Exchanging the identification, prevalence and coping of Australian primary school students with learning disabilities

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Abstract

Learning disabilities (LDs) have a prevalence rate of approximately ten percent in the population and result from processing problems that are neurological in origin and permanent in nature (Bradley, Danielson, & Hallahan, 2002; Prior, 1996). Indications of LDs in students are frequently manifested by underachievement in one or more academic areas such as reading, spelling, writing or mathematics despite intelligence scores in the normal range (Prior, 1996). Recognition of LDs in Australian schools requires registered educational psychologists to establish a demonstrable discrepancy between a range of educational tests and intelligence tests. However, such testing is expensive and, coupled with a lack of school resources and teacher knowledge about LDs, results in a failure to recognise LDs in many students in Australian schools. This failure to recognise students with LDs persists in spite of a body of research that demonstrates knowledge of LDs is a protective factor against a range of adverse outcomes for those with LDs (Raskind, Goldberg, Higgins, & Herman, 1999). A primary aim of this study was to propose and evaluate an alternative method for screening students for LDs using individual and group-administered standardised educational and intelligence screening tests that are less costly, less time-consuming and can be administered by classroom teachers. Specifically, students with low educational achievement scores coupled with intelligence scores in the normal range display a discrepancy between achievement and intelligence tests which is indicative of possible LDs. It was further argued that this screening process has the added advantage of providing teachers with critical information about their students that empowers them to make appropriate accommodations for students with LDs.

A second aim of this research was to examine the coping responses of students with LDs. Unidentified LDs can be particularly stressful for students. Indeed, LDs are often associated with adverse educational, social and psychological outcomes, which indicate that students with LDs are not coping. As such, two stress and coping models, namely the Conservation of Resources (COR) model (Hobfoll, 1989; 2001) and the Children’s Coping in the Academic Domain (CCAD) model (Skinner & Wellborn, 1997), were integrated and used as a theoretical framework to explain coping behaviours for students with LDs.
Important resources identified for students with LDs included external resources (student engagement, family cohesion) internal resources (external control, internal control) and coping styles (productive coping, non-productive coping). The overall goal was to test a proposed model of coping resources in which it was hypothesised that internal resources would mediate the relationships between external resources and coping styles, which, in turn, would predict the degree to which students expressed their inability to cope.

In study one, data were collected from 27 students who had dropped out of school and who were suspected of having LDs. These students were administered a battery of educational and intelligence tests where the purpose was to examine the validity of using intelligence screening tests that can be administered by a teacher. These results were then compared with comprehensive intelligence assessments that were administered by independent registered psychologists. A substantial correspondence between scores on intelligence screening tests and scores on comprehensive intelligence assessments was found. These results provided preliminary evidence to support the use of teacher administered intelligence screening tools as an integral part of the screening process for students with LDs.

In the second study, data were collected from 346 students in Years 5 and 6 across eight Victorian Government schools. The rationale for using this sample was based on the importance of identifying students with LDs early so that appropriate support can be provided. The same screening tools used in study one were administered to a sub-sample of students who demonstrated low educational achievement and a significant relationship was found between the individually-administered and group-administered intelligence screening tests. Given that group-administered tests are less expensive, less time-consuming and more practical than individually-administered tests, the group-administered intelligence screening test was used as the measure of intelligence. On the basis of specified cut-offs values on the group-administered educational and intelligence screening tests, approximately 16 percent of students were identified with possible LDs.
These students also completed questionnaires that included measures of student engagement, family cohesion, external control, internal control and the different coping styles. Mean comparisons revealed that students classified with possible LDs were less motivated, less connected to school and reported giving up more frequently than students with expected achievement. Structural equation modelling was used to test the proposed model of coping resources and coping outcomes using cross-sectional and longitudinal data. The cross-sectional model provided partial support for the mediational model. Although internal control partially mediated the relationship between student engagement and productive coping for students classified with possible LDs, this was not the case for non-productive coping where no direct effect was found between student engagement and non-productive coping. Furthermore, productive and non-productive coping strategies were respectively found to negatively and positively predict inability to cope. The results from the longitudinal model also highlighted the importance of internal control where internal control at time 1 predicted productive and non-productive coping at time 2.

The findings from this study provide support for the validity of using group-administered educational and intelligence screening tests to screen students for possible LDs. This finding has important implications in terms of allowing whole classrooms to be assessed for possible LDs and providing teachers with important information so that appropriate accommodations may be put in place early in order to benefit such students. Support was found for a mediational model of coping where internal resources partially mediated the relationship between external resources and coping styles, which, in turn, predicted not coping. This finding also supports the use of resource-based models to explain the coping behaviours of students with LDs and hence suggests key variables that might be targeted in future intervention studies.
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Declaration

This is to certify that this thesis

i) contains no materials which has been accepted for the award to the candidate of any other degree or diploma, except where due reference is made in the text of the examinable outcome;

ii) to the best of my knowledge contains no material previously published or written by another person except where due reference is made in the text of the examinable outcome; and

iii) where work is based on joint research or publications, discloses the relative contributions of the receptive workers or authors.

Signature:.................................................................
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Chapter 1: Overview of the research

Overview

The purpose of the current research was to test an alternative method for screening students for learning disabilities (LDs) and to examine the coping behaviours of students with LDs. There were five specific aims of the current research. The first aim was to examine the validity of using teacher administered educational and intelligence tests to screen students for possible LDs. The second aim was to determine the prevalence of students with possible LDs in a sample of Years 5 and 6 students from Victorian Government schools. The third aim was to test the structure of coping and establish a full independent-cluster measurement model of coping resources and the outcome of coping. The fourth aim was to examine the mean differences in each of these coping resources and coping outcome between students classified with possible LDs and students with expected achievement. The final aim was to test cross-sectional and longitudinal models of coping resources in which it was hypothesised that internal resources would mediate relationships between external resources and coping styles, which, in turn, predict not coping.

Focus of the thesis

In Australia, states and territories are responsible for providing the funding for government schools with the federal government also providing supplemental funding. Since the current research was based on a sample of students from the state of Victoria, it is important to describe the structure of schooling in Victoria as it varies from state to state. For instance, in Victoria, students attend primary school from Prep to Year 6 (7 years) and secondary school from Year 7 to Year 12 (6 years). There are four main stages of schooling in Victorian Government schools (Department of Education & Early Childhood Development; DEECD, 2009). The first stage is called the early years and begins at Prep and ends at Year 4. During this stage, there is an emphasis on developing literacy and numeracy skills. The second stage is from Years 5 to 8 and is referred to as the middle years. The aim of this stage is to consolidate literacy and numeracy skills and provide students with more in depth learning across all domains. The two year period of Year 9 and Year 10 is the third stage. The final stage is from Year 11 to Year 12. This period offers
two pathways, namely the Victorian Certificate of Applied Learning (VCAL) and the Victorian Certificate of Education (VCE).

In Victoria, it is the role of the DEECD to implement government policy on school education for all school age students. For the past few years, the relevant educational policy in Victoria has been the Blueprint for Government Schools, a document put forward by the state government (Department of Education & Training, 2003). The Blueprint outlined a number of reforms for the government school system, including: (a) recognising and responding to diverse student needs; (b) building the skills of the education workforce to enhance teacher-learning relationships; and (c) continuously improving schools. It also recommended the implementation of a range of strategies and initiatives, including the Victorian Essential Learning Standards (VELS) and the Principles of Learning and Teaching (POLT). In 2008, the DEECD prepared the Blueprint for Education and Early Childhood (DEECD, 2008), which extended on the Blueprint for Government Schools. According to the current Blueprint (2008), the Victorian government “recognise the needs of those who are at risk of being left behind” (p.12). In particular, the Blueprint identified groups such as Koorie children and children from low socioeconomic backgrounds as being over represented among low achievers. However, one group of students that is explicitly ignored in the Blueprint are those students with learning disabilities (LDs).

The term LDs refers to those students who experience difficulties in one or more academic areas such as reading, spelling, writing or maths, despite having intelligence in the normal range (Bradley, Danielson, & Hallahan, 2002). Learning disabilities are due to a processing problem that is neurological and permanent in nature and not the result of physical, sensory or intellectual disabilities, emotional disturbance, cultural or economic disadvantage, or inappropriate teaching (Bradley et al., 2002). Yet LDs are not recognised in Victorian schools, and there is no national definition of LD in Australia (Watson & Boman, 2005). This means that teachers and other professionals who work in schools are often not aware that students who experience difficulties in reading, spelling, writing and maths have a learning problem that is permanent in nature and resistant to intervention.
The absence of a national definition has led to the use of various terms to refer to underachieving students, such as LDs, learning difficulties, students with special needs and students at-risk (Louden et al., 2000; Rohl, Milton & Brady, 2000). The most common term is learning difficulties, which refers to a diverse group of students with school-related problems (Graham & Bailey, 2007). However, the inconsistent use of terms has been a significant problem for teachers and other professionals in schools. For instance, the terms learning difficulties and LDs are used interchangeably, which have made the distinction between the two terms unclear (Chan & Dally, 2000). Although there are similarities between learning difficulties and LDs, these definitions assume fundamentally different underlying causes. In particular, there is no assumption that students with learning difficulties have a problem that is neurological in origin. Thus, given these definitional problems, it has been difficult to ascertain an exact prevalence rate of LDs in Australian schools.

Despite LDs being an issue for the mainstream classroom, current forms of support for students with LDs are not working in Australian schools. Support is available for students who underachieve in reading, spelling, writing and mathematics, including in-class support and support programs. However, teachers receive little or no formal training about LDs in their professional training (White & Elkins, 2000), which means that teachers are limited in their capabilities to provide support to students with LDs in the mainstream classroom. In some cases, students who experience difficulties are often assigned to a teacher aide in the classroom to help support their learning. Yet, allocating students to teacher aides translates to students most in need of expert teaching being supported by those adults who are least qualified (Elkins, 2002).

There are support programs available in schools for students who experience learning difficulties. For example, a common program used in Victorian schools for students in the early years who experience reading difficulties is Reading Recovery (RR). This program is an individual withdrawal program that involves one-on-one sessions with a qualified RR teacher. However, there are mixed findings to support its long-term effectiveness (Chan & Dally, 2000; Reynolds & Wheldall, 2007). Moreover, withdrawing
students from the mainstream classroom can have negative social and emotional outcomes (Elbaum, 2002). For those students who continue to experience difficulties with learning despite receiving in-class support and participating in individual intervention programs, there is a lack of support available at school.

The identification of students with LDs is not a priority in Australian schools as students are not eligible for funding. Students who continue to experience difficulties in learning are sometimes referred to other professionals such as speech pathologists and school psychologists for an assessment. Yet these professionals frequently do not assess students for LDs. As a result, students are often forced to seek external LD assessments from private providers, which typically involve the administration of educational tests and a comprehensive intelligence assessment by a registered psychologist. However, these assessments are time-consuming and expensive. For instance, the administration of a comprehensive intelligence assessment and follow up report can take hours to complete and cost several hundreds of dollars. An additional drawback is that teachers often experience difficulties interpreting psychological reports and translating information from these reports into classroom practice. Given the costs associated with intelligence testing and the lack of school resources to have students individually assessed for LDs, it has been argued that comprehensive intelligence assessments are not an appropriate method for measuring intelligence as part of an LD assessment. Hence, there is a need for an alternative model for assessing LDs that is less costly, less time-consuming and more practical.

Unidentified LDs can be particularly stressful. For instance, LDs are often associated with a number of adverse outcomes, such as school dropout, unemployment, juvenile delinquency and criminal conviction and mental health problems (Prior, 1996). This suggests that a significant proportion of students with LDs are not coping. In this study, it was argued that students with LDs lack important resources to invest in coping. From the literature, when compared to students with average achievement, students with LDs tend to report lower mean levels of important affective, behavioural and cognitive resources, which could be utilised in the coping process (Nunez et al., 2005; Peleg, 2009; Sideridis, 2006). One limitation in the literature has been the tendency to use mean
comparisons exclusively and not regression or structural equation models to explain the relationships between coping resources and how these resources influence coping behaviours.

To address this need, three coping models were reviewed and integrated to provide a theoretical framework to explain the coping behaviours of students with LDs. The integrated model was largely based on the Conservation of Resources model (COR; Hobfoll, 1989; 2001) with aspects of the Children’s Coping in the Academic Domain model (CCAD; Skinner & Wellborn, 1997) added. Cunningham (2001) developed a conceptual model of coping resources that was also based on the COR model to explain relationships between coping resources and how these resources predict the coping styles of students from the general student population. Several studies have utilised Cunningham’s conceptual model of coping and found evidence to support multiple resource models that explain the coping behaviours of Australian school students (Cunningham, 2001; 2002; Cunningham, Brandon, & Frydenberg, 2002; Cunningham, Werner, & Firth, 2004; Nicholls & Cunningham, 2004). In particular, the results showed that key internal resources mediate the relationship between external resources and coping styles. However, many of these studies have utilised cross-sectional and not longitudinal research designs. This is important given that mediation is based on causal relationships where a key assumption of causality is that in order for one variable to cause another variable, it must precede that variable in time (Kline, 2005). Therefore, a model was proposed in which internal resources would mediate the relationship between external resources and coping styles, which, in turn, predict the outcome of not coping. This model was tested using cross-sectional and longitudinal data.

**Purpose of the thesis**

The purpose of this study was to test an alternative method for screening students for LDs and examine the coping behaviours of students with LDs. The present study tested three research questions and two specific hypotheses. These were as follows:

1. To what extent do scores on intelligence screening tests correspond with scores on comprehensive intelligence assessments?
2. To what extent do scores on individually-administered intelligence screening tests correspond with scores on group-administered intelligence screening tests?

3. What is the prevalence of students with possible LD in Victorian Government schools?

4. It was hypothesised that students classified with possible LDs would report lower mean levels of student engagement, external control, internal control and productive coping, and higher mean levels of non-productive coping and not coping compared to students with expected achievement.

5. It was hypothesised that key internal resources would mediate the relationship between external resources and coping styles, which, in turn, predict not coping for students with and without LDs.

**Significance of the thesis**

An important contribution of the current study was the evidence to support the validity of an alternative method for screening students for possible LDs using group-administered educational and intelligence tests that can be administered by classroom teachers. This means that teachers could screen whole classrooms for possible LDs, identify students who demonstrate unexpected underachievement in reading and spelling, gather more information about these same students and subsequently provide appropriate accommodations for students classified with possible LDs in the mainstream classroom.

It was also important to provide an estimate of the prevalence of students with LDs in a sample of Victorian Government schools. Approximately 16 percent of students in this sample were classified with possible LDs. This is in spite of the fact that students in Victorian Government schools who experience low achievement at school receive in-class support as well as whole class, small group and individual interventions. The identification of students with unexpected underachievement at this later stage in primary school is consistent with the permanent nature of LDs.

Another contribution of this study was establishing an independent-cluster measurement model that can be used to explain the coping behaviours of Years 5 and 6
students classified with possible LDs. This measurement model provided discriminant validity for the constructs in the model. Moreover, evidence was found to support an alternative structure of coping which included productive coping, non-productive coping and the outcome variable of not coping. It was also found that students with possible LDs have lower mean levels of some important coping resources. In particular, students were less motivated, less connected to school and reported giving up more frequently than students with expected achievement.

Finally, testing the proposed model of coping resources and coping outcome for students with possible LDs using structural equation modelling (SEM) with data collected from a sample of primary school students in Victorian Government schools provided a unique theoretical contribution to knowledge. The results from the cross-sectional model indicated that student engagement promoted the use of productive coping strategies for student with possible LDs, and that internal control was found to be an important key resource for students with possible LDs as it was positively and negatively associated with the use of productive and non-productive coping strategies respectively. These coping styles, in turn, predicted not coping. The results from the longitudinal model also provided some support for the mediational model where internal control at time 1 predicted productive and non-productive coping at time 2. Therefore, the integrated theoretical model that was used in the current research is an appropriate theoretical framework to explain the coping behaviours of students with LDs in the future.

**Scope of the thesis**

The focus of this study was on the identification, prevalence and coping of students with LDs. The first aim was to test the validity of using standardised educational and intelligence tests that can be administered by a classroom teacher to screen students for LDs. The second aim was to test a proposed model of coping resources and coping outcome for students with LDs using SEM.

Although LDs manifest in reading, spelling, writing and maths difficulties, the current research was limited to the study of reading and spelling. This decision was based
on the assessment process for LDs in Victorian schools as stated by the Victorian Curriculum Assessment Authority (VCAA). According to the VCE and VCAL Handbook developed by the VCAA (VCAA, 2009), a LD assessment requires certain reading and spelling tests to be used, namely the Progressive Achievement in Reading (Australian Council of Education Research, 2000) and the South Australian Spelling Test (Westwood, 2005) respectively. Therefore, only these two tests were utilised in this study.

The current research was separated into two studies. The first study involved a small sample of Technical and Further Education (TAFE) students who were enrolled in a program that was designed for school dropouts who were suspected of having LDs. This group of students provided an ideal sample to trial a set of teacher administered intelligence screening tests and compare them with independent comprehensive assessments undertaken by registered psychologists. However, given the time and costs associated with administering comprehensive intelligence assessments, the sample size was necessarily small.

The second study was restricted to Years 5 and 6 students from Victorian Government schools. The focus on this age group was based on the assumption that students who have not responded to interventions available in Victorian Government schools, and who continue to experience reading and spelling difficulties despite intelligence in the normal range, are students with permanent learning problems which are suggestive of LDs. Using the teacher administered screening tools, students were classified into one of three groups, namely a low achievement group, a group for students with possible LDs and an expected achievement group. Given the relatively small proportion of students classified with low achievement, only students from the possible LDs group and the expected achievement group were utilised in the statistical analyses. It is important to note, however, that students who were classified with possible LDs using screening tools may also have included some students with other possible causes for their poor reading and spelling, (e.g., emotional and behavioural problems, students with poor school attendance).
Students were also administered a questionnaire that was designed to measure important coping resources. In order to test the proposed mediational model using cross-sectional and longitudinal data, multiple waves of data were needed. However, one of the problems associated with data collection that extends over a one-year period in school-based research is that Year 6 students transfer to secondary schools and are difficult to follow. Therefore, in this study, it was decided to collect data twice in the one school year as longitudinal models can still be tested using two waves of data.

Finally, schools involved in the study were located in two separate outer urban areas in Melbourne, Victoria. One of the areas was selected on the basis of an existing professional relationship with the cluster educator/convener in that area. The other area was identified by its supervising region not only because it was likely to benefit from the research but also because very few students from the schools in this cluster came from non-English-speaking backgrounds. This was considered important since speaking English as a second language is a possible cause of learning difficulties. Although information relating to socio-economic background was not collected, both clusters were located in low socio-economic areas.

**Structure of the research**

In this chapter, the focus, purpose, significance and scope of the thesis have been discussed as well as the structure of the thesis outlined.

Chapter 2 discusses some of the issues surrounding the definition of LDs in Australia, problems with the various methods used to support students with LDs in Australian schools, including in-class support, whole class programs, individual withdrawal programs, ongoing support and private tutoring services and how current identification methods used in Australian schools are failing to detect students with LDs. It also reviews the most common approach for identifying students with LDs, which is the IQ-achievement discrepancy approach, as well as the more recent identification approach known as the response to intervention (RTI) approach. Although the IQ-achievement discrepancy approach is considered the preferred approach to identify students with LDs, it is argued
that administering comprehensive intelligence tests is time consuming, expensive and impractical. An alternative method that involves teachers screening students for LDs using standardised educational tests and intelligence screening tools is then proposed.

Chapter 3 highlights some of the adverse outcomes associated with LDs, including school dropout, juvenile delinquency and criminal conviction, unemployment and mental health problems. This chapter initially reviews the risk and protective factors for students with LDs, indicating that students with LDs report lower mean levels of important coping resources compared to their typically achieving peers. This chapter then describes and reviews three stress and coping models. The first model is a widely-used stress and coping model known as the transactional model (Lazarus & Folkman, 1984). The second model is a resource-based model of coping known as the conservations of resources model (COR; Hobfoll, 1989). Both of these models were generated in the adult stress and coping literature. A third coping model, namely the Children’s Coping in the Academic Domain (CCAD; Skinner & Wellborn, 1997) which is designed for children within school contexts is then presented. From these models, an integrated theoretical model is utilised to explain the coping behaviours of students with LDs. The chapter concludes with a proposed model of coping resources and coping styles that predict the outcome of coping.

The methodology is presented in Chapter 4. Information about conducting the studies, including details of the participants and the instruments used, is provided. The chapter also discusses the design of the studies, statistical issues and the statistical analyses used to address the research questions and hypotheses.

Chapter 5 reports the findings from study one. This study examines an alternative method for screening students for possible LDs using teacher administered educational and intelligence tests. The results from these tests were used to classify students into one of three groups, namely a low achievement group, a group of students with possible LDs and an expected achievement group. These results were then compared to the determinations of students with LDs based on an independent, comprehensive intelligence assessments administered by a registered psychologist. The results for this comparison are discussed.
In Chapter 6, the results from study two are presented. The screening tools used in study one were administered to a sample of Year 5 and 6 students from Victorian Government primary schools. Prior to analysis, data screening and assumption testing were completed. The chapter examines the correspondence between the individually-administered and group-administered intelligence tests. This is followed by the classification of students into one of the three groups on the basis of their scores from the educational and intelligence tests. After establishing a full independent-cluster model and testing an alternative structure of coping, the chapter reports the results of mean comparisons between students classified with possible LDs and students with expected achievement for each of the coping resources and the coping outcome. Finally, the results from the cross-sectional and longitudinal structural models are reported.

Chapter 7 provides an overview of the results and discussion in relation to the research questions and specific hypotheses. This is followed by the practical and theoretical implications of the findings. The chapter concludes by documenting the limitations of the current research, outlining recommendations for future research, and summarising the contributions of the current research.

Chapter summary

In this chapter, the focus of the thesis, purpose of the thesis, significance of the thesis, scope of the study and structure of the thesis were presented. The following chapter will present a review of the LD literature that covers definition, prevalence, support and identification, and propose an alternative model for screening students for LDs.
Chapter 2: Literature Review of Learning Disabilities

Introduction

This chapter highlights the lack of clarity and agreement regarding the definition of learning disabilities (LDs). Despite the absence of an unequivocal definition of LDs, there are common elements across a number of prominent definitions, which are identified. This chapter describes how LDs are not recognised in Australia and how learning difficulties is the preferred term to refer to students who experience difficulties with reading, spelling, writing and/or mathematics. While there are similarities between LDs and learning difficulties, there are fundamental differences in the assumed underlying causes of LDs and learning difficulties. It is argued here that teachers and other professionals who work in Australian schools are often unaware of the neurological and permanent nature of LDs.

Various methods used to support students with LDs in Australian schools are also discussed, including in-class support, whole class programs, individual withdrawal programs, ongoing support and private tutoring services. It is argued that, given the lack of pre-service and in-service training for teachers about LDs, teachers are not able to effectively support the learning needs of students with LDs in the mainstream classroom. This chapter also highlights the limitations of existing programs to support students with LDs, including the lack of evidence to support the effectiveness of whole class programs and the inappropriateness of individual intensive interventions. Furthermore, the absence of ongoing support for students who do not respond to previous interventions is also documented. Students who have not responded to the different forms of support are viewed as having permanent learning problems, which is consistent with the neurological and permanent nature of LDs.

This chapter also discusses how current identification methods used in Australian schools are failing to detect students with LDs. Specifically, it is argued that current methods detect students with low achievement, not necessarily students with unexpected underachievement. This chapter also reviews other approaches used to identify students with LDs. The most common approach for identifying students with LDs, which is predominantly used in the United States of America (USA), is the IQ-achievement
discrepancy approach. This approach involves the administration of educational and intelligence tests by a psychologist. A student is identified as having a LD if he/she demonstrates a discrepancy between his/her educational achievement and intellectual ability. It is further argued that while this approach does identify students with LDs, administering comprehensive intelligence tests is time consuming, expensive and impractical. Consequently, due to the lack of resources, it is not feasible in Australian schools. An alternative method that involves teachers screening students for LDs using standardised educational tests and intelligence screening tools is then proposed.

**Defining learning disabilities**

For several decades, there has been ongoing debate about the definition of LDs among professionals from several disciplines, such as medicine, psychology and education (Chan & Dally, 2000; Mather & Gregg, 2006; Siegel, 1999). Accordingly, various definitions of LDs have been proposed over the years that reflect different professional backgrounds and thus different theoretical perspectives toward LDs. Yet, none of these definitions has emerged as an unequivocal definition of LDs (Kavale & Forness, 2000). Moreover, numerous terms have been used to refer to a similar group of students, including minimal brain dysfunction, mild intellectual disability, clumsy children, hyperactivity, dyslexia, perceptual disability, LDs, learning difficulties, specific learning difficulties, reading disabilities and backward readers (Chan & Dally, 2000; Prior, 1996; van Kraayenoord & Elkins, 1998). Essentially, there is a lack of clarity and agreement in the field regarding the definition of LDs. Despite the absence of an unequivocal definition of LDs, some definitions have received more support than others (see Table 1). The following section will highlight some of the common elements across definitions from educational policymakers, family groups, researchers and clinical practitioners.

