slouched posture	2
Pushing people away	1
Wanting to be alone	1
Dependent	1
Boring	1
Not trying hard	1
Not talkative	1

Theme 5 – Displayed Emotion

N = 29

Sadness	16
Anger	5
Grumpiness	2
Fear	2
Loneliness	2
Resentment	1
Frustration	1

Theme 7 – Psychological Characteristics of the Child

N = 11

Disengaged	2
Inattentive / Lack focus	2
Change from normal personality	1
Unconfident	1
Not intelligent	1
Stressed out	1
Helpless	1
Hopeless	1
Selfish	1

Appendix G – Tests on the Effect of Including Students who had

Undertaken Additional Tutoring

Figure G1 provides evidence that the inclusion of students who had undertaken additional private tutoring apart from Kumon did not have an effect on the outcome of the tests performed. A large multiple regression with all factors that entered the final models discussed in Chapter 8 was conducted, and as the highlighted row (indicating the effect of additional tutoring) demonstrates, additional tutoring had a miniscule and insignificant effect on the model. Therefore, Control group participants who had completed additional private tutoring were retained in the sample used in testing the models developed in Chapter 8.

```
Linear regression                                    Number of obs =      98
                                                     F( 23,   74) =   50.63
                                                     Prob > F      =  0.0000
                                                     R-squared     =  0.7457
                                                     Root MSE      =  .07699

----------------------------------------------------------------------------
             |               Robust
 avg_lan2_s~e |     Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+--------------------------------------------------------------
 avg_lan1_s~e |   .294658   .0633212     4.65   0.000     .1684877    .4208283
   bia_total |  .0031013   .0008662     3.58   0.001     .0013753    .0048273
 locus_of_c~l | -.0082972    .002159    -3.84   0.000    -.0125991   -.0039954
 kumon_total |  .0010372   .0008901     1.17   0.248    -.0007363    .0028107
 total_life~s | -.0009653   .0007398    -1.30   0.196    -.0024394    .0005087
 private_tu~k |  .0009798   .0321055     0.03   0.976    -.0629918    .0649514
      _Isex_2 | -.0354576   .0185936    -1.91   0.060    -.0725061    .0015909
 _Iincome_c~3 |  -.008532   .0423839    -0.20   0.841    -.0929837    .0759197
 _Iincome_c~4 | -.0340524   .0730014    -0.47   0.642    -.1795108    .1114061
 _Iincome_c~5 | -.0641789   .0480924    -1.33   0.186    -.1600052    .0316473
 _Iincome_c~6 | -.0592658   .0422895    -1.40   0.165    -.1435294    .0249978
 _Iincome_c~7 | -.0468094   .0472895    -0.99   0.325    -.1410358    .0474171
 _Iincome_c~8 | -.0263101   .0437434    -0.60   0.549    -.1134708    .0608506
 _Iincome_c~9 | -.0613841   .0457919    -1.34   0.184    -.1526264    .0298582
   chks_total |  .0123557   .0075377     1.64   0.105    -.0026635    .0273748
 dt_percent~y | -.0005679   .0005586    -1.02   0.313     -.001681    .0005452
  _Ipoverty_1 | (dropped)
 total_sibl~s | -.0120755   .0101948    -1.18   0.240    -.0323892    .0082381
  resil_total | -.0115002    .007729    -1.49   0.141    -.0269005    .0039001
 _Icult_bgr~2 | -.0062123    .040527    -0.15   0.879    -.0869641    .0745395
 _Icult_bgr~3 |  .0377201   .0457317     0.82   0.412    -.0534023    .1288425
 _Icult_bgr~4 |  .0031569   .0513957     0.06   0.951    -.0992514    .1055651
 _Icult_bgr~5 | (dropped)
  two_parents |  .0111527   .0288249     0.39   0.700    -.0462822    .0685876
 total_age_~s |  .0002263   .0006417     0.35   0.725    -.0010522    .0015049
        _cons |  .2346481   .1732357     1.35   0.180    -.1105315    .5798277
----------------------------------------------------------------------------
```

Figure G1. The effect of additional tutoring on the preliminary regression model.

Appendix H – Correlations Between Variables Used in the Multiple Regression Model Described in Section 8.2.2

The only potentially concerning correlation occurs between Total Months in Kumon and Kumon status, since control group students all spent zero months in Kumon. Given that Kumon status was retained as a dummy variable in the model to control for this very effect, this correlation is not considered problematic in interpreting the model.

Table H1

Correlations amongst variables in the multiple regression model outlined in Section 8.2.2

	LAN1 score	BIA Total	Locus of control	Total months in Kumon	Cultural Background	Sex	FILE Total	Kumon status
LAN1 score	1	.578**	-.176	-.042	.000	.111	-.147	.064
BIA Total		1	-.340**	.218*	-.058	.065	-.070	-.112
Locus of control			1	-.145	.076	-.034	-.052	.066
Total months in Kumon				1	-.268**	-.018	-.142	-.837**
Cultural Background					1	-.168	-.066	.300**
Sex						1	.153	.010
FILE Total							1	.136
Kumon status								1

* - significant at $p < 0.05$ ** - significant at $p < 0.01$