A critical review of LD definitions (see Hammill, 1990) identified two prominent definitions, namely the 1977 United States Office of Education (USOE) definition and the 1988 National Joint Committee on Learning Disabilities (NJCLD) definition. The 1977 USOE definition was used in USA schools by teachers and school psychologists to ensure that students identified with LDs were eligible for
Table 1

**Table of Key Definitions of Learning Disabilities**

<table>
<thead>
<tr>
<th>Source</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States Office of Education</td>
<td>“The term „specific learning disability” means a disorder in one or more of the psychological processes involved in understanding or in using language, spoken or written, which may manifest itself in an imperfect ability to listen, speak, read, write, spell, or to do mathematics calculations. The term includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia and developmental aphasia. The term does not include children who have learning disabilities which are primarily the result of visual, hearing, or motor handicaps, or mental retardation, or emotional disturbance, or of environmental, cultural, or economic disadvantage” (USOE, 1977, p.65083).</td>
</tr>
<tr>
<td>National Joint Committee of Learning Disabilities</td>
<td>“Learning disabilities is a general term that refers to a heterogeneous group of disorders manifested by significant difficulty in the acquisition and use of listening, speaking, reading, writing, reasoning, or mathematics abilities. These disorders are intrinsic to the individual, presumed to be due to central nervous system dysfunction, and may occur across the life span. Problems in self-regulatory behaviour, social perception, and social interaction may exist with learning disabilities but do not by themselves constitute a learning disability. Although learning disabilities may occur concomitantly with other handicapping conditions (for example sensory impairment, mental retardation, serious emotional disturbance) or with extrinsic influences (such as cultural differences, insufficient or inappropriate instruction), they are not the result of those conditions or influences” (NJCLD, 1988, p.1).</td>
</tr>
<tr>
<td>Learning Disabilities Consensus</td>
<td>“The central concept of specific learning disabilities (SLD) involves disorders of learning and cognition that are intrinsic to the individual. SLD are specific in the sense that these disorders each significantly affect a relatively narrow range of academic and performance outcomes. SLD may occur in combination with other disabling conditions, but they are not due primarily to other conditions, such as mental retardation, behavioural disturbance, lack of opportunities to learn, or primary sensory deficits” (Bradley et al., 2002, p.792).</td>
</tr>
<tr>
<td>Diagnostic and Statistics Manual Fourth Edition</td>
<td>“Learning Disorders are diagnosed when the individual’s achievement on individually administered, standardised tests in reading, mathematics, or written expression is substantially below that expected for age, schooling, and level of intelligence. The learning problems significantly interfere with academic achievement or activities of daily living that require reading, mathematical or writing skills. A variety of statistical approaches can be used to establish that a discrepancy is significant. Substantially below is usually defined as a discrepancy more than 2 standard deviations between achievement and IQ. A smaller discrepancy between achievement and IQ (i.e., between 1 and 2 standard deviations) is sometimes used, especially in cases where an individuals performance on an IQ test may be compromised by an associated disorder in cognitive processing, a co-morbid mental disorder or general medical condition, or the individual’s ethnic or cultural background. If a sensory deficit is present, the learning difficulties must be in excess of those usually associated with the deficit. Learning Disorders may be persistent into adulthood” (APA, 2000, pp. 49-50)</td>
</tr>
</tbody>
</table>

special education funding. This definition, with minor amendments, remains the most widely used definition in the USA and is presently the definition used in the Individuals with Disabilities in Education Act (IDEA; Mercer, Jordan, Allsopp, & Mercer, 1996; Reschly & Hosp, 2004). Nevertheless, the 1977 USOE definition has been criticised for not providing a comprehensive definition of LDs (Kavale & Forness, 2000; Torgesen, 2004). More specifically, the definition can be misinterpreted as referring to a homogenous group of disorders that ignores the neurological and permanent nature of LDs.

Not satisfied with the 1977 USOE definition, the NJCLD, a national committee of representatives comprising parent and professional organisations concerned with LDs, proposed an alternative definition of LDs. In contrast to the 1977 USOE definition, the 1988 NJCLD definition (see Table 1) described LDs as a heterogenous group of disorders that lead to difficulties in acquiring and using language skills. The definition affirmed that LDs are neurological in origin and permanent in nature. Moreover, it emphasised that LDs are not caused by sensory or intellectual disabilities, emotional disturbances, cultural differences or inappropriate teaching, but can exist alongside these conditions.

According to Hammill (1990), common elements across the 1977 USOE definition and the 1988 NJCLD definition revealed an emerging consensus relating to the causes and characteristics of LDs. More recently, in 2001, a select group of researchers in the US was asked to review the current research on LDs and formulate a consensus statement relating to the definition of LDs (Bradley et al., 2002). The researchers agreed that students with LDs demonstrate specific learning problems despite having at least average intelligence (Bradley et al., 2002). It was affirmed that LDs are neurological in origin, permanent in their nature and resistant to intervention. Furthermore, the researchers agreed that LDs are not the result of other conditions such as intellectual, physical or sensory disabilities, or the lack of opportunities to learn (Bradley et al., 2002).
In contrast to the definition used by school psychologists in the USA, the definition used by psychologists who work in clinical settings is the definition found in the Diagnostic and Statistics Manual – Fourth Edition (DSM-IV: American Psychiatric Association, APA, 2000). The DSM-IV uses the term Learning Disorders to refer to students with LDs and affirms that learning disorders are associated with unexpected underachievement, which is indicated by a discrepancy between intellectual ability and educational achievement. The DSM-IV also categorises learning disorders into reading disorders (commonly known as dyslexia), mathematics disorders (dyscalculia) and disorders of written expression (dysgraphia). Indeed, the most common type of LD is dyslexia, which comprises an estimated 80 percent of LDs (Lerner, 1989, Lyon, 1995). According to Lyon, Shaywitz, and Shaywitz (2003), dyslexia is associated with unexpected underachievement in reading, which can be attributed to a phonological processing problem. As such, individuals with dyslexia have difficulties storing and retrieving the sounds of letter and words (Ramus et al., 2003). In particular, they have difficulties identifying and manipulating sounds within words (Shaywitz, Morris, & Shaywitz, 2008). These difficulties interfere with reading accuracy, fluency and comprehension. They also influence spelling and writing. Furthermore, it should be noted that dyslexia is also a genetic disorder that can be found within families (Shaywitz et al., 2008).

An inspection of the LD definitions that have received support reveals some common elements across those definitions. In particular, LDs are associated with information processing problems that influence the acquisition and effective use of one or more language skills, including listening, reading, spelling, writing and/or math skills. This implies that LDs are a specific and not a general learning problem. It is presumed that LDs are neurological in origin, permanent in nature and resistant to intervention. Furthermore, LDs are not considered the result of intellectual, physical or sensory disabilities, emotional disturbance, cultural or economic disadvantage or inappropriate teaching. Given that LDs are not related to below average intelligence, low achievement in reading, spelling, writing and/or maths is unexpected.
Definition of learning disability in Australia

In Australia, there has been little debate surrounding the definition of LD. This is partly attributed to students with LDs not being eligible for special education funding in Australia (van Kraayenoord & Elkins, 1998). Despite this, the definition of LD has been an ongoing problem in Australia for several decades (Watson & Boman, 2005). In spite of the fact that LDs are recognised in countries such as the USA and United Kingdom, there is no national definition of LD in Australia. This implies that teachers and other professionals who work in schools are often unaware that some students who experience difficulties in reading, spelling, writing and/or maths have a learning problem that is neurological in origin, permanent in nature and resistant to intervention.

The absence of a national definition of LD in Australia has led to the use of various terms to describe students experiencing difficulties with reading, spelling, writing and/or maths. This includes learning difficulties, LDs, students at risk, students with special needs and dyslexia (Louden et al., 2000; Rohl et al., 2000). However, the inconsistent use of the terms LD and learning difficulties has been a significant problem for teachers and other professionals who work in schools. For example, most state and territory education systems in Australia do not differentiate between the terms learning difficulties or LDs, using learning difficulties to cover all students with high incidence educational problems (Elkins, 2000, 2002; Rivalland & House, 2000). In contrast, the terms learning difficulties and LDs have also been used in the literature at times to refer to the same group of students, and at other times to refer to a different group of students (Chan & Dally, 2000). Thus, the distinction between the group of students who experience learning difficulties and the group of students who have LDs is unclear.

Much of the confusion relating to the definition of learning difficulties and LDs in Australia originates from an investigation during the 1970s. The Australian House of Representatives formed a Select Committee on Specific Learning Difficulties to report on specific learning difficulties in children and adults (Cadman, 1976). The report concluded that there was insufficient evidence to suggest that learning difficulties experienced by students were intrinsic in origin, which is a requirement for the use of the term disabilities
(Elkins, 2002). The committee also concluded that there was no need to demarcate students with learning difficulties, slow learners and students with mild intellectual disabilities (van Kraayenoord & Elkins, 1998). As such, the committee recommended the use of the term learning difficulties to refer to students who experience difficulties in reading, spelling, writing and/or maths.

Regrettably, failing to differentiate between learning difficulties and LDs has resulted in a lack of understanding about the neurological and permanent nature of LDs. Although much has changed in terms of the scientific evidence related to learning since the mid 1970s (Elkins, 2007), especially the research examining neuroimaging techniques (Pugh et al., 2000; Pugh et al., 2001; Shaywitz, Lyon, & Shaywitz., 2006; Shaywitz, Mody, & Shaywitz, 2006) and genetic studies (Wadsworth, Olson, Pennington, & DeFries, 2000), the neurological and permanent nature of LDs are still mostly ignored in Australia.

The term used to refer to students who experience difficulties with reading, spelling, writing and/or maths varies from school to school and state to state. However, the most common term used to describe students in Australian schools is learning difficulties (Louden et al., 2000; Rohl et al., 2000). The term learning difficulties refers to a diverse group of students who experience academic and school-related problems (Graham & Bailey, 2007). According to Westwood (2004), possible causes of learning difficulties include below average intelligence, speaking English as a second language (ESL), sensory impairment, emotional or behaviour problems, economic disadvantage and inadequate or inappropriate teaching. In other words, learning difficulties is an all-embracing term that refers to students who experience academic difficulties for a variety of reasons.

Although students who experience learning difficulties and students with LDs both demonstrate similar difficulties in reading, spelling, writing and/or maths, there are fundamental differences in the assumed underlying causes of these difficulties. More specifically, there is no assumption that students with learning difficulties have a problem that is neurological in origin (Elkins, 2000). One exception where the two terms, learning difficulties and LDs, are distinguished from each other is in the state of Queensland. For
example, students with learning difficulties are defined as those with persistent problems in one or more areas of school (Elkins, 2007). In contrast, students with LDs are considered a subset of those with learning difficulties, a small group of students who experience permanent learning problems as a result of a neurological problem (Elkins, 2007). This is consistent with the view of the Australian National Health and Medical Research Council (NHMRC) that released a statement relating to children and adolescents with learning difficulties who also distinguished between the terms learning difficulties and LDs. Learning difficulties was defined as:

“a generic term which refers to the substantial proportion (10-16%) of children and adolescents who exhibit problems in developmental and academic skills. These difficulties are considered to result from one or more of the following factors: intellectual disability, physical and sensory deficits, emotional difficulties, inadequate environmental experiences, lack of appropriate educational opportunities” (NHMRC, 1990).

In contrast, the term LDs:

“refers to the much smaller proportion (2-4%) of children and adolescents who exhibit problems in developmental and academic skills which are significantly below expectation for their age and general ability. The disabilities, which often include severe and prolonged directional confusion, sequencing and short-term retention difficulties, are presumed to be intrinsic to the individual, but they are not considered to be the direct result of intellectual disability, physical and sensory defects or emotional difficulties. Neither do they appear to derive directly from inadequate environmental experiences, or lack of appropriate educational experiences” (NHMRC, 1990).

As can be seen from the NHMRC (1990) definitions, the term learning difficulties refers to students with more general difficulties while LDs describes students with more specific difficulties. According to Elkins (2002), the term LDs should be restricted to those students with learning difficulties who do not respond to classroom teaching and remedial intervention where it can be assumed that their learning problems are intrinsic to the
individual. In other words, LDs should be viewed a subset of learning difficulties that are neurological in origin, permanent in nature and resistant to intervention, and not the result of below average intelligence, speaking English as a second language (ESL), sensory impairment, emotional or behaviour problems, economic disadvantage and inadequate or inappropriate teaching.

The classification of LDs as a subset of learning difficulties is consistent with the view of Prior (1996), who used the term „specific learning difficulties” to refer to students with unexpected learning problems. Prior (1996, p.4) operationalised the definition of students with specific learning difficulties as follows:

“an IQ score greater than 80, and deficits in at least one area of academic achievement (reading, spelling, mathematics), associated with specific cognitive impairments (such as short term memory problems, poor auditory discrimination ability, visuo-perceptual problems, and the like)”.

Prior’s (1996) definition highlights that LDs are associated with underachievement in one or more areas such as reading, spelling and/or mathematics. It is assumed that LDs are intrinsic to the individual and can be attributed to a specific processing problem (e.g., working memory). An advantage of Prior’s definition is that it is an operational definition, which means that it can be used by teachers, other professionals who work in schools and researchers to identify students with LDs. Accordingly, the current research partly uses the Prior (1996) definition to define students with LDs.

The prevalence of learning disabilities in Australia

Problems with definition have made it difficult to ascertain an exact prevalence rate of LDs in Australian schools. In contrast, considerable research has examined the proportion of students who experience learning difficulties in Australian schools (Andrews, Elkins, Berry, & Burge, 2000; Bartak & Fry, 2004; Prior, 1996; Prior, Sanson, Smart, & Oberklaid, 1995; Rohl et al., 2000; Westwood & Graham, 2000). For example, Rohl et al. (2000) examined the prevalence of learning difficulties in the national survey of schools ($N = 377$) where 65 percent of respondents (e.g., teachers, principals) estimated that between
10 percent and 30 percent of students experienced learning difficulties. Westwood and Graham (2000) examined the proportion of students with special needs in a sample of 1919 students across 41 primary schools in South Australia (SA) and 36 primary schools in New South Wales (NSW). They found that teachers identified 33 percent of students in SA and 28 percent of students in NSW as having special needs. More specifically, teachers reported that between seven and 12 percent of students experienced learning difficulties. This was consistent with the findings of Bartak and Fry (2004) who asked a group of 60 Victorian primary and secondary teachers to describe students with special needs in their classrooms. Teachers reported that 10 percent of the total number of students ($N = 1505$) were identified as experiencing learning difficulties.

The prevalence rates of students who experience learning difficulties in Australian schools are higher than those of students identified with LDs in the USA. Current estimates of the prevalence of students identified with LDs in the USA are about six percent (Bradley et al., 2002), although estimates of the prevalence of dyslexia have been reported as high as 17 percent (Shaywitz et al., 2008). According to Elkins (2000), differences in prevalence rates between the two countries are expected given that students with learning difficulties in Australia includes a much broader range of students compared to students with LDs in the USA. In Australia, estimates of the proportion of students with LDs have ranged from five percent (Westwood & Graham, 2000) to over 15 percent (Prior et al. 1995).

In one of the few studies to focus on LDs, Prior et al. (1995) assessed the prevalence of dyslexia in a large sample of Victorian Year 2 students ($N = 1205$). Participants were administered the Australian Council of Education Research (ACER) Word Knowledge Test Level B, which tests decoding and comprehension skills. Moreover, teachers rated each participant’s intellectual ability on a five-point scale ranging from „very much below average” to „very much above average”, and completed a school function questionnaire assessing a range of academic skills (i.e., linguistic, organisation) using a four-point scale (strong, average, poor and very poor). Sixteen percent of students were identified as having dyslexia as they scored more than one standard deviation below the Year 2 mean. Follow-up analyses were conducted two years later using sub-samples of participants. Participants
were administered a short form of the Wechsler Intelligence Scale for Children Revised (WISC-R) Intelligence test, the Neale Analysis of Reading Ability and the Schonell Spelling Test. It was revealed that most of these students had not „recovered” to attain average reading levels (Prior et al., 1995). In fact, participants with dyslexia were, on average, one year behind in reading and two years behind in spelling. However, one limitation of the first study was that students were identified with dyslexia without receiving an intelligence assessment. It is plausible that some of the students identified with dyslexia may have demonstrated expected learning difficulties rather than unexpected learning difficulties. As such, more research on the prevalence of LDs in Australian schools is needed. One aim of the current research is to address this need and provide an estimate of the prevalence of LDs in Victorian Government schools.

Supporting students with learning disabilities in Australian classrooms

Over the past decade, there has been a shift towards inclusive education in Australia, which means that most students are educated in mainstream schools, including students with disabilities (Forlin, 2006). Although special schools are available, these schools tend to be for students with severe or profound disabilities (Forlin, 2001; van Kraayenoord, Elkins, Palmer, & Rickards, 2001), and hence do not include students with LDs. In mainstream schools, there is support available for students with disabilities to ensure that all students can participate in education. For example, in Victorian schools, students with disabilities are supported through the Program for Students with Disabilities (PSD), which provides schools with additional resources. There are seven categories within the PSD, namely: (a) physical disability; (b) visual impairment; (c) severe behaviour disorder; (d) hearing impairment; (e) intellectual disability; (f) autism spectrum disorder; and (g) severe language disorder with critical educational needs. As can be seen from these seven categories, students with LDs are not included within the PSD and thus do not receive additional funding. However, consistent with Elkins (2000), it is argued here that students with LDs are a mainstream classroom issue and that students do not need individual funding.
In-class support

Despite the rhetoric about students with LDs being supported in mainstream classrooms, Australian teachers receive little or no formal training about LDs. For example, White and Elkins (2000) examined the content of pre-service primary education programs across Australia and revealed that while such programs provided limited literacy training, very few literacy units included information about LDs. This is consistent with the findings of Rohl and Greaves (2005) who gathered information from 303 beginning and experienced teachers and reported that less than half of beginning teachers felt prepared to teach students with LDs. Even fewer experienced teachers (18%) felt that beginning teachers were prepared to teach students with LDs.

In addition to the lack of pre-service training, most classroom teachers do not receive enough in-service training on LDs. Rohl et al. (2000) found that over half of the respondents who participated in their study indicated that classroom teachers in their schools had not received professional development (PD) on LDs in the previous two years. Although 44 percent of respondents reported that a classroom teacher had received PD on LDs in the past two years, it is likely that this training focused more on general learning difficulties and not on LDs. The lack of pre-service and in-service teacher training on LDs is evident in the limited understanding among Australian teachers about the causes and characteristics of LDs. For instance, Watson and Bond (2007) collected responses from 280 secondary school teachers in Queensland and found that over half of the teachers were not aware that students with LDs do not have below average intelligence. This limited understanding has serious implications in terms of the support provided to students with LDs in the mainstream classroom.

Although teachers in Australia have not been sufficiently trained to support students with LDs in mainstream classrooms, there is evidence available on effective teaching practices for students with LDs. Swanson and colleagues have conducted meta-analyses on the intervention research for students with LDs (Swanson, 1999; Swanson & Hoskyn, 1998; 2001). For instance, Swanson and Hoskyn (1998) classified studies into four general instructional approaches, namely: (a) neither strategy nor direct instruction; (b) direct
According to Ellis (2005), the key features of direct instruction include scripted presentations, a focus on teaching the essentials, the use of small groups, rapid pacing and opportunities for practice and drilling. The key features of strategy instruction include teaching cognitive (e.g., underlining, note taking, summarising), metacognitive (e.g., planning, monitoring) and self-regulatory strategies (e.g., re-reading, re-working) in small steps, modelling and providing guided student practice and feedback (Ellis, 2005). The results from the Swanson and Hoskyn (1998) meta-analysis showed that the combined approach (Effect Size, \( ES = .84 \)) was the most effective approach, followed by strategy instruction (\( ES = .72 \)), direct instruction (\( ES = .68 \)) and no strategy or direct instruction (\( ES = .62 \)). Hence, although there is no “one size fits all” approach to teaching students with LDs, these two teaching strategies, individually and in combination, have been found to have a positive effect on learning outcomes for students with and without LDs.

Vaughn, Gersten, and Chard (2000) also summarised the critical findings of several research studies on LDs and identified common findings. They found that instructional practices that are associated with more effective outcomes for students with LDs include explicit teaching, use of “think alouds”, providing ongoing and systematic feedback, building skills in reading, spelling and writing, using small groups and pairs, peer tutoring, strategies to enhance task persistence, and controlling task difficulty to ensure that students experience success.

There is considerable research on the effectiveness of accommodations for students with LDs (Elbaum, Arguelles, Campbell, & Saleh, 2004; Fletcher, Francis et al., 2006; Fuchs, Fuchs, & Capizzi, 2005; Fuchs & Fuchs, 2001; Fuchs et al., 2000; Macarthur & Cavalier, 2004). According to Fuchs et al. (2005), accommodations are changes in the teaching methods and assessment of students with LDs that compensate for their disabilities. More specifically, accommodations remove sources of measurement error that can be attributed to the LD (Fuchs et al., 2000). Westwood (2001b) uses the term differentiation, which refers to “teaching things differently according to observed differences among students” (p.5). According to Westwood, this can be achieved through
the use of different teaching methods, adjusting curriculum content and assessment methods, and monitoring the way teachers interact with students. In a study of Year 3 students, Fletcher, Francis et al. (2006) found that students with dyslexia ($N = 44$) who were provided with a selection of accommodations (e.g., extra time, reading proper nouns) performed significantly better on a reading comprehension measure compared to students with dyslexia who were not afforded the same accommodations ($N = 47$). Other recommended accommodations include allowing students to read aloud so that they can receive both visual and oral feedback on their reading, orally presenting material to students, using large print and different coloured paper, providing students with an alternative method to submit their work and allowing students to use different information and communication technologies (see Fuchs et al., 2005 for a full list).

Another form of in-class support for students with LDs in some Australian states is the support teacher (Graham & Bailey, 2007). The role of the support teacher is to assist the mainstream classroom teacher inside the classroom, and withdraw students from the classroom when necessary to work either individually or in small groups (Forlin, 2001). One of the main concerns of support teachers is the large number of students with LDs who need support (Forlin, 2001). Students are often assigned a volunteer or teacher aide to help support their reading and writing (Elkins, 2002). However, this translates to students who need the most help in the classroom being supported by those individuals who are least qualified (Elkins, 2002). Indeed, this is the case in Victorian schools where there is not enough support for students with special needs (see Bartak & Fry, 2004) and where schools do not have support teachers for students with LDs. Hence, it is essential that classroom teachers need to be able to cater for the educational needs of students with LDs.

**Support programs**

Rohl et al. (2000) examined the support provided to students with LDs in Australian schools and found a number of programs and strategies were being used. These ranged from whole class programs to individual withdrawal programs. A three-wave model has been used as a framework to explain the different programs and strategies used to support students with LDs (Rohl, 2000). These three waves are designed to be administered in
sequential order from first-wave to third-wave. The term „first-wave“ refers to whole class teaching in the early years of primary school; „second-wave“ refers to early intervention programs in the early years of primary school; and the term „third-wave“ relates to interventions for students in the middle and upper years of primary school (Rohl, 2000).

According to Rohl (2000), first-wave programs tend to focus on structured explicit teaching of literacy to all students in the early years of school. These include programs such as The Early Years Literacy Program, School-Wide Early Literacy and Language (SWELL), First Steps, and Teaching Handwriting Reading and Spelling Skills (THRASS). The Early Year Literacy Program operates in Victorian schools and is based on the assumption that a critical period for teaching literacy is the first three years of school where students who do not make sufficient progress in these years will experience ongoing learning problems (Rohl, 2000). This program involves a daily two-hour session on literacy, divided into reading and writing components, each of which includes whole class teaching, small group learning and a shared discussion (Rohl, 2000). However, programs such as these have been criticised due to the limited research evidence to support their effectiveness and because most of the favourable evidence has been provided by the developers of the programs (Elkins, 2002). In other words, there is a lack of independent research evaluating the effectiveness of such programs in Australia.

Second-wave programs are early intervention programs for students who do not respond to initial whole class teaching (Rohl, 2000). Reading Recovery (RR) is an example of a second-wave program, which is used in over three-quarters of Victorian schools for students in Year 1 (Louden, 2000). Reading Recovery is an individual withdrawal program that consists of 30 minute one-on-one sessions with a qualified RR teacher on a daily basis over a period of up to 20 weeks (Rohl, 2000). During these sessions, students re-read a previously read book as well as a book introduced in the previous session. This is monitored by the teacher using a running record. Students identify letters and words; write a story; practise hearing and writing sounds in words; cut up the story and re-assemble it; and introduce a new book (Chan & Dally, 2000). Students are discontinued from the
program once their reading is considered to be at class level, which is expected to be between 12 and 16 weeks after commencing the program.

Although RR is a popular program in Victorian schools, the long-term effectiveness of RR is a continuing source of debate (Chan & Dally, 2000; Reynolds & Wheldall, 2007). Some studies have shown long-term improvements in reading for students in RR (Pinnell, Lyons, DeFord, & Bryk 1994; Wade & Moore, 1998), while other studies have found that these improvements are not sustained over time (Center, Wheldall, Freeman, Outhred, & McNaught, 1995; Shanahan & Barr, 1995). For example, in one of the few experimental studies, Center et al. (1995) evaluated the effectiveness of RR using 10 primary schools in NSW. Students with low reading progress were randomly assigned to either an experimental group \((N = 31)\) that received RR, or a control group \((N = 39)\) that received support typically provided to students with poor reading. The results of the study revealed no significant difference in reading achievement between the experimental and control groups 12 months after the intervention finished. Furthermore, Center et al. found that 65 percent of the students who completed RR attained average reading levels on a battery of reading measures while the remaining 35 percent failed to do so. However, it was also revealed that around 30 percent of low performing readers who did not complete RR also reached average reading levels without RR. Therefore, it could be assumed that a similar percentage of students who completed RR would have improved without the intervention. This suggests that only 35 percent of students who completed RR benefited from the intervention (Center et al., 1995).

One of the main criticisms of early intervention programs such as RR is that these programs involve withdrawing students from the mainstream classroom. Withdrawing students from the mainstream classroom, in some instances, can have negative social and emotional outcomes for students (Elbaum, 2002). For example, Vaughn, Haager, Hogan, and Kouzakanani (1992) found that some students with LDs who were removed from the mainstream classroom believed that teachers had lower expectations for their educational achievement and that other students perceived them as being „dumb” (Elbaum, 2002). There are also practical implications associated with withdrawal programs. Programs, such as RR,
that require one-to-one teaching from a specialist teacher, are expensive and utilise a large amount of the limited resources for a small number of students (Rohl, 2000). For example, costs have been reported as high as $9088 per student in New South Wales (NSW) in 2003 (Reynolds & Wheldall, 2007). Given the equivocal evidence supporting the use of RR as well as the potential adverse outcomes associated with withdrawing students from the classroom, it appears that withdrawal programs such as RR are not an effective means of supporting students with LDs in mainstream classrooms.

Third-wave support refers to ongoing support for students in the middle years (Years 3 and 4) and upper years (Years 5 and 6) of primary school who have not responded to mainstream classroom teaching or early intervention programs (Rohl, 2000). This form of support can include whole class programs, withdrawal programs, in-class support and, in some schools, no support at all (Rohl, 2000). Since most of the limited school resources are allocated to first-wave and second-wave support, there are often insufficient resources in schools to provide students with effective ongoing support (Elkins, 2007). This can be interpreted as students who need the most support in the classroom, namely those who have not responded to whole class teaching and early interventions programs, being confronted with fewer resources to support their learning needs. Without ongoing support, these students will continue to experience difficulties with reading, spelling, writing and/or maths and are likely to disengage from school. Again, it is critical that classroom teachers be provided with the knowledge and skills to provide effective teaching methods and appropriate accommodations for students with LDs.

**Private support**

In addition to school-based support services, there are private providers that offer services for students with LDs at a cost (Greaves, 2000). These providers belong to organisations supported by volunteers (e.g., Specific Learning Difficulties Association: SPELD), public supported organisations such as hospitals, and small businesses (e.g., Kip McGrath, Kumon, Tomatis) and private providers (e.g., Psychologists, Speech Pathologists). These organisations and providers offer tutoring services for students with LDs, particularly for students in independent schools (Greaves, 2000). However, there is
little research to support their effectiveness. In addition, it also means that tutoring services are exclusively for those families who can afford them and that families that cannot afford the cost are not able to access such support.

Compounding the problems of limited access of tutoring services, several of the alternative therapies that are offered by some private providers for the purpose of remediating learning difficulties have little or no evidence to support their effectiveness, such as diet supplements and neuromotor therapies (Chan & Dally, 2000). For instance, Reynolds, Nicolson, and Hambly (2003) evaluated the effects of an exercise-based approach to remediation of dyslexia and related disorders. The authors claimed that their results suggested that exercise treatment was an effective way of improving cognitive skill and literacy performance. Yet the study contained significant flaws, including the fact that students in intervention and control groups were not matched for reading ability, only a few students actually had reading and spelling difficulties with one student in the control being 22 months ahead in reading, and some of the students in the intervention group were also receiving additional literacy support twice a week (Rack, 2003; Singleton & Stuart, 2003; Snowling & Hulme, 2003). Despite the absence of valid evidence to support the exercise-based approach, parents in Australia were asked to pay $5000 for a program based on this approach. For this reason, it is important for parents to be aware of false claims as they are potentially vulnerable to the appeal of such therapies that are purported to “cure” LDs.

Identification of learning disabilities

There is limited emphasis placed on the identification of students with LDs in Australian schools as students with LDs are not eligible for additional funding (van Kraayenoord & Elkins, 1998). This indifferent approach to identification is further exacerbated by the confusion between those students who experience learning difficulties and those students with LDs. As a result, the identification of students with LDs frequently does not occur in Australian schools.

In contrast to the lack of emphasis on the identification of students with LDs, there is a strong focus on the identification of students who experience learning difficulties in
Australian schools (Rivalland & House, 2000). In 1998, the Australian federal government and state and territory governments agreed to the National Literacy and Numeracy Plan (NLNP), which stipulated that all students be assessed for learning problems by their teachers in the first years of school. Rohl et al. (2000) found evidence to support the early identification of students who experience learning difficulties. For example, over one-quarter of the schools that participated in the national survey of schools assessed students as they entered school, almost half of the schools assessed students at the end of Year 1 and around one third of the schools assessed students in Year 2. Almost half of the schools also reported assessing students at other times during school (Rohl et al., 2000).

The initial identification of students who experience learning difficulties is often left to the discretion of individual classroom teachers and other professionals (e.g., speech pathologists, psychologists) who are encouraged to select from a range of informal and formal methods (Rivalland & House, 2000). This has resulted in considerable variation in the identification methods used to detect students with LDs in Australian schools. For example, Rohl et al. (2000) found that schools used different identification criteria, including “two or more years behind”, “one year behind”, and “in the bottom 10 percent of students” on measures of literacy and numeracy. Another identification method used in schools is basic skills testing, which involves the administration of standardised tests (Rivalland & House, 2000). For example, Victorian schools have used the Achievement Improvement Monitor (AIM) assessment, which involves assessing the literacy and numeracy skills of students in Years 3, 5, 7 and 9. More recently, AIM testing was replaced in Victorian schools by the National Assessment Program – Literacy and Numeracy (NAPLAN), which is a similar assessment for students across Australia. Despite the various identification methods, it should be understood that while these identification methods detect students with low achievement, they do not necessarily identify students with unexpected underachievement. As mentioned previously, there are multiple reasons that cause low achievement that do not reflect LDs (e.g., below average intelligence, ESL, sensory impairment) (Westwood, 2004). As such, it is argued that current identification practices used in Victorian schools do not indicate which of the students identified as experiencing learning difficulties have LDs.
Students who continue to experience difficulties in reading, spelling, writing and/or mathematics beyond the early years are sometimes referred to other professionals such as speech pathologists and psychologists (Rivalland, 2000). In Victorian schools, speech pathologists administer receptive and expressive language tests to determine whether a student is eligible for additional funding under the category of severe language disorder with critical educational needs within the Programs for Students with Disabilities. Likewise, psychologists may administer intelligence tests to ascertain whether students are eligible for additional funding under the intellectual disability category. However, neither speech pathologists nor psychologists assess students for LDs in Victorian Government schools. Students are often forced to seek assessment services external to the school in order to be assessed for LDs. For example, similar to tutoring services, private providers including support organisations, franchise services and private practitioners offer assessment services for LDs at a cost (Greaves, 2000). These assessments can cost several hundreds of dollars, which excludes many families, particularly those from low socio-economic backgrounds, from having children assessed. As a result, many students with LDs remain unidentified in Victorian schools.

**Identification methods in the United States of America**

While students with LDs often remain unidentified in Australian schools, the identification of students with LDs is common practice in the USA since students identified with LDs are eligible for special education funding. The most widely-used method for identifying students with LDs in the USA has been the IQ-achievement discrepancy approach (Reschly & Hosp, 2004). This method involves the administration of educational and intelligence tests by a psychologist, where the aim is to determine whether a student demonstrates a discrepancy between their educational achievement and intellectual ability. It is assumed that underachieving students who demonstrate a discrepancy between educational achievement and intellectual ability are qualitatively different from low achieving students whose educational achievement is consistent with their intellectual ability (Fletcher et al., 2002).
The use of the IQ-achievement discrepancy approach has been controversial (Lyon et al., 2001; Vaughn & Fuchs, 2003). Various studies have questioned the validity of the IQ-achievement discrepancy approach as a way of identifying students with LDs (Fletcher et al., 1994; Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996; Hoskyn & Swanson, 2000: Shaywitz, Fletcher, Holahan, & Shaywitz, 1992; Stanovich & Siegel, 1994; Stuebing et al., 2002). Fletcher et al. (1994) examined the validity of distinguishing between students with reading disabilities according to discrepancy and low achievement definitions. One hundred and ninety-nine children were administered a battery of reading and cognitive tests in order to group students into IQ-achievement discrepancy and low achievement groups. Results from the study found small or non significant differences between students with reading disabilities who satisfied the IQ-achievement discrepancy criteria and students who met the low achievement definition in reading. According to Fletcher et al., because all students in their study demonstrated similar reading problems, the practice of distinguishing between students with and without an IQ-achievement discrepancy was not supported. These findings have led some researchers to question the role of intelligence in the identification of LDs (Fletcher et al. 1998; Siegel, 1989). In fact, Siegel (1989) asserted that the use of intelligence tests should be abandoned in the identification of LDs.

Given the criticism of the IQ-achievement discrepancy identification method, an alternative approach to the identification of LDs known as the response to intervention (RTI) approach has been proposed in recent years (Fuchs, 2003; Fuchs & Fuchs, 2006; Fuchs, Fuchs, & Compton, 2004; Fuchs, Mock, Morgan, & Young, 2003; Gresham, 2002; Kavale, Holdnack, & Mostert, 2006; Vaughn & Fuchs, 2003). In the reauthorisation of the Individuals with Disability Education Act (IDEA) in 2004, students were able to be identified for special education based on the RTI approach. This approach can be described as a series of steps. First, students are provided with effective instruction by their classroom teacher and are assessed to determine if their level of performance is below that of their peers. Second, those students who do not respond to support from their teacher or someone else are re-assessed. Third, those students who continue not to respond are deemed eligible for special education or at least a special education evaluation.
The RTI approach differs in the number of levels (e.g., 2 to 4 levels) in the process, the different types of intervention, who delivers the intervention and whether the process is an evaluation or an intervention (Fuchs et al., 2003). In general, levels become more intensive such that levels move from whole class to small group or individual interventions. These interventions may be administered to all students or catered for the individual. Depending on where these interventions occur, they may be administered by the mainstream classroom teacher or a special education teacher.

According to Vaughn and Fuchs (2003), an advantage of the RTI approach is that it provides early identification and intervention to students with LDs. However, despite the potential benefits, there are a number of questions in relation to the RTI approach that need to be addressed. For instance, it seems questionable that students who respond to intensive individual education could return to the mainstream classroom and learn in the same manner as their peers (Fuchs, 2003). Even then, it also seems unrealistic that students who do respond to intensive education initially experience difficulties due to poor instruction rather than something intrinsic to the individual. Another criticism of the RTI approach is that it does not include a measure of intelligence (Kavale, 2005; Kavale et al., 2006). According to Kavale and colleagues, this means that it does not operationlise the notion of unexpected underachievement.

Despite the concerns of some researchers relating to the use of intelligence tests, other researchers support the use of intelligence tests (see Kavale, 2005; Kavale et al., 2006; Scruggs & Mastropieri, 2002). In fact, Kavale et al. (2006) postulated that the assessment of LDs needs to include some measure of intelligence in order to differentiate students with LDs from students with expected low achievement. More recently, there has been a movement in the literature toward a combined approach with a number of researchers proposing a hybrid model combining RTI and a comprehensive cognitive evaluation (Fuchs et al., 2003; Hale, Kaufman, Naglieri & Kavale, 2006; Mastropieri & Scruggs, 2005). Indeed, the preferred combined model incorporates only two levels of RTI, namely those applicable to the mainstream classroom, followed by a cognitive evaluation. This combined approach makes sense as the mainstream classroom teacher is responsible
for providing effective teaching and monitoring of student performance. For students who
do not respond, some form of intervention by the teacher is needed. If students continue to
fall behind following the intervention, then students should complete educational and
cognitive assessments to determine what the problem is.

To some extent, the RTI approach already exists in Australian schools (Graham &
Bailey, 2007). For instance, the RTI approach is analogous to the three-wave model present
in Australian schools (Rohl, 2000). Yet, as noted earlier, nothing happens for students who
continue to underachieve in reading and spelling. Given that Years 5 and 6 students in
Victorian schools have most likely received early intervention such as Reading Recovery
and other support programs by this stage of schooling, the current study will continue to
use the IQ-achievement discrepancy approach as a way of identifying students with LDs in
Years 5 and 6, which is consistent with the combined approach.

An alternative model

The following section provides an argument for an alternative method for screening
students for LDs using standardised educational tests and intelligence screening tests.
Standardised educational tests can be administered to students to detect low achievement.
These same students can then be administered an intelligence screening test to determine
whether their intelligence scores are in the normal range. Students who are found to
demonstrate a discrepancy between their educational achievement and intellectual ability
will be identified as having possible LDs.

Measuring educational achievement

The first step when screening students for LDs is to obtain a measure of educational
achievement. By definition, students with LDs demonstrate unexpected underachievement
in one or more areas such as reading, spelling, writing and/or mathematics. Various
methods are available for teachers to assess educational achievement, including direct
observation, analysis of work samples, diagnostic interviews and informal and formal
testing (Westwood, 2001a). One method of formal testing is standardised testing, which
involves tests that can be administered, scored and interpreted in a consistent manner. The
use of standardised tests enables the performance of students to be compared to other students or to the expected performance of a particular age level (Westwood, 2001a).

An advantage of group-administered standardised tests is that they can be used to screen whole classrooms of students for low educational achievement. For instance, standardised reading tests can be administered to a classroom of students and those students who score below the 25th percentile are deemed to have low achievement in reading (Fletcher et al., 1994; Lyon et al., 2001). In such cases, these same students would also need to complete some form of intelligence measure in order to determine whether they demonstrate unexpected underachievement. More importantly, the biggest advantage is that teachers would know which students demonstrate unexpected underachievement so that these students could be further assessed and provided with appropriate accommodations.

**Measuring intelligence**

The second step involved in screening students for LDs is to obtain a measure of intelligence. The most widely used comprehensive intelligence assessments for children and adults are the Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV) and the Wechsler Adult Intelligence Scale – Third Edition (WAIS-III) respectively (Whitaker, 2008). Although both of these tests are reliable and valid measures of intelligence (Flanagan & Kaufman, 2004; Kaufman & Lichtenberger, 1999), there are some practical limitations associated with the use of such tests in schools. In particular, the administration of the WISC-IV and WAIS-III and follow up psychological report can take a number of hours to complete, cost several hundreds of dollars per assessment (i.e., some assessments as much as $1000) and must be administered by a registered psychologist. Given previous estimates of the prevalence of LDs in Australia (e.g., 5-15%) as well as the limited resources available in schools, comprehensive individual intelligence assessments are not an appropriate method for measuring intelligence as part of an LD assessment. Thus, it is vital to consider some alternative methods of measuring intelligence in the school environment.
Two potentially useful alternatives for measuring intelligence are the Kaufman Brief Intelligence Test - Second Edition (K-BIT2) and the Standard Progressive Matrices (SPM). The KBIT-2 is a brief individually-administered intelligence test that takes 15-30 minutes to complete and can be administered by non-psychologists (Kaufman & Kaufman, 2004). The SPM is a non-verbal intelligence test that can also be administered by non-psychologists to groups of individuals. These two tests are typically used as screening tools for measuring intelligence in research and have robust psychometric properties (Kaufman & Kaufman, 2004; Raven, Raven, & Court, 2000). The advantage of these tests, in relation to assessing students, is that they can be administered by classroom teachers who have received some additional training.

A small number of studies have examined the use of the K-BIT as an alternative intelligence measure to comprehensive intelligence assessments when screening students for LDs. For instance, Canivez (1996) examined the concurrent validity of the K-BIT in a sample of 75 middle school students who had previously been identified with LDs using the WISC-III. Canivez found a strong correlation ($r = .82$) between IQ scores on the WISC-III and IQ scores on the K-BIT, which indicates that higher scores on the WISC-III corresponded to higher scores on the K-BIT. More recently, Canivez, Neitzel, and Martin (2005) examined the construct validity of the K-BIT and WISC-III in a sample of 207 students who were receiving special education assessments. Canivez et al. also reported a strong correlation ($r = .89$) between IQ scores on the WISC-III and IQ scores on the K-BIT. This suggests that the K-BIT is a promising general intelligence screening tool when a comprehensive assessment is not possible or needed. Although the K-BIT is less time consuming to administer and score than the WISC-III and does not require a registered psychologist to administer, it is still not a practical screening tool for classroom teachers. This is because it must be individually administered.

The SPM provides a more practical method for teachers to measure intelligence as it can be group-administered to whole classrooms. Notwithstanding the practical advantages, there is a paucity of research investigating the use of the SPM as a measure of intelligence when screening students for possible LDs. This is despite the SPM having been found to
correlate ($r = .80$) with the Wechsler Intelligence Scale for Children-Revised (WISC-R) for a stratified sample of children aged between seven and 11 years (Rogers & Holmes, 1987). There is a clear need for more research to examine the use of the SPM as an intelligence screening tool when screening students for LDs. Another aim of the current research was to address this gap in the research by examining the validity of the SPM as a measure of intelligence when screening students for possible LDs.

**Teacher screening for learning disabilities**

Given that LDs are a mainstream classroom issue in Australian schools, it is essential that classroom teachers are aware that some of their students have permanent learning problems so that appropriate assistance can be provided to students in the classroom. Current approaches involving the administration of comprehensive individual intelligence assessments by psychologists are not feasible in schools and simply do not happen. Additionally, recommendations from assessments conducted by psychologists are not taken up in the mainstream classroom (Westwood, 2001). According to Westwood, this is because information given in reports is not passed on to teachers, recommendations from assessments are sometimes not feasible in the mainstream classroom and reports are written in psycho-educational jargon that cannot be easily interpreted by teachers. In essence, not only do teachers have to wait for important information about their students, this information is not being translated into practice. However, one solution to this problem is for teachers to administer educational and intelligence screening tests in order to screen students for LDs.

There is some evidence from the USA to support the notion that teachers can screen students for LDs. Gresham, Reschly, and Carey (1987) examined the accuracy of teacher judgements for identifying students with LDs compared to psychological assessments using standardised tests. Gresham et al. compared 100 students with LDs to a group of 100 students without LDs and found that using a 5-item teacher rating scale of academic performance, teachers were able to accurately identify 96 percent of students with LDs compared to 91 percent of students with LDs using the standardised educational and intelligence tests. However, the Gresham et al. study had two main limitations. First, as the
study involved a sample of students who were being re-evaluated for LDs, it was plausible that teachers were biased in their judgements as they were already familiar with who had LDs (Gresham & MacMillan, 1997). Second, it could be argued that teacher judgements were just a confirmation of the original referral (Gresham & MacMillan, 1997). In other words, the use of a re-evaluation sample implies that confirmation bias was a possible issue.

In response to these limitations, Gresham and MacMillan (1997) evaluated the accuracy of teacher judgments compared to standardised tests in identifying students with LDs using a sample of Years 2 to 4 students \( (N = 240) \) who had been referred for an assessment, but not yet identified with LDs. Three groups were defined based on scores from the WISC-III and the Wide Range Achievement Test – Revised (WRAT). The groups comprised a LDs group, a low achievement group (LA) and a low IQ group. The LA and low IQ group differ in terms of intelligence level where students in the LA group had IQ scores above 76 but did not demonstrate a discrepancy between educational achievement and intellectual ability, and students with low IQ scores has IQ scores below 75. A control group was also formed and included students with no learning problems. The results of the study supported the notion that teachers are able to screen at-risk students for LDs. In particular, teachers were able to distinguish between the LDs group and the control group with 91 percent accuracy. Although teachers were able to discriminate between the LDs group and the control group, they were unable to differentiate between the LDs group, the LA group and the low IQ group. One explanation for this finding is that teachers did not obtain a measure of intelligence, which would have allowed teachers to discriminate between students with unexpected underachievement and students with expected low achievement.

In relation to the current study, the findings from the studies by Gresham and colleagues (Gresham & MacMillan, 1997; Gresham et al., 1987) suggest that there is evidence to support the view that teachers can screen students for possible LDs. However, in order to differentiate between students with unexpected underachievement and students with low achievement, the use of intelligence tests is required. Therefore, the current
research will examine the validity of using educational and intelligence screening tests to screen students for possible LDs that can be administered by classroom teachers.

**Chapter summary**

The educational needs of students with LDs are currently ignored in Australian schools. In fact, there is no national definition of LD in Australia. In contrast, the term learning difficulties is preferred and refers to a diverse group of students with school-related problems. Despite the similarities between LDs and learning difficulties, these definitions assume fundamentally different underlying causes of LDs and learning difficulties. For instance, whereas possible causes of learning difficulties include below average intelligence and inappropriate teaching, LDs are associated with processing problems that are neurological and permanent in nature and not the result of physical, sensory or intellectual disabilities, emotional disturbance, cultural or economic disadvantage, or inappropriate teaching. Since the terms LDs and learning difficulties are used inconsistently in practice and research, teachers and other professionals who work in schools are often unaware of the neurological and permanent nature of LDs. Furthermore, given the ambiguity surrounding the definition of LDs, there remains a critical need for more research on the prevalence of LDs in Australian schools.

Although LDs are considered a mainstream classroom issue in Australia, current forms of support for students with LDs are not working. This is understandable as teachers have not received sufficient pre-service and in-service training to support the diverse learning needs of students with LDs. Of the different forms of support available in schools, there is a lack of independent evidence to support the effectiveness of whole class programs, and individual intervention programs are not considered appropriate for supporting students with LDs in mainstream classrooms. There is also a lack of emphasis on ongoing support for students who have not responded to previous interventions. Furthermore, private tutoring services are not a solution for supporting all students with LDs as not all students have access to these services. It is argued that students who have not responded to whole class programs, intensive individual programs and ongoing support, are
students with permanent learning problems, which is consistent with the neurological and permanent nature of LDs.

Students with LDs are not being identified in Australian schools. Current identification methods are used to detect students with low achievement, not necessarily students with unexpected underachievement. This is in contrast to the USA where the identification of students with LDs is common practice and involves the administration of intelligence and educational tests by a psychologist. It is assumed that students with LDs in the USA demonstrate a discrepancy between educational achievement and intellectual ability. However, the administration of comprehensive individual intelligence tests is time consuming, expensive and impractical, and hence is not appropriate for measuring intelligence in students in Australian schools.

An alternative method for screening students for LDs is proposed in the current research using standardised educational tests and intelligence screening tools. In particular, standardised tests can be administered to students to detect students with low achievement in reading and spelling. These same students would then be administered an intelligence screening test in order to determine whether students have at least average intelligence. Students who are found to have low educational achievement and intelligence in the normal range are assumed to demonstrate unexpected underachievement. This is indicative of possible LDs.

The following chapter will highlight the negative outcomes associated with ignoring students with LD, including school dropout, unemployment, juvenile delinquency and criminal conviction, and mental health problems. It is argued that students with LDs have fewer resources to invest in coping and thus are more susceptible to giving up.
Chapter 3: Literature Review of Coping with Learning Disabilities

Introduction

This chapter highlights some of the adverse outcomes associated with learning disabilities (LDs), including school dropout, juvenile delinquency and criminal conviction, unemployment and mental health problems. These outcomes suggest that a significant proportion of students with LDs are not coping. Although there is some evidence indicating that a small number of students with LDs are able to deal with stress and move on to experience success in education and employment, many do not. Therefore, it is argued in this chapter that most students with LDs do not have the resources to cope with stress.

This chapter initially reviews the risk and protective factors for students with LDs. It has been found in the literature that students with LDs report lower mean levels of important affective, behavioural and cognitive resources than their peers. This chapter then describes and reviews three stress and coping models. The first model is a widely-used stress and coping model known as the transactional model (Lazarus & Folkman, 1984). The second model is a resource-based model of coping known as the Conservation of Resources model (COR; Hobfoll, 1989; 2001). Both of these models were developed in the adult stress and coping literature. A third coping model, namely the Children’s Coping in the Academic Domain (CCAD; Skinner & Wellborn, 1997) which is specific to children’s coping within school contexts, is then presented. From these models, an integrated theoretical model is utilised to explain the coping behaviours of students with LDs. It is argued that the integrated model’s emphasis on resource loss, loss spirals and the loss of expected gains as well as its focus on external (e.g., relationships with teachers) and internal resources (e.g., perceived control) make it an appropriate framework to guide the examination of coping behaviours for students with LDs.

Although empirical support for other models based on the integrated model that have been used to explain the coping behaviours of students in the general student population is discussed, a paucity of research on models to explain the coping behaviours of students with LDs in the literature is documented, especially for students with LDs in
Australian primary schools. The chapter concludes with a proposed model of coping resources that will be empirically tested in this study.

**Adverse outcomes associated with learning disabilities**

It is critical for mainstream classroom teachers to know which students have LDs so that teachers can provide appropriate support for these students in the classroom. This is important given that LDs are associated with a number of negative educational outcomes, including behavioural problems (Prior, 1996), school disengagement (Reschly & Christenson, 2006) and school dropout (Dunn, Chambers, & Rabren, 2004). Due to their permanent processing difficulties, students with LDs experience difficulties in one or more academic areas including reading, spelling, writing and/or mathematics, which typically lead to poor academic performance relative to their peers. As a result, these students tend to disengage from the school environment, which increases their risk of dropping out of school (Dunn et al., 2004)

Not only are LDs associated with poor educational outcomes, they have also been related to negative long term consequences including juvenile delinquency and criminal conviction, unemployment and mental health problems (Prior, 1996). Indeed, it appears that poor educational outcomes may be directly related to negative long term consequences. According to Christle, Jolivette, and Nelson (2005), poor educational achievement, suspension and school dropout have been identified as elements of the „school to prison pipeline“ . In other words, the characteristics that are associated with LDs are predictors of juvenile delinquency and criminal conviction. A similar relationship exists between the characteristics of LDs and unemployment. For instance, McMillan and Marks (2003) reported that low levels of literacy and numeracy skills are related to school dropout, which, in turn, are linked to higher levels of unemployment. Hence, there seems to be a spiral effect for students with LDs in which students who experience poor educational outcomes are more likely to end up involved in crime or in the ranks of the unemployed.

Learning disabilities are often associated with various mental health problems, including internalising (e.g., anxiety, depression) and externalising (e.g., behaviour
problems) problems. Maag and Reid (2006) conducted a meta-analysis of 14 studies involving students with LDs and depression. They were interested in whether students with LDs were more likely to experience higher levels of depression compared to their peers without LDs. The articles for the meta-analysis were selected on the basis on whether they were published in a peer-reviewed journal, used standardised depression measures with published norms, or included a control group, reported disaggregated data and used school or community based samples. The 14 studies included 1701 participants with LDs. The results showed that the LDs group reported significantly higher depression scores compared with the non LDs group.

Prior, Smart, Sanson, and Oberklaid (1999) examined the relationship between LDs and behaviour problems in a large sample of 1724 Australian students aged between 11 and 12 years. The criteria used to identify students with LDs included an IQ score of 80 or more on the WISC-R, and spelling and maths scores below the 30th percentile on the Wide Range Achievement Test-Revised (WRAT-R). The results showed that students with LDs reported a number of internalising disorders (e.g., anxiety, depression). Moreover, LDs were also associated with externalising problems such as attention deficit hyperactivity disorder (ADHD) and conduct disorder (CD) / oppositional defiance disorder (ODD). These disorders were identified via a structured psychological interview given by a trained psychologist. Prior et al. (1999) concluded that students with LDs were particularly vulnerable to internalising and externalising problems.

The mental health problems encountered by those with LDs appear to be ongoing. For instance, Raskind, Goldberg, Higgins, and Herman (1999) conducted a 20-year follow-up study with a sample of 41 adults with LDs in the USA as part of a longitudinal project. These 41 participants were also involved in a 10-year follow-up where participants had previously reported a verbal or performance IQ of 85 or above, diagnosis of a LD and no sensory deficits or severe emotional disturbances present at the initial diagnosis. After 20 years, a high incidence of mental health problems was reported. Rakind et al. found that 11 of the 26 participants who completed the full interview process individually reported suffering from one or more psychological disorders during this period (e.g., anxiety
disorders, depression). In essence, mental health problems are potentially a very serious problem for students with LDs.

In light of the possible adverse outcomes for students with LDs such as school dropout, juvenile delinquency and criminal conviction, unemployment and mental health problems, it is clear that a significant proportion of these students are not coping. As such, it is important to review what potential factors influence the coping behaviours of students with LDs.

**Risks factors associated with learning disabilities**

Risk factors refer to those factors that increase the likelihood of the onset, digression toward and maintenance of existing negative outcomes (Bellin, Kovacs, & Sawin, 2008). For instance, students with LDs often experience a number of affective, behavioural and cognitive consequences, which can be associated with their unexpected underachievement at school and specifically in language-related areas, including reading, spelling and writing. These consequences can be seen in the form of lower levels of important psychological resources, which are discussed in more detail below.

**Affective domain**

Affective consequences refer to emotional responses such as negative feelings about oneself. For instance, Peleg (2009) examined mean differences in self-esteem between students with LDs ($N = 52$) and without LDs ($N = 50$) in a sample of 102 Year 10 and 11 Arab students in Israel. Students were identified with LDs after psychological assessments were conducted by school psychologists and educational diagnosticians at the school which indicated intelligence levels in the normal range and evidence of specific processing impairment. A one-way analysis of variance (ANOVA) revealed students with LDs reported lower mean levels of self-esteem compared to students without LDs. This finding suggests that continued underachievement at school can lead to negative feelings about oneself.
**Behavioural domain**

Students with LDs who continue to underachieve in school are often told they are not investing sufficient effort (Westwood, 2008). In fact, teachers and parents often incorrectly assume that students with LDs underachieve at school due to a lack of effort and not because they have permanent processing difficulties. However, what they often fail to understand is that the ongoing lack of success at school associated with having LDs can result in a reduction in effort in the classroom. For instance, Sideridis (2006) examined motivation levels for a sample of Year 5 and 6 students with LDs ($N = 132$) and students with average achievement ($N = 538$) in Greek schools. These students were identified with LDs based on the state diagnostic criteria (i.e., discrepancy between intelligence and educational achievement) used in Greece. The results showed that students with LDs reported lower mean levels of motivation compared to students with average achievement. From these findings, it is apparent that, by late primary school, students with LDs have reduced motivation at school.

**Cognitive domain**

Cognitive consequences refer to an individual’s thoughts and beliefs about oneself, and include the constructs self-concept, self-efficacy and locus of control. The self-concept of students has received the most attention in the literature on LDs (Elbaum & Vaughn, 2003). Elbaum and Vaughn conceptualised self-concept as a multidimensional construct that includes academic, social and global aspects and refers to an individual’s thoughts about himself or herself across multiple domains. Bear, Minke, and Manning (2002) conducted a meta-analysis of 61 studies involving students with LDs and self-concept. Studies were selected for the meta-analysis if they included school-aged children identified with LDs using state or federal criteria in the USA, or similar criteria in the country in which the study was conducted. A reliable and valid measure of self-concept also needed to be administered in each of the studies. The results of the meta-analysis showed that students with LDs tended to report lower levels of academic self-concept compared to students without LDs, which is to be expected given their reading, spelling and writing difficulties. However, the findings relating to social and global self-concept were less clear.
A recent investigation by Nunez et al. (2005) examined whether Spanish students with LDs ($N = 173$) and students without LDs ($N = 172$) differed in their mean levels of self-concept. These students ranged in age from nine to 14 years. A comprehensive process was used to diagnose students with LDs. The diagnosis was conducted by school district specialists and involved a three-step process. The first step was to determine whether the student’s academic performance was significantly lower than their intellectual ability (i.e., two or more years behind). Second, for students who did not demonstrate an intellectual deficit, the specialist looked for a problem with a cognitive process that would explain the discrepancy. The third step was to exclude disabilities other than LDs. A multivariate analysis of covariance (MANCOVA) revealed that students with LDs reported significantly lower mean levels of academic, social and global self-concept compared to students without LDs. Although there are mixed findings in relation to social and global self-concept, the findings across studies suggest that students with LDs are more vulnerable to negative thoughts and feelings about their academic self-concept than average achieving students.

Previous research has also revealed significant differences in the mean levels of self-efficacy between students with LDs and students with average achievement. According to Bandura (1977; 1997), self-efficacy can be defined as the belief in one’s ability to produce a given outcome. Lackaye, Maraglit, Ziv, and Ziman (2006) compared the mean levels of self-efficacy for Year 7 students with LDs ($N = 123$) and without LDs ($N = 123$) from large regional schools in Israel. The criteria used to identify students with LDs included the presence of a verbal and/or performance IQ in at least the low average range, achievement test scores at least one standard deviation below their IQ score in one or more areas of functioning, and evidence of a deficit in or more cognitive processes. A series of MANOVAs revealed that students with LDs reported significantly lower academic self-efficacy and social self-efficacy. This was consistent with the findings of Lackaye and Margalit (2006) who also compared Year 7 students with LDs ($N = 124$) and without LDs ($N = 447$) in Israeli schools and found that students with LDs reported lower levels of academic self-efficacy. Not surprisingly, students with LDs who are characterised by
unexpected underachievement in reading, spelling and writing have less confidence in their own abilities to succeed in school.

While self-efficacy refers to beliefs about abilities to produce a certain outcome, internal self-efficacy relates to the beliefs about one’s ability to control his or her internal states. Firth, Cunningham, and Skues (2007) found a significant difference in the mean levels of internal self-efficacy between students with ($N = 93$) and without LDs ($N = 102$) in a sample of Australian secondary students. Students were identified with LDs if they had an IQ score greater than 80 on the Wechsler Intelligence Scale for Children – Third Edition (WISC-III) and scores of two or more years below on standardised tests in at least one area of educational achievement, such as reading, spelling and maths. Students who had not been assessed previously but were suspected of having LDs were administered the K-BIT and the South Australian Spelling Test (SAST) by the researchers. Students also completed the Children’s Internal Coping Self-Efficacy Scale (CICSES; Cunningham, 2002). A MANOVA revealed that students with LDs reported significantly lower mean levels of internal coping self-efficacy compared to students without LDs. In other words, students with LDs perceived themselves as having less control over their thoughts, feelings and behaviours, which may explain some of the poor mental health and behavioural outcomes often associated with LDs.

Students with little confidence in their own abilities are also more likely to attribute their successes to external factors and failures to internal factors. The results of Nunez et al.’s (2005) study revealed significant differences in attribution patterns between the students with and without LDs. For instance, students with LDs attributed their successes less to internal factors such ability and effort and their failures more to lack of ability or effort compared to students without LDs. However, students with LDs were not a homogeneous group in relation to their attributions. According to Nunez et al., two attribution profiles for students with LDs were identified, namely an adaptive profile and a helpless profile. In addition to their causal attributions, students with helpless profiles perceived themselves to be both less capable of learning and less persistent compared to
students with an adaptive profile. In contrast, students with adaptive profiles perceived themselves as more capable and were more persistent.

**Protective factors associated with learning disabilities**

Although previous research has identified lower levels of important resources, there is a small body of literature involving successful adults with LDs that has identified a number of protective factors for students with LDs. By definition, protective factors are those factors that prevent negative outcomes from occurring or reduce the effect of such outcomes. Reiff and Ginsberg (1995) interviewed 71 successful adults with LDs. These participants were identified with LDs via a three-stage process. First, nominations for successful adults with LDs were sought from a number of sources including national LD organisations and other institutions in the USA. Second, telephone interviews were conducted with potential participants in order to obtain demographic information and specific information about their occupation. The final stage of selection involved rating their success across five success variables, namely income, job classification, education level, prominence in one’s field and job satisfaction. A number of themes emerged from the interviews. For instance, taking control, motivation to succeed, goal setting, awareness of having LDs, persistence, awareness of strengths and weaknesses and matching these to a career, as well as support from others, were common among the successful adults.

The results from the Reiff and Ginsberg study (1995) are consistent with the findings of other studies that compared successful and unsuccessful adults with LDs (e.g., Goldberg et al., 2003; Raskind et al., 1999). For instance, Raskind et al.’s interviews identified that awareness of having LDs, being proactively involved in the world, perseverance, emotional stability and coping, goal setting and support from others were factors associated with future success in education and employment.

In summarising the literature on risk and protective factors for students with LDs, it is apparent that students with LDs tend to report lower mean levels of important affective, behavioural and cognitive resources, which puts them at risk of not coping, and, in turn, at risk of experiencing adverse outcomes. One limitation in the empirical literature, however,
has been the propensity to use mean comparison studies and not multiple regression or structural equation modelling (SEM) studies. That is, most of the previous research has compared means differences on important resources but has not explained the relationships between these important resources and how these resources are related to coping. What is needed is a model to help explain the coping behaviours of students with LDs. The next section will discuss different coping models and their relevance to students with LDs. In particular, it will discuss three stress and coping models and put forward an integrated theoretical model to explain the coping behaviours of students with LDs.

Explanatory models of stress and coping

There has been an increase in the research on stress and coping over the past 40 years (Folkman & Moskowitz, 2004). One of the most widely cited stress and coping models is Lazarus and Folkman’s (1984) Transactional model. This model is an example of a stimulus-organism-response model. More recently, resource-based approaches to stress and coping such as the Conservation of Resources model (COR: Hobfoll, 1989; 2001) have been utilised in research. Although both these models were originally developed for adult populations, they have been applied to children (see Cunningham, 2001; Ebata & Moos, 1991; 1994). However, a limitation of these two models is that they are both general stress and coping models and were not developed for specific contexts. Given that the focus of the current research is on developing a model to explain the coping behaviours of students with LDs in educational contexts, a suitable stress and coping model to consider is the Children’s Coping in the Academic Domain model (CCAD; Skinner & Wellborn, 1997), as it explains coping in the schooling context. These approaches to coping are discussed in the following sections.

Transactional model

The transactional model of stress and coping conceptualises stress as an interaction between the person and the environment. In this regard, stress incorporates the characteristics of the person and the nature of the environment. According to the transactional model, stress is defined as “a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources
and endangering his or her well-being” (Lazarus & Folkman, 1984, p.19). This definition implies that whether a situation is perceived as stressful depends on the individual’s availability of resources (e.g., social support) and what the demands (e.g., work deadlines) are from the environment. Moreover, it is the perception of the demands in the environment and not the actual demands that are important. This definition of stress also assumes that the outcomes of not coping must be significant to the individual.

**Appraisal within the transactional model**

In contrast to previous stress and coping models that focused on only stimulus and response reactions, the transactional model emphasises the importance of appraisal. Appraisal can be described as a cognitive process that determines to what extent a particular transaction between a person and the environment is stressful (Lazarus & Folkman, 1984). This cognitive process involves categorising an encounter and its various aspects with regard to its effect on the person.

Lazarus and Folkman (1984) distinguished between two types of appraisal, namely primary and secondary appraisal. Primary appraisal refers to the initial evaluation an individual makes when confronted with a negative situation. There are three kinds of primary appraisal, namely irrelevant, benign-positive and stressful (harm/loss, threat and challenge). When an appraisal is stressful, the situation is further appraised as either one of harm/loss, threat or challenge. For a harm/loss appraisal, the situation has already had some effect on the person. A threat appraisal is based on the anticipated harm or loss and not actual harm or loss. Furthermore, a challenge appraisal is the third kind of stress appraisal and focuses on the potential for gain in the situation and not harm or loss.

In the event of a stressful appraisal, an individual makes a secondary appraisal, which involves evaluating what might be and can be done to deal with the stressful situation. An individual must consider what coping resources are available, what is the likelihood that a particular resource will be effective and what is the likelihood one can utilise that coping resource. Lazarus and Folkman (1984) defined resources as “something one draws on in order to cope, whether they are readily available to the person (e.g.,
money, tools, people to help, relevant skills) or whether they exist as competencies for finding resources that are needed but not available” (p.158). In other words, secondary appraisal, or what individuals can do to cope with a stressful encounter depends largely on what resources they have available. As such, appraisal mediates the relationship between stressful demands and coping behaviours. More recently, Lazarus (1999) put forward that the appraisal might be better captured by constructs such as self-efficacy and perceived control. Thus, these control-related beliefs may influence coping behaviours by mediating the relationship between stressful demands and coping behaviours (Cunningham, 2002).

**Coping in the transactional model**

Coping is the process that describes how individuals deal with the interaction between demands and resources that are appraised as stressful. Lazarus and Folkman (1984) defined coping as “constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person” (p.141). That is, coping refers to what an individual thinks or does in response to demands in a specific context. It is an ongoing dynamic process that involves the use of different coping strategies as the relationship between the person and environment changes. The coping process depends on ongoing appraisals and reappraisals where reappraisals are a re-evaluated appraisal based on changes in the environment and/or the person.

**Limitations of the transactional model**

Despite being the most widely used stress and coping model, the transactional model has a number of limitations. Firstly, Hobfoll (1989) asserted that the transactional model is “tautological, overly complex, and not given to rejection” (p.515). For instance, the model does not distinguish between demands and coping, whereas demands are offset by coping, and coping is what offsets demands. Secondly, both demands and coping are defined after the event (Hobfoll, 1989). In other words, a resource is identified if it is effective, but it is unknown if the resource will be a resource in the future. Thirdly, with its emphasis on appraisal, the transactional model downplays the objective nature of the environment (Hobfoll, 1989). Thus, some demands may remain unnoticed if an individual
perceives they have resources to able to cope with them. In other words, the transactional model does not consider the broader context.

**Conservation of Resources model**

Hobfoll (1989) proposed a resource-based approach to extend the transactional model and better explain coping responses. Although the transactional model does include resources, the emphasis of the model is on appraisal. In contrast, resource-based models of stress and coping focus on personal, social and other resources and how these resources impact coping. These resource-based models also highlight the importance of the social and cultural context in which individuals cope with stress. For instance, Hobfoll (2001) posits that individuals are nested in families, which are nested in tribes (i.e., organisations, communities). This means that in order to fully understand an individual, it is important to take into account his or her family and the community in which they belong. However, discounting one of these levels would necessarily lead to only a partial understanding of the individual.

Hobfoll’s resource-based model is known as the conservation of resources (COR) model (Hobfoll, 1989; 2001). The basic principle of the COR model is that individuals strive to obtain, retain, protect and build resources and that stress is experienced when there is a potential for or actual loss of resources, or lack of gain of resources. According to the COR model, stress is defined as “a reaction to the environment in which there is (a) the threat of a net loss of resources, (b) the net loss of resources, or (c) a lack of resource gain following the investment of resources” (Hobfoll, 1989, p.516). Resources can be defined as those entities that people value, which can be valued in their own right or because they enable other resources to be obtained. For instance, Hobfoll categorised resources into four kinds of resources: (a) objects (e.g., home, car) that are valued because of their physical nature or secondary status value; (b) personal characteristics (e.g., self-esteem, self-efficacy) that enable stress resistance; (c) conditions (e.g., employment, marriage) are resources to the extent that they are valued by others and often sought after; and (d) energies (e.g., time, money) that assist the acquisition of other kinds of resources.
Resources can also be broadly classified into internal and external resources, which are those resources within the individual and from the environment respectively.

**The concept of loss**

Central to the COR model is the assumption that resource loss is disproportionately more salient than resource gain (Hobfoll, 2001; Hobfoll, & Lilly, 1993). This means that the loss of resources has more of an effect on the individual than the gain of resources. When confronted with stress, the COR model predicts that individuals strive to minimise net loss of resources (Hobfoll, 1989). To do this, individuals must invest the resources they have or utilise resources available to them from the environment. This can be achieved through resource replacement, which is the most direct method. For example, a person who loses money will often attempt to win that money back. A second method for minimising resource loss is resource substitution. For instance, people who experience difficulties in their personal life will tend to invest more resources at work.

It is important to note that investing resources to cope with stress can deplete resources (Hobfoll, 1989; 2001). Moreover, the COR model postulates that those with fewer resources are more vulnerable to resource loss (Hobfoll, 2001). When individuals lack the resources to offset future loss, loss spirals can occur where individuals use resources to prevent the loss of other resources, which leads to further resource losses and a reduced resource pool (Hobfoll, 1989). When loss spirals occur, individuals use the most readily available resources they have to cope, whether they are appropriate or not (Hobfoll, 1989). This often corresponds to the use of loss control strategies that are high risk and have a poor chance of success (Hobfoll, 1989).

The COR model also predicts that individuals who lack resources tend to be defensive and conserve their limited resources by not investing resources (Hobfoll, 1989; 2001, Hobfoll & Lilly, 1993). One method for conserving resources is to reinterpret a threat as a challenge, which means that an individual might perceive a situation as one of gaining resources and not as one of losing resources (Hobfoll, 1989). This is consistent with Lazarus and Folkman’s (1984) primary appraisal. Another method for conserving
resources is to re-evaluate resources that are threatened or lost so that these resources are interpreted as having less value (Hobfoll, 1989). However, this is not appropriate for all stressors.

**Key resources**

The term, key resources, has been used to refer to those resources that are associated with having other resources (Thoits, 1994). The COR model assumes that resources aggregate into resource caravans (see Hobfoll, 2001) and that having one resource is often linked to having other resources (Hobfoll, 1989). According to Hobfoll (2002), key resources are those resources that assist in obtaining and managing other resources in the coping process. These key resources tend to be control-related resources (e.g., self-efficacy). For instance, individuals with high levels of self-efficacy are more capable of utilising other internal or external resources in order to cope with stress compared to those with lower levels of self-efficacy. A person who feels in control over a stressful situation will employ what resources they have available to them to deal with the situation. Conversely, individuals with low levels of self-efficacy are less capable of using other resources to cope with the situation. Essentially, key resources are critical resources as they promote resource gain and provide more access to productive coping options.

**The expectations of net gain of resources**

In the absence of a stressful situation, people strive to develop their resource surpluses in order to offset future loss of resources (Hobfoll, 1989; 2001; Hobfoll & Lilly, 1993). Similar to investing resources to protect against the loss of resources, individuals must invest resources to gain resources. An example of this is financial investing. Those who invest money expect to make a profit. However, if their initial investment does not provide a good return, then this will be perceived as a loss of expected gain.

**Limitations of the Conservation of Resources model**

The COR model provides a theoretical framework to explain the motivation behind coping. However, a limitation of the COR model is that it is too general. That is, it is a general stress and coping model and is not itself contextual (Hobfoll, 2001). The COR
model describes how resources contribute to the stress and coping process, but does not make predictions about individuals in certain environments unless the specific person-environment elements are highlighted. Therefore, it is important to consider a specific coping model that can be added to the COR model.

**Children’s Coping in the Academic Domain model**

Contrary to the general stress and coping models proposed by Lazarus and Folkman (1984) and Hobfoll (1989; 2001), Skinner and Wellborn (1997) proposed a coping model specifically for the schooling context. In particular, their model explains how students deal with threats and challenges in the classroom. Skinner and Wellborn utilised a motivational model called Self Determination Theory (SDT; Deci & Ryan, 1983), which posits that individuals have three basic needs, namely relatedness, competence and autonomy, to help explain coping in schools. According to Skinner and Wellborn (1997), students actively construct beliefs about themselves (i.e., self-system beliefs), which are organised around relatedness, competence and autonomy. Indeed, it is differences in these beliefs that explain why some students experience certain situations in school as stressful and others do not. In terms of the COR model, relatedness is an example of an external resource while competence and autonomy are internal resources. The following section discusses each of the three basic needs.

**Relatedness**

Relatedness refers to the need to feel connected to others and to be a valued member of a group (Skinner & Wellborn, 1997). At school, students form relationships with their peers and teachers, which can fulfil the need for relatedness. These relationships can be a source of support for students that promote adaptive coping. Equally, interactions with others in the school environment that undermine the need for relatedness, described as neglect by Skinner and Wellborn, can lead to maladaptive coping. For example, neglect can include being ignored or overlooked by peers and teachers at school as well as not receiving encouragement or praise from teachers. According to Skinner and Wellborn, when the need for relatedness is not satisfied, students often respond to challenges in school with self-derogation (e.g., nobody likes me) and catastrophising (e.g., I let everybody
down). Students also internalise their problems and avoid social interactions. Therefore, it seems that students who do not relate well to others at school have fewer external resources available to them to draw on in the coping process.

**Competence**

Students also have a need to be effective in their interactions with the school environment, which is referred to as the need for competence (Skinner & Wellborn, 1997). This need is consistent with other control-related constructs (e.g., self-efficacy). Similar to relatedness, the need for competence can be challenged or threatened by school environments that are characterised by chaos. For example, chaotic environments can include situations in which students are not sure of what to do or when they find a task too difficult to complete (Skinner & Wellborn, 1997). When this happens, students perceive these situations as evidence of incompetence and subsequently respond to these situations with self-derogation (e.g., I am dumb) and catastrophising (e.g., I will never learn how to do it). As a result, students who perceive themselves as incompetent tend to avoid threatening situations. That is, they do not try. It may also be the case that students internalise their problems and subsequently become anxious or depressed.

**Autonomy**

The third need, autonomy, is a need for students to be able to choose their own actions (Skinner & Wellborn, 1997). However, situations in which students are told or shown what to do may not satisfy their need for autonomy. Students whose needs for autonomy are not being met are likely to respond to these stressful situations by blaming themselves (e.g., It’s my fault) or giving up (e.g., I don’t care about that subject anymore). In such cases, students can react by taking control in other ways such as being defiant in the classroom, which is a maladaptive way of coping. Taken together, it seems that when students’ needs for relatedness, competence and autonomy are not satisfied, students are at risk of coping in maladaptive ways or not coping at all.

The integrated theoretical model that will be used in the current research is largely based on the COR model and explains the motivation underlying the use of certain coping
behaviours. In particular, the COR model details how an individual’s resource pool impacts on how he or she copes with stress. It also highlights the importance of taking into account the context. Indeed, what the CCAD model adds is the specifics around core motivational needs for students in the school context, namely relatedness, autonomy and control. These three motivational needs are consistent with the notion of external (i.e., relatedness) and internal resources (i.e., competence, autonomy). The next section will discuss the empirical support for studies that used similar models to explain coping in the general student population.

**Empirical support for the integrated theoretical model in the general student population**

A number of studies have examined the relationship between coping resources and coping behaviours in samples of Australian school students (Cunningham, 2001; 2002; Cunningham et al., 2002; Cunningham et al., 2004; Frydenberg & Lewis, 2004; Lewis & Frydenberg, 2002; McKenzie, Frydenberg, & Poole, 2004; Wojcik, McKenzie, Frydenberg, & Poole, 2004; Nicholls & Cunningham, 2004). These studies have involved different populations (e.g., secondary school students, primary school students) and utilised various statistical methods (e.g., correlations, MANOVAs). These studies are described in more detail in this section.

**Secondary schools**

One of the studies that examined the resources most valued by secondary students and how these resources related to coping was conducted by McKenzie et al. (2004). A sample of 172 secondary school students were administered a modified version of the COR Evaluation (CORE; Hobfoll, 1988) inventory and the Adolescent Coping Scale (ACS; Frydenberg & Lewis, 1993). Of the 74 resources listed on the CORE, 23 were omitted as they were only relevant to adults, some were combined as they were similar and others added to the list as they were considered relevant for adolescents. For the revised total of 48 resources, students were asked to rate whether a particular resource was important in their life, how much of a particular resource they had, how stressful would it be to lose that resource and what effect would it have if they gained a particular resource. McKenzie et al.
found that students reported having friends, being close with one friend, parent support, advocating for oneself and having a stable family as important resources. Correlations revealed significant positive \((r = .45)\) and negative relationships \((r = -.20)\) between having resources and productive and non-productive coping styles respectively. Students who reported having more resources used strategies such as solving the problem and working hard. In contrast, students who reported having fewer resources tended to use the strategy not cope, which corresponds to giving up.

Similar to the study by McKenzie et al. (2004), Wojcik et al. (2004) examined the relationship between coping resources and coping behaviours in a sample of 176 Year 9 students. Using 10 resources valued by adolescents and responses to the Adolescent Coping Scale (ACS; Frydenberg & Lewis, 1993), participants were again asked to rate the importance of each resource and how much of each resource they have. In addition, how much of each resource they had lost and how much had they gained. The results showed a significant positive correlation \((r = .24)\) between having resources and productive coping, and a significant negative correlation \((r = -.15)\) between having resources and non-productive coping. Despite low correlations, the findings from both studies are consistent with the COR model where students with more resources are better equipped to cope with stress.

Another two studies based on older adolescents who believed they did not have the resources to cope found that they tended to use more non-productive coping strategies (Frydenberg & Lewis, 2004; Lewis & Frydenberg, 2002). However, a positive correlation was found for both studies between non-productive and productive coping, indicating that students who were not coping reported using a combination of non-productive coping and productive coping strategies. One possible explanation for this unexpected positive relationship was that the effects of using productive coping strategies were washed out by the outcomes of the non-productive strategies (Frydenberg & Lewis, 2004; Lewis & Frydenberg, 2002). Essentially, the use of non-productive coping strategies was more effective than the use of productive coping strategies. An alternative explanation suggested that when productive coping strategies were not effective, non-productive strategies were
utilised. This is referred to as the *fallback hypothesis* (see Rothbaum, Weisz, & Snyder, 1982, 1982) and is consistent with the COR model where students use the most potent resources they have available. However, if these are not effective, then students rely on less appropriate forms of coping in order to protect against further resource loss.

Cunningham et al. (2004) extended on previous studies that have primarily used correlations and examined the relationships between multiple coping resources and coping styles using SEM. More specifically, Cunningham et al. examined the relationships between external resources, internal resources and coping styles in a sample of 300 Year 9 and 10 students. This study was based on a conceptual model of coping resources developed by Cunningham (2001) that was consistent with the COR model. In particular, Cunningham”s conceptual model designed for children and early adolescents specified that internal resources (e.g., attribution style, coping self-efficacy) would mediate the relationship between external resources (e.g., family support) and coping styles (e.g., productive and non-productive coping strategies) Cunningham et al. (2004) hypothesised that internal resources such as self-efficacy and mastery would mediate the relationship between external resources from school (i.e., peer, teacher and school connectedness) and coping styles (i.e., productive and non-productive coping). The results showed that the relationship between peer, teacher and school connectedness and the use of non-productive coping strategies was mediated by self-efficacy and mastery. Students who felt connected to their peers, teachers and school reported higher levels of self-efficacy and mastery, which in turn, were associated with the use of fewer non-productive coping strategies. Although there was a strong relationship between peer, teacher and school connectedness and the use of productive coping strategies, only self-efficacy partially mediated the relationship. Students who felt connected to their school environment reported being in more control of their thoughts and feelings, and, in turn, reported using more productive coping strategies. These findings reveal how external and internal resources influence coping behaviours. Moreover, they highlight the importance of key resources such as self-efficacy and mastery and how these resources can influence the relationship between external resources and coping styles.
Primary schools

Compared to research conducted in secondary schools, fewer studies have examined the relationship between coping resources and coping behaviours in primary school students. One of the earlier studies was conducted by Cunningham et al. (2002) who examined the effectiveness of a universal school-based prevention program designed to increase coping resources in a sample of 333 Year 5 and 6 students. The program was designed to build optimistic thinking skills. Students were administered the Children’s Attributional Style Questionnaire (CASQ; Seligman et al., 1984), the Children’s Coping Scale (CCS, Cunningham, 2002) and the Children’s Internal Coping Efficacy Scale (CICSES; Cunningham, 2002), both pre and post program. The results showed a weak positive correlation \( r = .14 \) between non-productive and productive coping. Moreover, students who completed the program reported significantly less reliance on non-productive coping strategies compared to the control group. This finding indicates that interventions designed to build coping resources can lead to the use of fewer non-productive coping strategies. However, no significant difference was found in the use of productive coping after the program.

Another study conducted by Nicholls and Cunningham (2004) examined how school connectedness, achievement motivation and internal coping self-efficacy promoted positive coping among 281 Year 5 and 6 students. Using the Feelings About Yourself and School survey (FAYAS; Department of Employment, Education & Training, DEET, 2000) to assess school connectedness and achievement motivation, the Children’s Internal Coping Self-Efficacy Scale (CICSES; Cunningham, 2002) and the Children’s Coping Scale (Cunningham, 2002), the results showed that achievement motivation and internal coping self-efficacy mediated the relationship between school connectedness and productive coping. Moreover, internal coping self-efficacy also mediated the relationship between school connectedness and non-productive coping, whereas achievement motivation did not. These findings suggest that those students who are more connected to school tend to have more confidence in their ability to control their internal states, and in turn, use more productive coping strategies.
The work of Cunningham and colleagues (see Cunningham, 2001; 2002; Cunningham et al., 2004; Cunningham & Walker, 1999) has highlighted that relationships between coping resources can influence coping behaviours in the general student population. With the exception of Cunningham (2001), one limitation regarding a majority of these studies was the use of correlational or cross-sectional research designs in which data collection occurred only at one point in time. For instance, although correlations test the association between two variables, they do not imply causality (Field, 2005; Kline, 2005; Tabachnick & Fidell, 2006). Equally, some of the studies (e.g., Cunningham et al., 2004; Nicholls & Cunningham, 2004) tested a mediated model of coping resources, which involves demonstrating that the relationship between an independent variable and dependent variable can be explained by a third variable, known as a mediator. These studies imply that the independent variable causes the mediator, which, in turn, causes the dependent variable. However, a key assumption of causality is that in order for one variable, X, to cause another variable, Y, the variable X must precede Y in time (Kline, 2005). Therefore, a longitudinal research design is appropriate as data are collected at more than one time point. This would allow for a time difference between the collection of data relating to the independent variable, the mediator and the dependent variable.

**How students with learning disabilities cope**

Despite several studies focusing on coping in the general student population, there is a paucity of studies that have examined the coping behaviours of students with LDs. An earlier study by Geisthardt and Munsch (1996) compared whether students with LDs were at an increased risk of experiencing school stress and whether they have more difficulties coping at school than students without LDs. Year 7 students from two schools in the USA completed a survey that contained 11 frequently reported stressful events at school. They were asked to indicate whether a particular event happened to them. They also reported on their individual coping efforts by completing six subscales from the Coping Response Inventory (Ebata & Moos, 1991). The results showed similarities in the type of stress experienced at school. However, two significant differences were found between the two groups whereby students with LDs reporting failing more classes and being chosen for fewer activities compared to students without LDs. In relation to coping, students with LDs
used significantly more cognitive avoidance and reported utilising fewer peers for social support associated with academic stressors.

A recent study has investigated how students with LDs cope with stress (Singer, 2008). Singer examined the coping strategies of 60 Dutch students with dyslexia aged between nine and 12 years. Students were identified by registered psychologists or remedial specialists using criteria in line with the DSM-IV (APA, 1994). They completed structured interviews and were asked to recall a situation involving academic failure. They were also questioned on what they did, what they tried to do, why that was important and how they felt about the situation. Responses were categorised into actions, goals, concerns and emotions. In terms of coping, actions were divided into external and internal types. For external actions, students reported turning to their parents for support, but not really their teachers and peers. Moreover, students also felt ashamed and tried to hide examples of poor work. Students used reframing (e.g., everybody struggled) and distraction as internal actions to deal with stress. Students also revealed that they used these coping strategies in order to feel good and to avoid being compared with their peers.

Alexander-Passe (2006) investigated self-esteem, coping and depression in a sample of 19 teenagers recruited through a newsletter handout, referrals from an educational psychologist or volunteers from a college. However, no information was given on the criteria for inclusion in the study or whether the participants even had dyslexia. Participants completed the Culture-free Self-esteem Inventory (CFSEI; Battle, 1992), the Coping Inventory for Stress Situations (CISS; Endlers & Parker, 1999) and the Beck Depression Inventory (BDI; Beck, Steer, & Brown, 1996). Means and standard deviations were presented and mean comparisons made between males and females, yet no significance tests were included. The author concluded that the results suggested that there are gender differences with females using more emotional and avoidance coping and males employing task-based coping. Nonetheless, given the lack of information regarding the sample, the very small sample size and absence of significance testing, these findings are not able to be generalised to the wider population. Yet this study is one of the few that has been published
in the area of coping and LDs, which highlights the need for further research in the area of coping and LDs.

**How students with learning disabilities cope in Australian schools**

Not only is there a general lack of research on coping for students with LDs, there is also a dearth of research investigating the coping behaviours of students with LDs in Australian schools. In one of the few studies, Cheshire and Campbell (1997) compared a group of secondary students with LDs ($N = 30$) to a group of students without LDs ($N = 30$) using the ACS (Frydenberg & Lewis, 1993). Students were aged between 13 and 15.5 years. The LD group was selected from students who had been assessed using psychological and educational data and scored on their level of educational need. A MANOVA revealed that students with LDs used the coping strategy of wishful thinking and reported more not coping than students without LDs. It was also revealed that productive coping strategies (e.g., focus on the positive, relaxing, working hard, solve the problem) were used less by students with LDs.

More recently, Firth, Frydenberg, and Greaves (2008) examined the effect of a coping program and a teacher feedback intervention on perceived control and productive coping behaviours for secondary students with LDs ($N = 98$). All students who were involved in the study had an IQ greater than 80 and score two or more years below their chronological age in at least one area of academic achievement, including reading, spelling or mathematics. Students were divided into four groups. These groups included: (a) those that completed a coping program; (b) a group who had completed a teacher feedback program; (c) a group who completed both programs; and (d) a wait-list control group. The teacher feedback program was based on providing strategy-based feedback, while the coping program involved giving students knowledge on possible coping strategies and developing productive coping skills. Students completed pre- and post-program measures of perceived control and coping. The coping measure used was the ACS (Frydenberg & Lewis, 1993). The results showed that students with LDs who completed only the coping program reported a significant increase in external control. Moreover, while there were no significant differences between the groups in overall productive coping, there was an
increase in the self-reported use of working hard and solving the problem for the group who received the coping program.

Although the Cheshire and Campbell (1997) and Firth et al. (2008) studies examined the coping styles of students with LDs in Australian schools, it is important to note that both studies were based on samples of secondary school students. According to Ingesson (2007) who conducted interviews with 75 teenagers and young adults with dyslexia in Sweden, the first six years of school were experienced by the participants as the most distressing. Hence, there is a need for research to focus on the coping behaviours of students with LDs in Australian primary schools.

Given the adverse outcomes associated with LDs, including school dropout, juvenile delinquency, criminal conviction, unemployment and mental health problems, it is vital that more research is conducted on the coping behaviours of students with LDs. There has been little research on the coping behaviours of students with LDs, especially in Australian primary schools. Of the studies that have been published, both internationally and in Australia, very few have utilised multiple regression or structural equation models to explain how coping resources predict coping behaviours for students with LDs. This highlights an urgent need for research to examine the predictors of productive and non-productive coping styles for students with LDs and how this influences the outcome of coping. The current study addresses this need by testing a proposed model of coping resources and coping outcome based on an integration of the COR model (Hobfoll, 1989; 2001) and the CCAD model (Skinner & Wellborn, 1997).

**A proposed model of coping resources for students with learning disabilities**

Since the integrated theoretical model emphasises the specific external and internal resources that are critical to students in schools, this model is an appropriate theoretical framework for understanding the coping behaviours of students with LDs. For instance, the proposed theoretical model’s emphasis on resource loss, loss spirals and the loss of expected gains provides an explanation for the association between LDs and the negative outcomes students with LDs often experience. An example of this would be when a student
with LDs makes a concerted effort to succeed in school but continues to fail. As a result, the student perceives himself or herself as not being able to succeed and subsequently reduces his/her effort at school. The reduction in effort leads to continued failure, which reinforces the negative belief that he/she is not capable of success. The student may begin to misbehave in the classroom or start missing school in order to avoid doing schoolwork. This behaviour continues until he/she eventually drops out, which, as noted earlier, can be associated with other negative outcomes.

In line with the integrated theoretical model, students with LDs who have fewer resources to invest in the coping process tend to use less adaptive ways of coping. For example, in the event of a weekly mathematics test, a student with LDs may deliberately get into trouble and be asked to leave the classroom in order to avoid testing. Although this may have a short term benefit of not completing the test, it is likely to lead to disciplinary issues such as detention and suspension. However, the self-esteem of the student may remain intact because he/she was not shown to be incapable of succeeding on the test.

Another prediction of the integrated theoretical model is that students with LDs will conserve their resources. That is, students with LDs may not invest the necessary effort to pass a spelling test, subsequently failing. Even though a student failed, the failure can be attributed to lack of effort rather than lack of ability, thus minimising resource loss. In contrast, if they invested effort into the test and failed, it may lead students to attribute their failure to being less intelligent, which would have a greater impact on their internal resources such as perceived control and self-esteem.

Students with LDs also have fewer resources to invest in gaining other resources. This is especially important for students with LDs. Whereas students who are able to read may read a wide range of books, which exposes them to more words and further improves their reading skills, students with LDs who find reading difficult and frustrating are less likely to read multiple books, which makes them less likely to improve their reading skills. Since further learning at school is predicated on the ability to read, students
with LDs become increasingly less likely to gain resources. Therefore, students with LDs continue to fall further behind their peers at school.

In sum, students with LDs have fewer coping resources available to them, which is of concern as fewer resources translate to students with LDs having less coping options, being more vulnerable to the use of non-productive coping behaviours, and being less capable of gaining resources. The next section will discuss each of the specific coping resources that have been selected in this study in order to empirically test the proposed integrated model of coping resources.

**The school as an external resource**

Since students spend most of their time in school, it is vital to consider the different aspects of the school environment and its role in coping with stress. According to Skinner and Wellborn’s (1997) model, students have a motivational need (e.g., relatedness) to form relationships at school and engage with the school environment. Various terms have been used to refer to relatedness at school, including attachment, belonging, bonding, connectedness and engagement (Libbey, 2004). For instance, Baumeister and Leary (1995) defined belonging as a “pervasive drive to form and maintain at least a minimum quality of lasting, positive, and significant interpersonal relationships” (p.497). Goodenow (1993) described school connectedness as “the extent to which students feel personally accepted, rejected, included, and supported by others in the school social environment” (p.80). Maddox and Prinz (2003) referred to school bonding as “the connection a student has with their school, the school personnel, and the academic ideals espoused by the school” (p. 31). Fredricks, Blumenfield, and Paris (2004) described student engagement as a multidimensional construct that is believed to contain affective, behavioural and cognitive aspects. For instance, behavioural engagement refers to effort and participation, emotional engagement is associated with relationships with peers, teachers and schools and cognitive engagement is related to the investment in cognitive effort.

An inspection of these definitions identified different aspects of the school environment, including how connected students are with their peers, teachers and school,
and how motivated students are to do well at school. Thus, each aspect needs to be discussed separately. For the purposes of the current study, the term student engagement will be used to refer to student relationships with the school environment, which comprise peer, teacher and school connectedness and motivation to perform well at school.

**Peer relationships**

Peer relationships have an important role in influencing the social, emotional and academic outcomes for children and adolescents. These peer relationships have been studied in terms of group-based interactions such as peer acceptance and peer rejection, and dyadic relationships such as friendships (Gifford-Smith & Brownell, 2003). Although peer acceptance has been associated with positive outcomes, students who are rejected by their peers are more likely to experience negative outcomes (Gifford-Smith & Brownwell, 2003; Kistner, Balthazor, Risi, & Burton, 1999; Ollendick, Weist, Borden, & Greene. 1992; Parker & Asher, 1987). Buhs and Ladd (2001) examined the relationship between peer rejection and emotional and academic adjustment in a sample of 399 kindergarten students. The results showed that rejected children were more likely to experience negative peer treatment, reduced classroom participation, loneliness, school avoidance and decreased academic achievement. However, according to Buhs and Ladd (2006), their previous study (see Buhs & Ladd, 2001) had two important limitations. First, the 2001 study did not specify different types of mistreatment (e.g., exclusion, abuse). Second, only classroom participation was examined in relation to engagement, and not school avoidance.

In an extension of the 2001 study that addressed these prior limitations, Buhs and Ladd (2006) tested a model in which peer exclusion and peer abuse were hypothesised to mediate the relationship between peer rejection, classroom engagement (classroom participation, school avoidance) and achievement. This study was a longitudinal design with measures collected every year from kindergarten to Year 5. The results supported and extended the findings of Buhs and Ladd (2001) in that students who were rejected in kindergarten were mistreated (e.g., excluded, abused) by their peers in the subsequent grades of school, which was associated with disengagement from the classroom (e.g., classroom participation, school avoidance). In particular, while peer exclusion mediated the
relationship between peer rejection and classroom participation, peer abuse mediated the relationship between peer rejection and school avoidance. Reduced classroom participation was also associated with decreased academic achievement. In other words, peer rejection in the early years of school can negatively affect student engagement and academic achievement across the subsequent years. This is important because students with LDs are more likely to be rejected by their peers (Bryan, 1974; Kavale & Forness, 1996; Wiener, 2004). For instance, Murray and Greenberg (2006) examined the relationship between peer relationships and emotional and behavioural problems for students with high incidence disabilities (including students with LDs; N = 40) in Years 5 and 6. They found that students with LDs who experienced alienation and rejection in their peer relationships were more likely to experience emotional and behavioural problems compared to students without disabilities.

One explanation for students with LDs reporting poor quality peer relationships is that students with LDs tend to have deficits in their social skills. In a comprehensive review of social skills deficits in students with LDs, Kavale and Forness (1996) asserted that 75 percent of students with LDs have social skills deficits. In particular, students with LDs often experience difficulties starting a conversation, asking questions, listening to others and expressing their opinions (Kavale & Mostert, 2004). These deficits make it difficult for students with LDs to establish and maintain relationships, which lead to internalising and externalising problems (Wiener, 2004). These internalising and externalising problems can be taken as evidence of students with LDs not coping.

According to Guay, Boivin, and Hodges (1999), peer relationships also influence academic outcomes through internal resources. That is, peer relationships promote the development of internal resources such as self-esteem and self-efficacy (Wiener, 2004). In a sample of 397 French Canadian children aged between seven and 13 years, Guay et al. (1999) tested a model where negative peer relationships lead to a decrease in academic achievement through self-system processes such as low relatedness and low competence. The results supported the model. Negative peer relationships were associated with feelings of not belonging and not being able to succeed, which in turn, were related to a decrease in
academic achievement. From these findings, it appears that peer relationships can have an
effect on important internal resources, which, in turn, can impact academic outcomes.

**Teacher relationships**

Teacher-student relationships are also an important aspect of student engagement
and are associated with social, emotional and academic outcomes (Klem & Connell, 2004).
Pianta and colleagues (Pianta, 1994; Pianta & Steinberg, 1992) found that students with
higher levels of support from teachers had fewer behavioural problems, greater social
competence and better school adjustment than students with higher levels of conflict. Birch
and Ladd (1997) examined the association between teacher-student relationships and
various aspects of school adjustment using a sample of 206 Kindergarten students. It was
revealed that closeness in the teacher-student relationship was significantly related to better
academic performance, teachers’ rating of school liking and self-directedness. According to
Birch and Ladd, “children who share a close relationship with their classroom teacher may
feel better able to utilise the teacher as a source of support in the school environment”
(p.75). This was consistent with the findings of Baker, Grant, and Morlock (2008) who
found that teacher-student relationships characterised by warmth and trust were associated
with better academic achievement and classroom adjustment for a sample of 423
kindergarten through to Year 5 students from four schools in the USA. Thus, it seems that
positive relationships with teachers are a resource that can promote more positive outcomes
for students.

In contrast, poor teacher-student relationships have been associated with negative
outcomes (Birch & Ladd, 1997; Hamre & Pianta, 2001). Birch and Ladd (1997) reported
that conflict in the teacher-student relationship was associated with teachers’ ratings of
liking school less, school avoidance, less self-directedness and decreased participation in
the classroom. Dependency was found to be related to poorer academic performance, more
negative attitudes toward school and less positive engagement with the school environment.
In a sample of 179 students, Hamre and Pianta (2001) examined teacher-student
relationships in kindergarten and the extent to which they predicted educational outcomes
in Year 8. The results suggested that relationships characterised by conflict and dependency
were associated with a wide range of academic and behavioural outcomes from kindergartens through to Year 8. In particular, the relationship between conflict and dependency and behavioural outcomes in upper primary and early secondary years was mediated by behavioural outcomes in the earlier years. This indicates that teacher-student relationships in early primary school are important for behavioural outcomes later on in school.

Another study by Murray and Murray (2004) examined conflict and dependency in the teacher-student relationships for 99 students in Years 3 and 4 and found that conflict and dependency were positively associated with internalising and externalising problems. In particular, conflict was related to both internalising and externalising problems while dependence was more strongly associated with internalising problems. Taken together, these findings indicate that students with poor teacher-student relationships are at risk of not coping with the demands of the school environment and thus are prone to experiencing social and emotional problems at school.

Similar to their relationships with peers, students with LDs also report poor quality teacher-student relationships. Al-Yagon and Mikulincer (2004) examined patterns of close relationships for students with LDs (N = 98) and average achieving students (N = 107) from four primary schools in Israel. They found that students with LDs were more likely to experience adjustment problems (e.g., higher sense of loneliness, lower sense of coherence) compared to average achieving peers. Moreover, students with LDs reported that their teachers were more rejecting, less accepting and less available compared to their average achieving peers. In fact, teachers also reported less emotional closeness to students with LDs. Murray and Greenberg (2006) revealed that students with disabilities (e.g., LDs) in Years 5 and 6 who reported poor alienation in relationships with teachers also experienced more externalising behavioural problems. As with peer relationships, it appears that teachers are less of a resource for students with LDs and that having poor quality teacher-student relationships can be associated with more negative outcomes.
School connectedness

Another aspect of student engagement relates to how connected and involved students are with school. Finn (1989) proposed a participation-identification model in which students who identify with the school tend to participate more in school-based activities. This is important as students who connect with the school report more positive outcomes including health-related outcomes (Resnick et al., 1997) and mental health outcomes (Anderman, 2002; Shochet, Dadds, Ham, & Montague, 2006). For example, Resnick et al. (1997) examined the relationship between school connectedness and health-risk behaviours for a large sample of 11,572 adolescents in the USA. It was revealed that school connectedness was associated with less health-risk behaviours including emotional distress, suicidality, violence, substance use and sexual activity. A similar pattern was found in an Australian study by Shochet et al. (2006) who examined the relationship between school connectedness and mental health problems in a sample of 2022 Year 8 students. Shochet et al. found that students with higher levels of school connectedness reported lower levels of depressive symptoms.

Although previous research has investigated school connectedness and its association with health-risk and mental health outcomes, there is little research on students with LDs and their connectedness to school. Of the available evidence, the findings are mixed. For instance, Svetaz, Ireland, and Blum (2000) compared the mean levels of school connectedness for adolescents in Years 7 to 12 with and without LDs and found no significant difference in school connectedness. However, in the Svetaz et al. study, LD was defined based on parent responses to questions relating to whether or not their child had LDs, or whether their child had ever been in special education. As such, it is possible that students with LDs were excluded as their parents were unaware of their child’s LD, or that other students who do not have LDs were incorrectly identified as having LDs. In contrast, there is evidence to indicate that students with low academic achievement report lower levels of school connectedness (Eisenberg, Neumark-Sztainer, & Perry, 2003). Thus, it is plausible that students with LDs who continue to underachieve at school would report feeling less connected with school compared to students without LDs.
**Motivation at school**

A necessary but not sufficient part of student engagement is motivation (Appleton, Christenson, & Furlong, 2008). Students who are motivated to perform well at school tend to be engaged in school. However, these terms are not equivalent. For example, Appleton et al. (2008) uses a reading example to illustrate the difference between motivation and engagement. According to Appleton et al., motivation is related to the perceived value of reading or the perceived ability to succeed at reading while engagement is about the number of words read or the comprehension of reading. Therefore, students can be motivated but not engaged.

In her work on motivation, Dweck and colleagues demonstrated that students with similar levels of ability displayed different approaches to completing a cognitive task (Dweck, 1986; Dweck & Leggett, 1988). This implied that there were other factors (e.g., motivation) that influenced these approaches. For instance, Dweck (1986) specified two motivational patterns, namely adaptive and maladaptive patterns. An adaptive (mastery-orientated) pattern refers to seeking challenges and persisting on difficult tasks. A maladaptive (helpless) pattern involves giving up on difficult tasks or avoiding challenges. Dweck also proposed that these motivational patterns can be influenced by student goals, which include learning and performance goals. For learning goals, individuals are concerned with increasing their competence. In contrast, the aim of performance goals is to gain favourable judgements of their competence or avoid negative judgements of their competence.

Sideridis (2006) investigated the motivational goals for a sample of Year 5 and 6 students with LDs ($N = 132$) and students with average achievement ($N = 538$). In addition to the learning and performance goals described by Dweck and colleagues (Dweck, 1986; Dweck & Leggett, 1988), Sideridis (2006) cited more recent research that showed that dividing performance goals into approach (e.g., get good grades) or avoid (e.g., avoid ridicule) can have a different effect on motivation. More specifically, performance approach goals can be motivating for some students in certain situations. Sideridis (2006) found that students with LDs reported lower mean scores on approach goals (e.g., mastery,
performance) compared to average achieving students. Moreover, approach goals were associated with more persistence compared to avoidant goals. These findings suggest that students with LDs are motivated to avoid negative outcomes rather than approach positive ones. This is consistent with the proposed model in terms of focusing more on preventing further resource loss and less on gaining resources.

According to Dweck (1986), another factor that influences student outcomes is a student’s belief about intelligence. Students who believe intelligence is a fixed trait tend to orient towards performance goals. In contrast, students who believe intelligence is malleable orient toward learning goals. Dweck asserted that students with low achievement perceive themselves as having a fixed low ability. This is particularly relevant for students with LDs who are characterised by unexpected underachievement. As such, it is plausible that students with LDs who continue to underachieve at school would perceive that their ability is fixed at a low level, which would direct them towards avoiding negative judgements rather than increasing their competence.

It also appears that whether or not students with LDs are prepared to persist may depend on their level of internal resources. In a study investigating effort for 46 student with LDs and 46 students without LDs from Years 6 to 8 in USA schools, Meltzer et al. (2004) examined how effort and the use of different strategies relates to academic performance. Students were identified with LDs if they satisfied the state guidelines on the diagnosis of a LD. Meltzer et al. showed that students with LDs who have a positive self-perception (i.e., more internal resources) were more likely to work hard and use strategies to complete their schoolwork compared to students with LDs who had negative self-perceptions (i.e., fewer internal resources). Furthermore, students with LDs who had a positive self-perception were rated by their teachers as working hard while students with LDs who had negative self-perceptions were viewed as not making an effort. These findings highlight a potential loss spiral where students with LDs who do not have a positive self view and are not motivated to work hard would continue to underachieve and experience negative teacher appraisals, which, in turn, may lead to the student giving up altogether.
In summarising the literature on student engagement as a coping resource for students with LDs, it appears that students with LDs are more likely to experience peer rejection, report more conflict with teachers, lack a sense of connection with school and have reduced motivation to perform well at school. These aspects combine to reduce the overall level of student engagement for students with LDs. This is problematic for this group as decreased student engagement is associated with poor social, emotional and academic outcomes, which are indicators that students are not coping at school. Therefore, it is expected that students with LDs have fewer coping resources available to them from the school environment compared to students with average achievement.

The family as an external resource

Since children and adolescents are to some extent dependent on their parents, it is important to consider how the family environment influences the children’s coping behaviours. Indeed, several studies have examined how different aspects of the family environment, such as family cohesion and family conflict, influence children’s coping (Cunningham, 2002; Kliewer, Fearnow, & Miller, 1996; Kliewer, Fearnow, & Walton, 1998; Seiffge-Krenke, 1995). While family cohesion refers to the closeness or connectedness that one feels towards his or her family, family conflict can be defined as the state of tension or dispute between family members (Lohman & Jarvis, 2000). For instance, Kliewer et al. (1996) tested a theoretical model of coping in middle childhood for 310 primary school students and their parents. Using the Family Environment Scale (FES; Moos & Moos, 1986) to measure family cohesion, family expressiveness and family conflict, and the Children’s Coping Strategies Checklist (CCSC; Sandler, Tein, & West, 1994) to measure coping behaviours, it was revealed that a family environment characterised by high levels of cohesiveness and expressiveness and low levels of conflict were associated with active coping.

Kliewer et al. (1998) examined family cohesion, family conflict, family expressiveness and parental acceptance as indices of the family environment and how they related to perception of threat in everyday situations for a sample of 215 Year 4 and 5 students. Parents provided the measure of cohesion, conflict and expressiveness while children rated parental acceptance. The authors expected that children in more cohesive and
less conflictual families would report lower perceived threat in everyday stressful situations. Contrary to expectations, neither family cohesion nor conflict were associated with threat perception. Instead, maternal and paternal acceptance were associated with lower perceptions of threat, which indicates that children who feel accepted by their parents are aware that they have the resources in their family to deal with a stressful situation. However, according to Kliewer et al., it may be that parent’s perceptions of family cohesion are less important predictors of children’s threat perception than children’s perceptions of the family environment.

Lohman and Jarvis (2000) explored the relationships between family cohesion, family conflict and coping behaviours in 42 adolescents ranging in age from 11 to 18 years. Participants were administered the FES (Moos & Moos, 1986) and the COPE (Carver, Scheier, & Weintraub, 1989). The results showed that family cohesion and conflict predicted active and avoidant coping respectively. Higher levels of family cohesion predicted the use of active coping, while higher levels of conflict predicted the use of avoidant coping. Family cohesion also predicted the use of emotional coping, which indicated that emotional coping was adaptive for this particular sample. Adolescents who were from more cohesive families and who used active coping behaviours also reported fewer health problems. Thus, it seems that supportive families with high levels of cohesion are a potential resource for children to utilise during the coping process.

Cunningham (2002) tested a measurement model including family support, internal coping-efficacy, productive coping and non-productive using a sample of 359 Years 5 and 6 students. Participants were administered the Children’s Coping Scale (CCS), the Children’s Internal Coping Self-efficacy Scale (CICSES) and the Family Environment Scale (FES; Moos & Moos, 1994). Using SEM, a four-factor measurement model of coping resources resulted in an adequate fit to the data. From this finding it can be inferred that children who perceived their family as being more supportive believed they were able to control their thoughts, feelings and behaviours and also reported using more productive coping strategies and fewer non-productive coping strategies than children who perceived their family as less supportive.
Although previous research has found that family cohesion and family conflict affect coping behaviours, both directly and indirectly, much less is known about the nature of these relationships for students with LDs. Aside from a few studies that examined LDs and the family environment (e.g., Al-Yagon, 2007; Dyson, 2003; Heiman, Zinck, & Heath, 2008), there is little research in this area. In one of the few studies, Dyson (2003) examined social competence and behaviour problems of 19 children with LDs within the family context. Children were diagnosed with LDs based on the criteria used in a province of Canada, which included severe difficulties in basic academic skills, a significant weakness in one or more cognitive processes and a significant discrepancy between intellectual ability and academic performance. The results showed that parents who had children with LDs rated their children as less socially competent and having more behaviour problems than their siblings. Of particular interest, social competence and behavioural problems were associated with parent stress about their child’s LD. More specifically, children with LDs who were rated as not coping had parents who reported higher levels of stress related to their child’s LDs, indicating that parent coping may be an important factor for the family environment.

Some studies have particularly focused on the influence of mothers on the coping behaviours of children with LDs. For instance, Al-Yagon (2007) examined the role of maternal resources in moderating the effect of LDs on social and emotional adjustment. The sample comprised 59 mothers and their children with LDs and 51 mothers and their average achieving children. Children with LDs had previously been diagnosed using the policy of the Israeli Ministry of Education, which involves a discrepancy between intelligence and educational achievement. The results showed that children with LDs experienced more social and emotional problems compared to their average achieving peers. In particular, children with LDs reported higher levels of loneliness, lower levels of sense of coherence and lower levels of hope. Consistent with Dyson (2003), Al-Yagon (2007) found that mothers also rated more internalising and externalising problems for children with LDs compared to their average achieving children. It was also revealed that mothers’ coping strategies did moderate the relationship between children’s LDs and their
social and emotional adjustment. That is, mothers who used more avoidant coping strategies had children who experienced more social and emotional problems.

From these studies, it is apparent that certain aspects of the family environment have an important role in children’s coping. Families that are characterised by higher levels of cohesion and lower levels of conflict are associated with more adaptive coping behaviours for children. From the LD literature, there is some research on the coping behaviours of children with LDs within families, but there are very few studies that have investigated the influence of the family environment on the coping styles of children with LDs. Moreover, there is an absence of research that has incorporated measures of both school and family environments in the same theoretical model. Hence, the current study will explore how the school and family environments influence the coping styles of students with LDs.

**Perceptions of control as key resources**

According to Hobfoll (2002), there are important internal resources, called key resources, which help individuals to utilise other resources. These key resources tend to be control-related resources such as self-efficacy. Indeed, a number of constructs have been studied in relation to control-related resources, including perceived control (Skinner, 1996), self-efficacy (Bandura, 1977), locus of control (Lefcourt, 1991; Rotter, 1966), causal attributions (Weiner, 1985) and learned helplessness (Seligman, 1975). These constructs have received considerable attention in the literature, yet there still remains some confusion as to what each term means and how these constructs are different from each other. One important distinction has been the difference between control over the external environment (e.g., getting a certain grade) and control over internal states (e.g., thoughts). This is consistent with the two process model put forward by Rothbaum et al. (1982), which described two methods of gaining control, primary and secondary, over a threatening situation. Each is discussed in more detail in the following sections.
**External control (Primary control)**

Primary control can be defined as an attempt to change the world so that it fits with the needs of the individual (Rothbaum et al., 1982). This definition implies control over the external environment. For instance, in the event of a stressful situation, individuals will try to re-establish control over the environment. Weisz and colleagues (Weisz, 1986; Weisz & Stipek, 1982) proposed the contingency-competence-control (CCC) model to help explain the multidimensional nature of perceived control over the external environment. Within this model, control is defined as the perceived ability to produce a desired outcome (e.g., getting a certain grade). The model posits that perceived control has two underlying dimensions, outcome contingency and personal competence. Outcome contingency is the extent to which an outcome depends on the behaviour of relevant individuals (e.g., children). Personal competence is defined as the ability to produce the behaviour on which the outcome is dependent. This is related to constructs such as capacity beliefs (Skinner, Wellborn & Connell, 1990), self-efficacy (Bandura, 1977) and mastery (Pearlin et al., 1981). These have all been used to describe an individual’s belief that they can produce a desired outcome. For example, students’ perception of control over their academic performance may be influenced by their perception of whether or not their performance is contingent on their teacher, or whether they perceive they are competent enough to produce the behaviour associated with good performance.

Previous research has shown external control to be related to depression in children and adolescents (Bandura, Pastorelli, Barbaranelli, & Caprara, 1999; Weisz, Southam-Gerow, & McCarty, 2001; Weisz, Sweeney, Proffitt, & Carr (1993). For example, Weisz et al. (2001) examined the relationships between the three aspects of control and depression in a clinical sample of children and adolescents ($N = 360$). Students were administered the Self-Perception Profile for Children (Harter, 1985), Perceived Contingency Scale for Children (Weisz, Sweeney & Proffitt, 1993) and the Perceived Control Scale for Children (Weisz, Southam-Gerow & Sweeney, 1998) in order to measure competence, contingency and control respectively. Depression was assessed using a number of measures including the Children’s Depression Inventory (CDI; Kovacs. 1992). The results showed that control-related beliefs were moderately associated with depressive symptoms. Specifically,
perceived contingency \( (r = .55) \) and perceived competence \( (r = .47) \) were found to be positively associated with perceived control, which in turn, was negatively associated with depression \( (r = -.53) \). A conceptual model was tested using SEM and explained 43 percent and 39 percent of the variance in depression for children and adolescents respectively. From these findings, it is clear that students who report having less control over their external environment are at risk of not coping with stress and thus experiencing negative outcomes such as depression.

According to Bandura (1977; 1997), there are four sources of self-efficacy (i.e., external control), namely: (a) past performance; (b) exposure to and identification with efficacious models (e.g., vicarious learning); (c) access to verbal persuasion and support from others; and (d) experience of emotional and physiological arousal in the context of task performance. Unfortunately, it seems that students with LDs have less access to these different sources of self-efficacy (Hampton & Mason, 2003). For instance, in a qualitative design investigating self-efficacy belief among 28 students with severe LDs (i.e., more than 2 \( SD \) between IQ and educational achievement in reading or writing, and evidence of a processing deficit), Klassen and Lynch (2007) found that students reported that the most common source of self-efficacy was verbal persuasion from teachers. However, students reported receiving negative feedback from teachers, which reduced their confidence levels. As one student commented, “I actually tried hard on a huge project, and everybody thought I’d get 100% on it. My teacher gave me 50%, and he said I was lucky to pass. Then my confidence kind of disappeared” (p.498). Students also noted that observing other students who were able to do their work lowered their confidence. This was especially the case when they perceived the other students as having less ability than them. Furthermore, some students noted that just having LDs was a negative source of self-efficacy. As one girl said, “When you read it and it sounds like mumbo-jumbo – that can lower your confidence” (p.498). Based on these findings, it is understandable why some students with LDs would believe that they have little control over the external environment.
Internal control (Secondary control)

According to Rothbaum et al. (1982), control researchers have ignored a second process, which they called secondary control. This form of control relates to adapting to or regulating one’s emotional response to a stressful situation. Although there is a considerable amount of literature on perceived control over the external environment, there is less known about perceived control over internal states.

In one of the few studies that investigated the relationship between internal coping self-efficacy and coping behaviours, Creasey et al. (1997) found that children who felt that they had little confidence in their ability to make themselves feel better when faced with negative affective situations were more likely to use avoidant coping behaviours. The researchers concluded that low coping self-efficacy may prevent children from using more productive coping strategies. This was consistent with the findings of Cunningham (2002) who found that students with lower levels of internal coping self-efficacy tended to use more non-productive coping strategies. Again, it seems that students with lower levels of internal control have fewer resources to invest in the coping process.

Given that students with LDs often find themselves in situations in the classroom with little or no external control, it is likely that internal control would be an important predictor of coping behaviours for students with LDs. As mentioned earlier, Firth et al. (2007) found a significant difference in internal coping self-efficacy between secondary students with and without LDs. More specifically, students with LDs reported significantly lower mean levels of internal coping self-efficacy compared to students without LDs. These findings suggest that students with LDs are not only at risk of not feeling in control over their external environment, they also may lack control over their thoughts, feelings and behaviours.

Not surprisingly, after years of struggling at school, students with LDs have little reason to believe that they can control their external environment or their internal states. In line with the proposed model, it was expected that students with LDs would have lower mean levels of external and internal control compared to students with average
achievement. Moreover, students with LDs would be less capable of using productive coping strategies and more inclined to use non-productive coping strategies. This would lead to students with LDs not coping at all.

**Proposed model for empirical testing**

Based on the literature reviewed, it was hypothesised that students classified with possible LDs would report lower mean levels of student engagement, external control, internal control and productive coping, and higher mean levels of non-productive coping and not coping compared to students with expected achievement. In relation to the proposed model, it was also hypothesised that student engagement would be positively associated with productive coping and negatively associated with non-productive coping. Similarly, it was hypothesised that family cohesion would be positively associated with productive coping and negatively associated with non-productive coping. It was also predicted that external perceived control and internal control would be positively associated with productive coping and negatively associated with non-productive coping. Furthermore, it was hypothesised that external control and internal control would mediate the relationships between external resources and coping styles, and, in turn, these coping styles would predict the outcome of not coping. These relationships are represented in Figure 1.

*Figure 1: Proposed Mediational Model of Coping*
Chapter summary

There are a number of adverse outcomes associated with LDs including school dropout, juvenile delinquency and criminal conviction, unemployment and mental health problems. These outcomes highlight that a significant proportion of students with LDs are not coping. Although some students with LDs move on to experience positive outcomes, too many suffer negative outcomes. This discrepancy in possible outcomes implies that while some students have the resources to cope with the demands associated with LDs, many do not. A review of the literature revealed that students with LDs report lower mean levels of important affective, behavioural and cognitive resources compared to students with average achievement. However, one limitation in the literature has been the tendency to use mean comparison studies and not regression or SEM studies. That is, previous studies have demonstrated that students with LDs have lower mean levels of these resources, but have not explained the relationships between these resources and how these resources impact coping behaviours. As such, there is a need for more research to explain the coping behaviours of students with LDs.

To address this need, three coping models were reviewed and integrated to provide a theoretical framework to help explain the coping behaviours of students with LDs. The integrated model was largely based on the COR model with aspects of the CCAD model added. The emphasis on resource loss, loss spirals and the loss of expected gains in the integrated model provides an explanation for the association between LDs and negative outcomes. Moreover, the model’s focus on resources that are relevant to all students such as external resources (e.g., relationships with teachers) and internal resources (e.g., perceived control over the external environment) make this model appropriate for students with LDs.

Prior to specifying the proposed model, several studies that have examined the relationships between coping resources and coping styles for samples of Australian students were reviewed. These studies utilised a conceptual model of coping resources developed by Cunningham (2001) that was based on the COR model. The findings from these studies provided evidence to support the use of multiple resource models to explain the coping behaviours of Australian school students. In particular, the results showed that key internal
resources mediate the relationship between external resources and coping styles. With the exception of Cunningham (2001) who utilised a longitudinal design, one limitation of these studies has been the use of cross-sectional research designs.

In contrast to the number of studies investigating coping behaviours in samples of students from the general student population, the literature review revealed a paucity of research on the coping behaviours of students with LDs, especially for students in Australian primary schools. From the limited studies that have been conducted, most have not utilised regression or structural equation models to explain the coping behaviours of students with LDs. For this reason, the current research will test a proposed model of coping resources for students with LDs using SEM with cross-sectional and longitudinal data. Since this model has not been tested before with a sample of students with LDs, testing this model provides a unique contribution to knowledge.

The next chapter will provide information about the methodology of the research, including conduct of the studies, measures, the structure of coping, design of the studies and statistical analyses.
Chapter 4: Methodology

Introduction

This chapter provides information about conducting the studies, including details of the participants and the instruments used. It also discusses the structure of coping, design of the studies, statistical issues and the statistical analyses used to address the research questions. The current research consisted of two phases. The first study examined the validity of using teacher administered educational and intelligence screening tests to screen students for possible learning disabilities (LDs). The second study involved the administration of screening tools as well as questionnaires that measured different coping resources to a sample of Years 5 and 6 students. Data from the questionnaires were collected at two points in time, which allowed for a proposed theoretical model of coping resources and the outcome of coping to be tested using cross-sectional and longitudinal data.

Conduct of the studies

Ethics approval was obtained for the current research from Swinburne University of Technology Human Research Ethics Committee and from the Department of Education and Early Childhood Development (see Appendix A). Two studies were conducted and are discussed in more detail.

Study One

The first study involved a small sample of Technical and Further Education (TAFE) students from regional Victoria who were enrolled in a program that was designed to reconnect school dropouts with education via TAFE. This sample was selected based on an existing professional relationship with the disability/equity co-ordinator who suspected an over-representation of students with possible LDs enrolled in the program. The purpose of the study was to develop a screening process for possible LDs using educational tests and intelligence screening tests that can be administered by a teacher. A battery of educational tests and intelligence screening tools were administered, scored and interpreted. Funding was made available for participants to receive an independent comprehensive intelligence assessment for possible LDs by a registered psychologist. Given the time and costs...
associated with administering comprehensive intelligence assessments, the sample size was necessarily small. The aim of the study was to examine the validity of using teacher administered screening tools to identify students with LDs.

Letters of consent were distributed to parents of participants who were under the age of 18 years while participants over the age of 18 gave their consent to participate in the research. The overall response rate was 90 percent. Prior to administering the screening tools, teachers were presented with an explanation of the tests and instructions on how to administer these tests to participants. Each participant was provided with a concise report documenting their performance on the educational and intelligence screening tests. In addition, a formal psychological report explaining the results from the comprehensive intelligence assessment was given to each participant.

**Study Two**

A sample of Years 5 and 6 students from 26 class groups across eight Victorian Government schools participated in the study. In Victoria, Government schools are organised into nine regions, and each region is further organized into clusters. Clusters comprise a group of up to 10 schools. Schools involved in the study were located in two separate outer urban clusters in Melbourne, Victoria. One of the clusters was selected on the basis of an existing professional relationship with the cluster educator/convener. The other cluster was identified by its supervising region not only because it was likely to benefit from the research but also because very few students from the schools in this cluster came from non-English-speaking backgrounds. This was considered important since speaking English as a second language is a possible cause of learning difficulties. Although information relating to socio-economic background was not collected, both clusters were located in low socio-economic areas.

Schools were also involved in a project conducted by Swinburne University of Technology in partnership with the Department of Education and Early Childhood Development (DEECD). This project focused on building the capacity of teachers and schools to screen students for possible LDs and to provide support in the mainstream
classroom. As part of the project, representatives from each of the eight schools (e.g., Year 5 and 6 teachers, teacher aides, principals) attended a 15-hour professional development (PD) program called *Engaging and empowering students with learning disabilities/dyslexia* (Cunningham, Firth, Skues, Munyard, & Sullivan, 2006).

The aims of the second study were to: (a) examine the correspondence between individually-administered and group-administered intelligence screening tests; (b) determine the prevalence of students with possible LDs in a sample of Years 5 and 6 students from Victorian Government schools; (c) test the structure of coping and establish a full measurement model of important coping resources and the outcome of coping; (d) examine mean differences in each of the coping resources and coping outcome between students classified with possible LDs and students with expected achievement; and (e) test cross-sectional and longitudinal models of coping resources in which internal resources mediate the relationship between external resources and coping styles, which in turn, predict not coping.

Participants were recruited via letters sent to all parents of Year 5 and Year 6 students (see Appendix B). Consent forms were distributed to parents and returned to the classroom teacher with a response rate of 62 percent. Initially, educational tests were administered, scored and interpreted for all students with parental consent. Participants who were found to have scored below specified cut-offs on the educational tests also completed the intelligence screening tests. Scores from these teacher administered screening tools were then used to develop individual student profiles and school level profiles that were given to each school. In order to assess the differences in coping resources participants also completed a questionnaire measuring different coping resources twice in the school year, once in either Term 1 or Term 2, and again in Term 3 or Term 4 (see Appendix C). Self-report data were collected in the areas of student engagement, family cohesion, internal control, external control and coping styles.
Measures

The measures administered in the current research included educational tests, intelligence screening tests and comprehensive intelligence tests. These measures are discussed in the following sections.

Educational tests

The educational tests used in the current research were based on the recommended tests for a LDs assessment in Victorian Government schools. According to the Victorian Curriculum Assessment Authority (VCAA), a statutory authority that is responsible for the provision of special consideration for students with LDs in Victorian Government schools, assessments for LDs should include measures of reading comprehension and spelling. In particular, these areas need to be assessed using the Progressive Achievement Test in Reading (PAT-R; Australian Council of Education Research, ACER, 2001) and the South Australian Spelling Test (SAST; Westwood, 2005), which are both group-administered standardised tests.

**Progressive Achievement Test in Reading: Comprehension (PAT-R; Australian Council of Education Research, ACER, 2001)**

The PAT-R is a standardised test designed to measure reading comprehension skills for students ranging from Year 3 to Year 9. The PAT-R consists of four reading test forms, which are sequential. Each form contains eight or nine prose accompanied by four to six multiple-choice questions assessing both literal and inferential reading comprehension. The selection of an appropriate form for TAFE students (i.e., Form 4) and Year 5 and 6 students (i.e., Form 2) was based on guidelines found in the PAT-R manual (ACER, 2001). Correct responses on the PAT-R were summed to form a raw score, which was converted into a percentile rank. A cut-off score of less than or equal to the 25th percentile was used where scores below the cut-off indicated low achievement in reading (Fletcher et al., 1994). Cronbach’s alphas for the different PAT-R comprehension tests are reported in the PAT-R manual and range from 0.88 to 0.91, providing evidence for the reliability of the PAT-R test (ACER, 2001). Correlations between 0.65 and 0.86 with other tests of reading comprehension provide evidence for the validity of the PAT-R (ACER, 2001).
South Australian Spelling Test (SAST; Westwood, 2005)

The SAST is a standardised test of spelling achievement for students between six and 16 years of age. The SAST has two separate forms (i.e., Form A and Form B), though only Form A was used in the current research. Form A contains 70 spelling words of increasing difficulty and requires students to generate a written response. Correct responses on the SAST were summed to form a raw score, which was converted into an approximate spelling age. A spelling age cut-off of two or more years below chronological age was specified to indicate students with low achievement in spelling. The SAST is a reliable measure of spelling achievement with a test-retest reliability of 0.96 (Westwood, 2005).

Intelligence tests

Four intelligence measures were used in the current research, namely the Standard Progressive Matrices (SPM; Raven et al., 2000), Kaufman Brief Intelligence Test - Second Edition (KBIT-2; Kaufman & Kaufman, 2004), Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV; Wechsler, 2003) and Wechsler Adult Intelligence Scale – Third Edition (WAIS-III; Wechsler, 1997). While the SPM and KBIT-2 are screening tools with robust psychometric properties, the WISC-IV and WAIS-III are the most widely used tests for comprehensive intelligence assessments. Each test is described in more detail in the following sections.

Standard Progressive Matrices (SPM; Raven et al., 2000).

The SPM is a measure of nonverbal intelligence. The SPM consists of 60 visual puzzles divided into five equal sets (A,B,C,D,E) where puzzles within each set become progressively more difficult. Each puzzle has a missing section where participants are required to select the missing part from six options. The SPM was group-administered by the classroom teacher. Correct responses were summed to form a raw score, which was converted into a percentile rank. An arbitrary cut-off of the 10th percentile was specified to indicate low intelligence. According to the SPM manual, split-half reliabilities have exceeded 0.90 and the test-retest reliability for individuals under 30 years of age for the SPM is 0.88 (Raven et al., 2000). Correlations with other intelligence measures (e.g., WISC-R) between 0.8 and 0.9 have also been reported (Raven et al., 2000).

The KBIT-2 is a brief, individually-administered test that measures verbal and nonverbal intelligence for people between four and 90 years of age. The KBIT-2 provides a verbal, nonverbal and overall intelligence score. The verbal score comprises two subtests (Verbal Knowledge and Riddles) and the nonverbal score is based on one subtest (Matrices). The Verbal Knowledge subtests consist of 60 items that measure receptive vocabulary knowledge. The Riddles subtest has 48 items and measures verbal comprehension, reasoning and vocabulary knowledge. The Matrices subtest is a 46-item subtest that assesses the ability to identify relationships among meaningful and abstract visual stimuli. Correct responses on the Verbal Knowledge and Riddles subtests are totalled to form the verbal raw score, and the correct number of responses on the Matrices subtest forms the nonverbal raw score. Both the verbal and nonverbal raw scores are then summed to form the overall raw score. Raw scores were converted into standard scores for the verbal, nonverbal and overall intelligence scores, which is known as the IQ composite score. Consistent with previous studies (Siegel, 1989), an IQ composite cut-off score of 80 was used with scores below the cut-off indicating low intelligence. Split-half reliabilities for the KBIT-2 range from 0.89 to 0.96 for the overall IQ composite score with an average of 0.92 for participants between four and 18 years of age (Kaufman & Kaufman 2004). The test-retest reliability of the overall the IQ composite score ranged from 0.88 to 0.92. The KBIT-2 has also been correlated with other intelligence tests, including the WISC-IV \( (r = .77) \) and the WAIS-III \( (r = .89) \) (Kaufman & Kaufman 2004).


The WISC-IV is an individually-administered test that measures intelligence for individuals aged between six and 16 years. It provides an overall full scale intelligence quotient score (FSIQ) and four index scores, namely the verbal comprehension index (VCI), the perceptual reasoning index (PRI), the working memory index (WMI) and the processing speed index (PSI). The WISC-IV has a total of 15 subtests where 10 of these are core subtests and the other five supplemental subtests. The structure of the WISC-IV
includes three subtests each for VCI and (Similarities, Vocabulary, Comprehension) PRI (Block design, Picture Concepts, Matrix Reasoning), and two subtests each for WMI (Digit Span, Letter-Number Sequencing) and PSI (Coding, Symbol Search). Raw scores for each subtest were calculated by summing the correct responses, which were converted in scaled scores. The scaled scores were used to form the four index scores and the FSIQ. A cut-off FSIQ score of 80 was used where participants who scored below the cut-off were classified with low intelligence (Siegel, 1989). Split-half reliabilities for the WISC-IV are .94 for VCI, .92 for PRI, .92 for WMI, .88 for PSI and .97 for FSIQ. The test-retest reliabilities are .93, .89, .89, .86 and .93 for the VCI, PRI, WMI, PSI and FSIQ respectively (Flanagan & Kaufman, 2004). Correlations between the FSIQ of the WISC-IV and the FSIQ of other Wechsler scales (i.e., WISC-III, WPPSI, WAIS-III) were each strong ($r = .89$) (Flanagan & Kaufman, 2004).

**Wechsler Adult Intelligence Scale – Third Edition (WAIS-III; Wechsler, 1997)**

The WAIS-III is an individually-administered test that measures intelligence for individuals aged between 16 and 89. It provides an overall full scale IQ score (FSIQ), verbal IQ score (VIQ) and performance IQ score (PIQ), and four index scores including the verbal comprehension index (VCI), the perceptual organisation index (POI), the working memory index (WMI) and the processing speed index (PSI). The WAIS-III has a total of 14 subtests where 11 of these are core subtests and the other three are supplemental subtests. The structure of the WAIS-III includes three subtests each for VCI (Vocabulary, Similarities, Information) and PRI (Picture completion, Block design, Matrix reasoning), and two subtests each for WMI (Digit span, Letter-number Sequencing) and PSI (Digit-symbol coding, Symbol search). Raw scores for each subtest were calculated by summing the correct responses, which were converted into scaled scores. The scaled scores were used to form the three index scores, the VIQ and PIQ and the FSIQ. A cut-off FSIQ score of 80 was also specified where participants who scored below the cut-off were classified with low intelligence (Siegel, 1989). Similar to the WISC-IV, split-half reliabilities for the WAIS-III are .97 for VIQ, .94 for PIQ and .98 for FSIQ. Test-retest reliabilities are .96, .91 and .96 for the VIQ, PIQ and FSIQ respectively.
Measures for coping resources

Participants also completed a questionnaire measuring different coping resources, namely student engagement, family cohesion, internal control, external control and coping styles. The questionnaire included the following scales.

Feelings About Yourself And School survey (FAYAS; Department of Education, Employment and Training, DEET, Victoria, 2000)

The FAYAS (now known as the Attitudes to School survey) consists of 26 items that measure students’ perceptions of themselves and the school environment. Participants were asked to indicate on a five-point Likert scale the degree to which each statement was true. Responses ranged from 1 (Strongly Disagree) to 5 (Strongly Agree). Higher scores on each of the measures indicated a greater perception of that particular resource. The current research was interested in the student engagement measures, which examined students’ perceived connectedness to their peers (4 items; e.g., “I get on well with others”) teachers (5 items; e.g., “At this school there is a teacher who cares about me”) school (4 items; “I look forward to going to school”), and their motivation (4 items: e.g., “I try very hard at school”). Previous research involving a sample of 300 Years 9 and 10 students found Cronbach’s alphas of .74 for peer connectedness, .83 for teacher connectedness and .84 for school connectedness (Cunningham et al., 2004). Furthermore, Nicholls and Cunningham reported a Cronbach’s alpha of 0.82 for motivation in a sample of 281 Years 5 and 6 students.

Family Environment Scale (FES; Moos & Moos, 1994)

The FES comprises 90 forced-choice true-false statements that assess dimensions of the family environment, including relationships (cohesion, conflict, expressiveness), personal growth (independence, achievement orientation, intellectual-cultural orientation, active-recreational orientation, moral religious emphasis) and system maintenance (organisation and control). Boyd, Gullone, Needleman, and Burt (1997) reported normative and reliability data for the FES from a large sample of Australian adolescents (N= 1289). Cronbach’s alphas of .67, .39 and .72 were found for cohesion, expressiveness and conflict, respectively. Given the low reliability of the expressiveness sub-scale, as well as the need
to reduce the number of items to be completed by the participants, only the cohesion sub-scale was used in the current research. Nine items were used to measure family cohesion (e.g., “There is a feeling of togetherness in our family”). After reverse scoring five of the items, scores from the nine items were summed to provide an overall measure of family cohesion where higher scores corresponded to higher levels of perceived family cohesion.

**Children’s Internal Coping Self-efficacy Scale (CICSES: Cunningham, 2002; adapted from the Perceived Control of Internal States Inventory, Pallant, 2000)**

The CICSES (Cunningham, 2002) is a 15-item unidimensional measure that assesses the degree to which students perceive they can control their internal environment, including their thoughts (5 items; “I can usually stop myself from thinking about my problems”), feelings (5 items; “There are lots of things I can do to feel better when bad things happen”) and behaviours (5 items; “I have a number of ways of staying calm that I know will help me cope”) when faced with a stressful situation. Participants were asked to indicate on a four-point ordinal scale the degree of correctness of each statement, with responses ranging from 1 (Very wrong) to 4 (Very right). Higher scores on any item reflected a greater ability to control one’s thoughts, feelings or behaviours when confronted with a stressful situation. In a sample of 367 Years 5 and 6 students, Cunningham (2002) reported a Cronbach’s alpha of .83 for the CICSES.

**Perceived Control Scale for Children (PCSC: Weisz et al., 1998)**

The PCSC consists of 24 items that measure the degree to which students perceive they can control their external environment. The PCSC contains three subscales, namely the academic subscale (8 items; “I can get good grades if I try”), social subscale (8 items; “I can make friends with other kids if I really try”) and behavioural subscale (8 items; “If I try to behave, adults will like the way I act”). Each subscale comprises four positively worded items and four negatively worded items. However, for the purposes of the current research, only the positively worded items were included (12 items) as negatively worded items may be a source of method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Participants were asked to indicate on a four-point scale the degree to which each statement was true, with responses ranging from 1 (Very false) to 4 (Very true). Higher scores on any item
indicated a greater ability to control one’s academic environment, social environment and external behaviour. Previous research has found a Cronbach’s alpha of .88 for the PCSC in a sample of 360 children and adolescents (Weisz, et al., 2001).

The Children’s Coping Scale (CCS; Cunningham, 2002; adapted from the Adolescent Coping Scale, ACS, Frydenberg & Lewis, 1993)

The ACS consists of 79 coping actions that are grouped into 18 coping strategies. These coping strategies are further grouped into three coping dimensions, or coping styles, namely productive coping, non-productive coping and reference to others. The 41 items selected for the CCS were slightly adapted (i.e., some wording changes) from the ACS. Items related to the coping strategy worry and the coping style reference to others were not included for theoretical reasons. Although the two coping strategies, seeking relaxing diversions and physical recreation, were each represented with three items, there was some overlap in the content between some of the items (Cunningham, 2002). Consistent with Cunningham (2001), these coping strategies were combined into a single coping strategy called seeking recreational diversions. The CCS comprised the coping strategies solve the problem, work hard, focus on the positive and seeking recreational diversions from the productive coping style, the coping strategies wishful thinking and ignore the problem to capture avoidance coping, self-blame, keep to self and tension reduction from the non-productive coping style and the items comprising not cope for the outcome not coping.

Participants were asked to indicate on a five-point scale of whether they use certain coping actions when dealing with their problems, with responses ranging from 1 (Never) to 5 (A lot). Responses for each coping action relating to a particular coping strategy were averaged to form a coping strategy score. Higher scores reflect greater use of that particular coping strategy. A similar adapted version of the ACS was administered to Years 5 and 6 students where Cronbach’s alphas ranged from .62 for seeking relaxing diversions to .81 for self-blame (Cunningham, 2002). Cunningham et al. (2004) administered a 45-item adapted version of the ACS to Years 9 and 10 students and reported Cronbach’s alphas ranging from .52 for wishful thinking to .78 for self-blame.
The structure of coping

Within the coping literature, the measurement of coping has varied in terms of the number of underlying coping factors and the content that forms these coping factors. The classification of coping actions and behaviours into factors has been generally based on either conceptually-based models or empirically-derived models. Each of these approaches is discussed.

Conceptual models of coping

Most of the conceptual models for categorising coping behaviours are based on adults and tend to be dichotomous theoretical frameworks. The most widely used dimensions include problem- and emotion-focused coping (Lazarus & Folkman, 1984), primary and secondary coping (Rothbaum et al., 1982) and approach and avoidance coping (Roth & Cohen, 1986). For instance, the problem- and emotion-focused coping dimension indicates that coping behaviours are directed at managing or altering the problem causing the distress (i.e., problem-focused), or that coping that is directed at regulating the emotional response or alleviating emotional distress through withdrawal or avoidance (i.e., emotion-focused) (Lazarus & Folkman, 1984). According to Lazarus and Folkman (1984), the use of certain coping behaviours depends on whether the stressor or situation is perceived as controllable. More specifically, problem-focused strategies tend to be used in situations that are perceived as controllable while emotion-focused strategies are more likely to be used when it is appraised that nothing can be done to change a harmful, threatening or challenging situation. One limitation to the problem- and emotion-focused dichotomy, however, is that a coping strategy could be both problem- and emotion-focused. For example, a student may withdraw from an argument with a peer in order to calm down and produce a more appropriate response. Although this may be classified as emotion-focused, it is also problem-focused, which suggests that these two dimensions may not be entirely distinct from each other.

An alternative model, proposed by Rothbaum et al. (1982), described two methods of gaining control over a stressful situation. The first refers to attempts to change the situation and is called primary control. Alternatively, secondary control involves attempts
to fit in with the situation. The use of primary-control coping strategies can produce mixed outcomes, ranging from successful attempts to change a situation through to disappointing failures. Moreover, secondary-control coping strategies are associated with adjusting to the situation, which leads to less severe highs and lows. These two forms of coping are not seen as mutually exclusive, but rather are used interchangeably. Indeed, secondary-control coping is often used when primary-control coping has failed.

Another coping framework is the approach and avoidance coping dichotomy (Roth & Cohen, 1986). According to Roth and Cohen (1986), coping strategies are either directed toward or away from a threat. The use of either style of coping can depend on the particular situation or whether individuals may have a preference to utilise one orientation over the other. One of the benefits of approach coping is that the problem can be addressed and resolved. However, it may be that avoiding a particular threat alleviates stress and anxiety, thus providing time to adjust to the stressor and prepare efforts to change the environment. In other words, the benefits of avoidance may in fact facilitate the use of approach strategies. Roth and Cohen (1986) posit that an ideal coping style would utilise both modes of coping in which the benefits of each are realised.

Although most of the previous research on coping is based on adults, there has been some research that has investigated coping dimensions in childhood and adolescence (Band & Weisz, 1988; Compas, 1987; Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001; Cunningham, 2001; 2002; Ebata & Moos, 1991; 1994). Band and Weisz (1988) applied the problem- and emotion-focused, and the primary and secondary coping dimensions to a sample of children aged between six and 12 years. Interviews were conducted with 73 participants to explore the coping behaviours used in several everyday stressful situations. The results showed that children varied their coping strategies depending on the situation. For instance, children used primary coping strategies for situations that were perceived as controllable (e.g., school stress), but employed secondary coping for situations that were appraised as uncontrollable (e.g., medical stress). It was also found that, as the children got older, they started to use less primary control coping and more secondary control coping. One possible explanation for this finding was that younger
children may find it difficult to comprehend secondary-control coping and thus are more effective in the use of primary-control coping.

Ebata and Moos (1991) used conceptual models and empirically derived models and organised them into a hierarchical model based on approach and avoidance coping dimensions to examine the coping behaviours of 190 adolescents aged between 12 and 18 years. Approach responses were directed at the problem and involved trying to solve the problem, while avoidance response were indirect methods to deal with the situation such as accepting the situation, avoiding having to think about the situation or expressing emotions in order to manage the stress. The results showed that older adolescents tended to use multiple coping responses (e.g., positive reappraisal, problem solving) compared to younger adolescents. Those adolescents with psychological (e.g., depression) and behavioural (e.g., conduct disorder) problems used more avoidant coping responses (e.g., cognitive avoidance, emotional discharge) compared to other adolescents without such problems. In terms of individual differences, it was found that adolescents who used more approach responses reported higher levels of well-being and lower levels of distress. It was also revealed that seeking alternative rewards was associated with higher wellbeing. In general, adolescents who report using more approach and less avoidance coping tend to be better adjusted.

Ebata and Moos (1994) also organised eight narrow-band scales into two hierarchical dimensions, approach and avoidance coping. They examined the influence of personal (e.g., age, sex temperament), situational (e.g., stressor appraisals) and contextual (e.g., chronic stressors, social stressors, negative events) factors on approach- and avoidance-coping behaviours in a sample of 315 adolescents aged between 12 and 18 years. They found that adolescents used a variety of coping strategies to deal with problematic situations. In particular, approach coping strategies were associated with adolescents who were older, more active, perceived stressors as controllable and had more social resources. In contrast, avoidant coping strategies were associated with adolescents who were more distressed and those adolescents who experienced more chronic stressors. According to Ebata and Moos (1994), the findings from their study largely support the use of narrow
band distinctions that can be divided into approach-avoidance dimensions and that seeking alternative rewards should be included into the approach dimension.

In sum, it appears that the use of certain coping strategies depends on several factors. There also seems to be an overlap between some of the coping dimensions. This indicates that individual coping strategies may be used for both different purposes or have different effects. As such, one limitation of the measurement of coping is the lack of agreement about the discriminant validity between the coping dimensions.

Empirically derived models of coping

Although conceptual models have largely argued for two main coping factors, factor analytic studies have identified up to five underlying coping factors. For instance, Ayers, Sandler, West, and Roosa (1996) conducted semi-structured interviews with 57 children whose parents had divorced within the past two years. A content analysis revealed 11 distinct categories that described coping behaviours in children. This was followed by the use of confirmatory factor analysis (CFA) to test alternative conceptual models of coping in one sample of 217 children and another sample of 303 children aged between nine and 13 years. A four-factor model was identified, namely: (a) active coping (focus on the stressful event); (b) distraction (release of emotions); (c) avoidant (avoid actions and cognitive avoidance); and (d) support seeking (problem and emotion-focused). This four-factor model provided a better fit to the data compared with two-factor models such as the problem- and emotion-focused coping model (Lazarus & Folkman, 1984) and approach and avoidance coping model (Ebata & Moos, 1991). The four-factor model that was found using the first sample was cross-validated in the second sample. From these results it can be concluded that the structure of coping may include more than two factors and that avoidance and seeking social support should be separate factors of coping.

Another study that examined the structure of coping was conducted by Connor-Smith, Compas, Wadsworth, Harding Thomsen, and Salzman (2000) who used CFA to test a five-factor conceptual model of coping using the Response to Stress Questionnaire (RSQ). The five factors included primary control engagement coping, secondary control
engagement coping, disengagement coping, involuntary engagement and involuntary disengagement. The model distinguished between voluntary and involuntary coping responses, and between responses directed toward the stressor or reaction to the stressor and responses oriented away from the stressor. The RSQ was administered to three separate samples. The first sample comprised 437 adolescents ranging in age from 16 to 19 years. The second sample consisted of 364 adolescents aged between 12 and 18 years. Eighty-two adolescents aged between 11 and 17 years and their parents formed the third sample. The results indicated that the factor structure was consistent for all three samples. In general, the five-factor model provided support for distinguishing between voluntary and involuntary coping and engagement and disengagement. Moreover, voluntary engagement could also be separated into primary- and secondary-control.

Frydenberg and Lewis (1993) proposed an alternative theoretical framework for grouping coping behaviours. Based on a sample of 673 Australian secondary school students ranging in age from 13 to 18 years, exploratory factor analysis (EFA) revealed that 18 coping strategies were grouped into three higher order factors, namely productive coping, non-productive coping and reference to others. Productive coping included the strategies solving the problem, work hard to achieve, focus on the positive, seek recreational diversions and physical recreation. The non-productive coping factor comprised worry, wishful thinking, not coping, tension reduction, ignore the problem, self-blame and keep to self. Support was also found for a third factor called reference to others, which included the coping strategies, social support, invest in close friends, seek to belong, social action, seek spiritual support and seek professional support. Similar to previous models, the ACS model assumes that certain coping strategies are associated with positive outcomes while other strategies are related to negative outcomes.

There is considerable evidence to support the ACS (Frydenberg & Lewis, 1993) as an instrument to measure the coping behaviours of adolescents. However, it is important to note that the ACS was normed on an older adolescent population ranging in age from 13 to 18 years and may not necessarily be representative of the coping behaviours used by younger children. For instance, Frydenberg and Lewis (1999) found that older adolescents
tend to use more non-productive strategies compared to younger adolescents. Cunningham (2001) was the one of the first to utilise a modified form of the ACS in a sample of children aged between 10 and 12 years. In order to make the questionnaire appropriate for younger children, some of the item wording was simplified. Moreover, the response format was also modified from a four-point to a five-point response format ranging from “great deal” to “doesn’t apply or don’t do it” to a three-point form (never, sometimes, a lot). Using CFA, Cunningham tested a series of alternative coping models using a subset of items from the ACS.

The first model was consistent with Frydenberg and Lewis’s (1993) conceptual model in which it was hypothesised that solve the problem, focus on the positive, work hard to achieve and seek recreational diversions would comprise the productive coping factor, and worry, wishful thinking, ignore the problem, self-blame, keep to self, tension reduction and not cope captured the non-productive coping factor. The reference to others factor was excluded based on empirical findings that indicated a lack of unique factor loadings for reference to others, as well as a view in the literature that social support should be classified as a coping resource as opposed to a coping strategy (Cunningham, 2001). Moreover, the coping strategy worry was omitted based on the view that worry was involuntary and hence not a coping strategy. The second was a three-factor model in which the strategies wishful thinking and ignore the problem were hypothesised to form a third factor known as a cognitive avoidance coping, which was consistent with the findings of Ayers et al. (1996). The third model was a two-factor model that allowed wishful thinking and ignore the problem to be freely estimated for productive and non-productive coping. The results from the CFA revealed that the third model was the better fitting model. Although the results did not support specifying wishful thinking and ignore the problem as uniquely contributing to the non-productive coping factor, they do suggest that the structure of coping may be different in late childhood compared to older adolescents.

Another structural issue relating to the ACS (Frydenberg & Lewis, 1993) refers to the coping strategy called not cope. Although this strategy has been typically associated with non-productive coping strategies (e.g., self-blame, tension reduction), a more recent study by Frydenberg and Lewis (2002) suggested that the not cope items form an additional
scale that “assesses a respondent’s professed inability to cope” (p.645). In fact, in this study, the items comprising not cope were put forward as being different from the 18 scales that reflect conceptually and empirically distinct coping strategies such as self-blame, keep to self and tension reduction. Based on item content, it seems reasonable to separate not cope from self-blame, keep to self and tension reduction. For instance, items for not cope (e.g., „There is nothing I can do so I don’t do anything”) are different from items for self-blame (e.g., „Think that I make things difficult for myself”), keep to self (e.g., „Avoid being with people”) and tension reduction (e.g., „cry or scream”) in terms of utilising a coping action. That is, while the items for self-blame, keep to self and tension reduction involve attempts at coping, albeit non-productively, the items for not cope refer to doing nothing to cope. In effect, the not cope items are not indicative of non-productive coping. Rather, they represent not coping at all or giving up. Therefore, in this study, the items comprising not cope were respecified as a separate outcome factor and not as an indicator of the non-productive coping style.

Based on the empirical findings that highlight the need for more than two-factors to represent the factor structure of coping (Ayers et al., 1996; Connor et al., 2000), the improved model fit associated with cross-loading wishful thinking and ignore the problem for students in late childhood (Cunningham, 2001) and the argument for considering not cope as an additional coping strategy, it was decided to test a three-factor model of coping. (i.e., productive coping, avoidance coping and non-productive coping) together with a fourth factor reflecting inability to cope.

**Design of the studies**

A cross-sectional design was used to examine the validity of a screening process for possible LDs using teacher administered educational and intelligence tests. Participants were recruited through judgemental sampling, which is appropriate for selecting members of a difficult to reach, specialised population (Neuman, 2006). Furthermore, a hierarchical, longitudinal comparison of groups design was used in study two where students were nested in classrooms, which in turn, were nested within schools. The hierarchical design can be seen in Figure 2. Participants completed the questionnaire at two points in time. This
design allowed for a mediational model of coping resources to be tested. Participants were conveniently selected from schools that agreed to participate in the study.

Statistical issues

Prior to analysis, data screening and assumption testing were undertaken. This involved screening the data for out-of-range values, outliers and dealing with missing data. The assumptions underlying multivariate analyses were also addressed, including normality and independence of observations.

Out-of-range values, univariate outliers and multivariate outliers

Frequencies and descriptive statistics were produced and inspected for each variable to ensure that values were within the plausible range. Univariate outliers were detected using standardised z scores in excess of 3.29 ($p < .001$) and multivariate outliers assessed using Mahalanobis distance ($p < .001$), which is a measure of the distance from a particular case to the centroid of remaining cases. When outliers were identified, analyses were conducted with and without the outlier to determine whether the presence of the outlier had
a substantial effect on the results of the analyses. The decision was made to retain the outlier if it did not have a substantial effect on the results of the analyses.

**Missing data**

Missing data is a common problem in research (Tabachnick & Fidell, 2006). For instance, when participants do not respond to some items on a questionnaire and not others, or when participants are present for some waves of data collection but not for other waves, are both examples of missing data. The importance of missing data depends on how much data is missing and whether there is a pattern of missing data. Cohen and Cohen (1983) suggested that up to 10 percent of missing data is not a serious problem. More recently, Newman (2003) reported that as much as 25 percent of data can be missing without biasing parameter estimates when missing data is replaced with maximum likelihood (ML) and multiple imputation (MI) methods.

Although the amount of missing data is important, it is vital to know whether there is a pattern to the missing data (Tabachnick & Fidell, 2006). Missing data can be described as missing completely at random (MCAR), missing at random (MAR) and missing not at random (MNAR) (Rubin, 1976). For example, suppose there are two variables, X and Y, where all X values are present but some Y values are missing. Missing data is defined as MCAR when the missing Y values do not depend on values of X or Y. Data is defined as MAR when missing Y values depend on X but not on Y. Furthermore, MNAR is defined when missing Y values depend on Y. Missing data that is either MCAR or MAR are associated with less serious problems and are assumed to be ignorable. However, data that is MNAR is a serious problem because it impacts the interpretation of results and is thus not ignorable (Allison, 2003; Schafer & Graham, 2002). A Missing Value Analysis (MVA) was performed in SPSS to determine whether missing data were either MCAR, MAR or MNAR. This type of analysis generates Little’s MCAR statistic where a non significant result at the $p < .001$ level indicates that data can be assumed to be MAR.

Various methods are available for dealing with missing data that is MCAR or MAR, including listwise deletion, pairwise deletion, mean imputation and estimation techniques
such as maximum likelihood (ML) and multiple imputation (MI; Allison, 2003; Schafer & Graham, 2002). The treatment of missing data is important as inappropriate methods for dealing with missing data can lead to biased parameter estimates and standard errors. One method recommended for replacing missing data from longitudinal studies is ML estimation (Newman, 2003; Twisk & de Vente, 2002). A common method for ML estimation is the EM algorithm (Enders, 2001). The EM algorithm is an iterative procedure that consists of two steps: an expectation (E) step and a maximization (M) step. The E step consists of estimating the missing values using regression. The M step updates the covariance matrix using the data from the previous E step. This covariance matrix is then used in the next E step to estimate missing values and the two-step process repeated until there is minimal difference between the covariance matrices (Peugh & Enders, 2004). Graham, Hofer, Donaldson, Mackinnon, and Schafer (1997) found the EM algorithm provided effective and unbiased parameter estimates compared to other methods such as list-wise deletion and mean substitution. Therefore, data from participants with 25 percent or more missing data from the two waves of questionnaires were replaced with the EM algorithm through the MVA procedure in SPSS.

The current research also included missing data from test scores. For instance, participants who scored above specified cut-offs on reading and spelling tests were not administered intelligence tests due to the cost and time involved. This is known as planned missing data (Schafer & Graham, 2002).

**Independence of observations**

A key assumption underlying multivariate analysis is that observations are independent (Field, 2005). As mentioned previously, data collected from schools can be described as nested or hierarchical data (Tabachnick & Fidell, 2006). For example, students are nested within classrooms and classrooms are nested within schools. Analyses from previous school-based research have used either student level data as the unit of analysis and ignored class and school level effects, or used classroom level data as the unit of analysis and ignored student level effects (Dorman, 2008). However, failure to consider variance explained at different levels can lead to biased parameter estimates and standard
errors (Lee, 2000). Accordingly, a Variance Components Analysis was performed in SPSS to determine the proportion of variance explained by each of the different levels prior to selecting the unit of analysis. A variance level above 10 percent of the overall variance in a dependent variable at either the classroom or school level needs to be taken into account in the statistical analyses (Lee, 2000). Equally, if the explained variance of the dependent variables due to classroom or school effects is less than 10 percent, the nested observations can be treated as independent.

Univariate normality

Multivariate analyses assume that data are from one or more normally distributed populations. In order to test for univariate normality, histograms and normality probability plots were produced for each of the variables and checked for symmetry and whether cases were lined up on the diagonal respectively. This was followed by an inspection of the skewness (i.e., the symmetry of the distribution) and kurtosis (i.e., the peakedness of the distribution) statistics where values different from zero indicate positive or negative skewness or kurtosis. Should significant skewness be identified, transformations would be used and the variable reassessed. Transformed variables that continued to demonstrate skewness problems were excluded from further analyses.

Multivariate normality

Whereas univariate normality refers to the distribution of a single variable, multivariate normality relates to the assumption that all combinations of variables are normally distributed (Tabachnick & Fidell, 2006). Although the assessment for univariate normality partially checks the multivariate normality assumption, Mardia’s coefficient (Mardia, 1970) was also used to assess multivariate kurtosis with values of 3 or above indicating possible kurtosis (Ullman, 2006). It is important to note that multivariate kurtosis is a significant problem for SEM when ML estimation is used as it can impact the $\chi^2$ statistic and standard errors. Hence, violations of the multivariate normality assumption need to be addressed.
Although ML estimation is robust to moderate violations of normality (Anderson & Gerbing, 1984), severe violations of normality affect the model test statistic and parameter standard errors (Nevitt & Hancock, 2001). There are a number of approaches to deal with the problems associated with ML estimation under nonnormal conditions. One approach is the ADF estimation method, which makes no assumptions about the distribution of observed variables (Browne, 1984). However, one major limitation of the ADF method is that requires very large sample sizes (i.e., \( n > 2000 \)) in order to produce stable parameter estimates. A second approach is the use of adjusted \( \chi^2 \) statistics (Nevitt & Hancock, 2001). Satorra and Bentler (1994) developed the Satorra-Bentler \( \chi^2 \) statistic, which is a correction to the normal \( \chi^2 \) statistic when ML is used. Nonetheless, the Satorra-Bentler \( \chi^2 \) statistic is not available in AMOS. However, a third approach to deal with nonnormality that produces an equivalent value to the Sattora-Bentler \( \chi^2 \) statistic involves bootstrapping (Nevitt & Hancock, 2001). Bootstrapping is a resampling method that can be used to estimate the model test statistic \( p \) value and standard errors. It involves using cases from the observed data that are randomly selected with replacement to generate other data sets to correct the \( \chi^2 \) distribution adjusted for non-normality. When this process is repeated numerous times (i.e., 2000), it simulates drawing samples from the population (Kline, 2005). The current research used the Bollen-Stine bootstrapping method available in AMOS to produce an adjusted model test statistic, the Bollen-Stine bootstrap \( p \), which is equivalent to the Sattora-Bentler \( \chi^2 \) statistic.

**Sample size and power**

Although SEM is described as a large sample technique (Kline, 2005), there is little consensus about the minimum sample size needed for SEM. Earlier guidelines have indicated that a minimum sample size of 200 is needed (Kline, 1998). However, simulation studies have shown that sample sizes of 100 can provide accurate parameter estimates (Lei & Lomax, 2005). One important consideration is the complexity of the structural equation model (Kline, 2005). For instance, the more complex the model (i.e., more parameters to be estimated), the larger the sample size required. According to Kline (2005), a ratio of 10:1 participants to parameters estimated is sufficient. As such, attempts were made to reduce
the model complexity in this study and thus increase the ratio of participants per estimated parameter through the use of item parcels and single indicator latent variables.

Single indicator latent variables were used when a latent variable was unidimensional. For instance, a single-indicator latent variable consists of a single composite variable with specified values for the factor loading and measurement error variance (Munck, 1979). The use of a single indicator latent variable reduces the number of parameters to be estimated in a model compared to multiple indicator variables. Hence, for small sample sizes, single-indicator latent variables provide a way of increasing the ratio of the number of participants to the number of estimated parameters. To do this, Munck’s (1979) formulae were employed to calculate the factor loading and measurement error variance for a particular latent variable. The factor loading was calculated by multiplying the standard deviation by the square-root of the Cronbach’s alpha value. The measurement error variance was calculated by squaring the standard deviation and multiplying the squared value by one minus Cronbach’s alpha.

MacCallum, Browne, and Sugawara (1996) presented tables of the minimum sample size necessary for tests of goodness of fit, which are based on degrees of freedom and effect size. Based on the calculation of greater than 100 degrees of freedom in the cross-sectional structural model, the minimum sample size needed to be 80 percent confident of correctly rejecting a null hypothesis of close fit was at least $N=132$.

**Statistical analyses**

All data were analysed using SPSS Version 16.0 and AMOS Version 16.0. The first study used primarily crosstabulations to examine the relationship between intelligence screening tests and comprehensive intelligence assessments. Study two used a variety of statistical techniques, including independent groups t-tests, one-way multivariate analysis of variance (MANOVA) tests and one-way multivariate analysis of covariance (MANCOVA) tests. Structural equation modelling (SEM) techniques were also used.
**Study One**

Scores on the educational tests, comprehensive intelligence assessments and intelligence screening tests were recoded into dichotomous variables with values classified either below or above the specified cut-off values. Although the practice of dichotomising continuous variables is a contentious topic (MacCallum, Zhang, Preacher, & Rucker, 2002), using cut-off scores provides a practical means for teachers to screen students for possible LDs.

Using the scores from the educational and intelligence screening tests, participants were classified into one of three groups, namely a low achievement (LA) group, a group of students with possible LDs and an expected achievement (EA) group. Participants who scored below the cut-offs on either the PAT-R (i.e., less than the 25th percentile) or the SAST (i.e., two or more years behind), and who scored below the cut-offs on the KBIT-2 (i.e., less than 80) and SPM (i.e., below the 10th percentile) were classified into the LA group. In contrast, participants who also scored below the cut-offs on the PAT-R or the SAST, but scored above the cut-offs on the KBIT-2 and SPM were classified into the possible LDs group. Those participants who scored above specified cut-offs on the PAT-R and SAST were classified into the EA group.

Pearson’s chi-square test is used to examine the relationships between two dichotomous variables (Field, 2005). However, the chi-square test is based on the assumption that expected frequencies should be greater than five. Given the small sample size in study one, this assumption was not satisfied. As such, crosstabulations were used to assess the correspondence between intelligence screening tests and comprehensive intelligence assessments without a significance test.

**Study Two**

In contrast to the small sample size in study one, there were sufficient participants in study two to use Pearson’s chi square statistic to test the correspondence between intelligence measures. Independent groups t-tests and one-way MANOVA tests were used to examine whether there were significant differences in mean levels of coping resources
and coping outcome at time 1 between students classified with possible LDs and students with expected achievement. Time 2 data were analysed using MANCOVA tests, which controlled for the time 1 variables. Furthermore, SEM was used to test a proposed model of coping resources in which the relationship between external resources and coping styles would be mediated by internal resources, and, in turn, coping styles would predict inability to cope.

Structural equation modelling is a collection of statistical techniques that allows relationships between one or more independent variables and one or more dependent variables to be examined (Ullman, 2006). These variables can be either measured variables (observed variables, indicators, manifest variables) or factors (latent variables, constructs, unobserved variables). Structural equation modelling has been described as a combination of factor analysis and path analysis (Weston & Gore, 2006). For instance, SEM can be used to examine how items on a scale relate to a particular construct or how different constructs relate to each other. It has a number of advantages over other techniques such as exploratory factor analysis (EFA), multiple regression (MR) and analysis of variance (ANOVA), including: (a) the ability to estimate and model measurement error; (b) the ability to estimate complex relationships between multiple independent and dependent variables simultaneously; and (c) the ability to evaluate model fit using test statistics and model fit indices (Ullman, 2006; Weston & Gore, 2006).

Ullman (2006) outlined four steps involved in using SEM, including: (a) model specification; (b) model estimation; (c) model evaluation; and (d) model modification. The next section describes these four steps.

**Model specification**

Model specification involves stating the hypotheses to be tested in the model, which are often represented in a path diagram. There are two main components of the structural equation model that need to be specified: (a) the measurement model; and (b) the structural model. The *measurement model* refers to the relationships between observed variables (e.g., items on a scale) and latent variables (e.g., constructs). The *structural model* relates to
relationships between latent variables. According to Anderson and Gerbing (1998), it is important to deal with issues in the measurement model before examining relationships in the structural model, a process known as the two-stage approach. Although some researchers argue that the measurement model cannot be disentangled from the structural model (Hayduk & Glaser, 2000), an advantage of separating the structural equation model into the measurement and structural models and systematically testing each model is that it allows sources of measurement misfit to be identified (Mulaik & Millsap, 2000). As such, this two-stage approach was used.

The purpose of specifying a full measurement model was to examine whether indicators contributed uniquely to the latent variable they were hypothesised to represent (i.e., unidimensionality), and whether latent variables in the model were statistically distinct from each other (i.e., discriminant validity) (Anderson & Gerbing, 1998). This is a necessary step to assign meaning to estimated constructs in the model. Scree plots and one-factor congeneric models were used to assess whether variables were unidimensional. One-factor congeneric models are the simplest measurement models and are used to examine how observed variables are related to a single latent variable. Additionally, confirmatory factor analysis (CFA) was used to test the factor structure of coping. The results from the one-factor congeneric models and CFA models were used to specify an independent-cluster measurement model.

Measurement Invariance

Measurement invariance refers to the relationships between latent variables and indicators and whether these relationships are the same for different groups (Kline, 2005). There are different levels of invariance ranging from configural invariance to fully invariant measures. It is important to establish measurement invariance at the scalar level to ensure that underlying constructs have the same meaning for different groups and thus allowing mean comparisons between groups.

Vandenberg and Lance (2000) describe a series of steps for testing measurement invariance. The first step is to perform an omnibus test of the equality of variances and
covariances, which determines whether the variances and covariances for each group are drawn from the sample population. If the difference in \( \chi^2 \) statistic (\( \Delta \chi^2 \)) is not significant, then the variance and covariances are equivalent across groups. Alternatively, if the \( \Delta \chi^2 \) statistic is significant, additional testing is needed. The second step is a test of configural invariance. This tests whether the factor structure is the same for each group where a non significant \( \Delta \chi^2 \) statistic indicates that the factor structure is equivalent across groups. A third test is the metric invariance test, which tests whether the factor loadings are the same across groups. If the \( \Delta \chi^2 \) statistic is significant, then the factor loadings are not equal across groups. The fourth step is a test of scalar invariance. This tests whether the intercepts of regressions of similar items on latent variables are equivalent across groups. If the \( \Delta \chi^2 \) is significant, then equality of intercepts does not hold and mean differences should not be used. In contrast, if the \( \Delta \chi^2 \) statistic is not significant, then mean comparisons between groups are valid. The final step is the invariance uniqueness test, which tests whether measurement errors are equivalent across groups. Again, if the \( \Delta \chi^2 \) statistic is significant, then error variances are not equal across groups. The independent-cluster measurement model was tested for scalar invariance across students classified with possible LDs and students with expected achievement in the current study.

**Structural model**

A proposed model of coping resources that predicts the outcome of coping was specified and included both direct effects and indirect effects. A direct effect describes the relationship between a latent variable and another latent variable (path coefficient), while an indirect effect refers to the relationship between two variables through a third intervening variable and potentially mediating variable. The total effect is the sum of the direct and indirect effects. It was hypothesised that relationships between external resources (student engagement and family cohesion) and coping styles (productive and non-productive coping) would be mediated by internal resources (external control and internal control), and, in turn, coping styles would predict not coping.

There is a comprehensive literature on the different methods for testing mediational models (Baron & Kenny, 1986; Cole & Maxwell, 2003; Frazier, Tix, & Barron, 2004;
According to MacKinnon et al. (2002), the most common approach to testing mediation is the causal steps approach (see Baron & Kenny, 1986). The first step of this approach is to establish a significant relationship between the independent variable, X, and the dependent variable, Y. The second step is to show that there is a significant relationship between X and the mediator, M. The third step is to demonstrate that M is significantly related to the Y. The final step is to show that the strength of the relationship between the X and Y reduces or is no longer significant when M is added to the model.

Another approach to test mediation using cross-sectional data is the \( \Delta \chi^2 \) test. For instance, the \( \Delta \chi^2 \) test is used to evaluate nested models, which refers to those models that are a subset of a larger model (Ullman, 2006). The test involves subtracting the \( \chi^2 \) value and degrees of freedom of one model from that of a second model. For example, \( \Delta \chi^2 \) can be used to test for mediation where the \( \chi^2 \) value and degrees of freedom of the reduced or mediating model is subtracted from the \( \chi^2 \) value and degrees of freedom of the full model. A non-significant \( \Delta \chi^2 \) test indicates that the mediating model provides a better fit to the data. In contrast, a significant \( \Delta \chi^2 \) test implies that the full model is the better fitting model. The \( \Delta \chi^2 \) test will be used in this study to test for mediation using the cross-sectional data.

A limitation of the causal steps approach is that it is based on a cross-sectional design and does not provide a clear method for testing mediation using longitudinal designs (Cole & Maxwell, 2003). This is despite mediation being a series of causal steps which assumes that in order for one variable, X, to cause another variable, Y, the variable X must precede Y in time (Kline, 2005). According to Cole and Maxwell (2003), longitudinal designs provide a more rigorous test of mediation as longitudinal designs allow for prior levels of the dependent variable to be controlled. Hence, Y must precede M in time, and M must precede X in time. However, it is often the case that M and Y are rigorously tested, but X and M are tested at the same time. This is referred to as a half-longitudinal design. When testing two waves of data, Cole and Maxwell (2003) recommended that paths from X1 to M2 (controlling for M1) and from Y2 to M1 (controlling for Y1) need be specified. Although this approach can test whether M is a partial mediator, it does not test whether M
fully mediates the relationship between X and Y. Despite this limitation, failing to control for prior levels of dependent variables is considered a more serious problem (Cole & Maxwell, 2003). As such, this approach was used in this study to test for mediation using longitudinal data.

**Model Estimation**

After the model specification is completed, the parameters in the model are estimated. There are numerous estimation techniques in SEM, including maximum likelihood (ML), least squares (LS), unweighted LS, generalised LS and asymptotic distribution free (ADF; Weston & Gore, 2006). The ML estimation technique is the most widely used technique and assumes that measured variables are continuous and multivariately normally distributed (Tabachnick & Fidell, 2006). It is based on parameter estimates that maximise the likelihood that data were drawn from the population (Kline, 2005).

**Response format**

There is a considerable amount of research on the use of different response formats and how this impacts the reliability and validity of different scales (Lozano, Garcia-Cueto, & Muniz, 2008; Muniz, Garcia-Cueto, & Lozano, 2005; Weng, 2004). For instance, simulation studies have shown that as the number of response categories increases, so does the reliability and validity (Lozano et al., 2008). As such, response formats between four and seven points are preferred where one of the widely used response formats is the Likert-type format (i.e., strongly disagree, disagree, undecided, agree, strongly agree). In this study, the scales used were dichotomous, four-point and five-point ordinal scales. However, since ordinal data is not continuous data, this issue needs to be addressed.

One approach to dealing with ordinal data is item parcelling (Bandalos, 2002; Little, Cunningham, Shahar, & Widaman, 2002). Item parcelling is a measurement practice that involves summing or averaging item scores from two or more items of a construct and using these parcel scores as indicators of the construct (Bandalos, 2002). According to Little et al. (2002), item parcels have more scale points and less distribution violations.
compared to individual items, which makes this form of data suitable for SEM. Bandalos (2002) conducted two simulation studies to investigate the effects of item parcelling on parameter estimates and model fit indices. The results showed that using parcels (2 items, 4 items, 12 items) resulted in less parameter bias and better model fit compared to using individual items. Hence, it was concluded that parcelling can ameliorate the effects of ordinal item level data when the item parcels are unidimensional.

The method for constructing parcels depends on whether the factor is unidimensional or multidimensional. For unidimensional factors, parcels can be constructed by randomly assigning items into three or four parcels. In contrast, parcels for multidimensional factors can be constructed either by internally consistent parcels based on subscales or by domain representative parcels in which items from these subscales are dispersed across the different parcels (Kishton & Widaman, 1994). According to Bandalos (2002), the use of a dispersed method of item parcelling resulted in upwardly-biased factor loadings. The current research used internally consistent parcels as indicators of Student Engagement, Productive and Non-productive Coping. Scree plots and one-factor congeneric models were conducted for all item parcels to ensure that each parcel was unidimensional.

Another method for dealing with ordinal data is the use of single indicator latent variables. Sass and Smith (2006) found that when a latent variable is measured using a unidimensional scale, the use of individuals items, item parcels or single indicator latent variables will produce identical structural path coefficients. Therefore, in this study, single indicator latent variables were used when latent variables were unidimensional.

**Model Evaluation**

Following the model specification and estimation, how well the model fits the data needs to be evaluated. Model fit can be evaluated in terms of the significance and strength of estimated parameters, the variance explained in the dependent variables and the values of test statistics and fit indices (Weston & Gore, 2006). The chi-square statistic ($\chi^2$), which measures discrepancies between the sample covariance matrix and the implied covariance
matrix, is the most cited fit index. A non-significant χ² indicates the model fits the data well. Yet one limitation of this χ² statistic is that it is sensitive to large sample sizes (Kline, 2005). For instance, studies using large sample sizes are more likely to find a significant χ² statistic, indicating a significant difference between the sample covariance matrix and the implied covariance matrix.

One method to address this problem has been the use of multiple fit indices, which provide a measure of approximate fit. There has been considerable and ongoing debate in the literature about the use of model fit indices (see special issue on Structural Equation Modelling, Vernon & Eysenck, 2007). While some researchers argue that model fit indices are not tests of model fit and should not be reported (Barrett, 2007), others argue that there is a role for model fit indices and recommend that model fit indices should be reported (Bentler, 2007; Markland, 2007). In particular, when the χ² statistic is not significant, then these other measures provide an indication of closeness of fit provided that the reason for this is not related to departures from the multivariate normality assumption.

Three approximate fit indices have been consistently recommended (Bentler, 2007; Ullman, 2006; Weston & Gore, 2006), namely the Root-Mean Square Error of Approximation (RMSEA), the Standardised Root Mean Square Residual (SRMR) and the Comparative Fit Index (CFI). The first two are residual fit indices, which mean that these fit indices provide a measure of the difference between the sample covariance matrix and the implied covariance matrix. The RMSEA estimates the lack of fit in model compared to a saturated model where a value closer to 0 indicates better model fit. It also adjusts for model complexity by including a correction for model complexity in the formula. The SRMR is based on transforming the sample covariance matrix and implied covariance matrix into correlation matrices and measuring the average difference between the sample and predicted correlations with smaller values indicating better fit. The CFI is an incremental fit index and assesses the fit of the model compared to a null model. Scores on the CFI range from 0 to 1 where values closer to 1 indicate better fit.
Although guidelines for model fit exist, there is debate about what cut-off values should be used to indicate acceptable model fit (Marsh, Hau, & Wen, 2004). Previous guidelines for acceptable fit have included a RMSEA < .10, SRMR < .10 and CFI > .90 (Bentler, 1995). More recently, minimum cut-off values have included RMSEA < .06, SRMR < .08 and CFI > .95 (Hu & Bentler, 1998). However, these recent cut-off values are more appropriate for sample sizes of \( N = 500 \) or more since it has been shown that sample size and model complexity affect cut-off values (Weston & Gore, 2006). It should also be noted that the RMSEA value can be misleading in small samples (Kenny, 2010). The RMSEA value is calculated by taking the square root of the value obtained when subtracting 1 from the \( \chi^2 \) value divided by the degrees of freedom, and dividing this value by the sample size minus one. For example, a \( \chi^2 \) value of 3.83 with a df of 1 (which is not significant) in a sample size of \( N = 100 \) yields a RMSEA value of .169, which indicates poor fit. However, these same \( \chi^2 \) and df values in a sample of 500 produce a RMSEA value of .075, indicating reasonable fit. Therefore, because of the small sample size in this study, criteria to indicate model fit will be RMSEA < .08, SRMR < .08 and CFI > .90, but it is important to be mindful that RMSEA values may occasionally exceed this value.

**Model modification**

Models are modified to improve model fit or to test new hypotheses. This involves estimating new relationships in the model, or deleting existing relationships from the model. Two statistics were used in the current study to locate model misfit, namely: (a) standardised residuals; and (b) modification indices. Standardised residuals values greater than a magnitude of 2 indicate that the model does not explain a particular covariance that exists between a pair of observed variables (Byrne, 2001). Modification indices reveal the expected minimum decreases in the \( \chi^2 \) value when specific parameters are freed to be estimated. For instance, a change in \( \chi^2 \) value of 3.84 (the critical \( \chi^2 \) value for 1 degree of freedom) indicates a significant improvement in model fit (Byrne, 2001). However, these cut-off values are appropriate for one-factor models. For larger models, a standardised residual value of greater than a magnitude of 2.58 and a change in \( \chi^2 \) value of greater than 10.00 for one degree of freedom is utilised as it takes into consideration type I error.
Importantly, it should be noted that modifications to the theoretical model were only made if changes were theoretically meaningful.

Assessment of model fit for the current research

It was decided to use the following criteria to indicate adequate model fit. If the $\chi^2$ statistic was non-significant, then the model provided a good fit to the data. However, if the $\chi^2$ statistic was significant, the following approximate fit indices were then used: RMSEA < .08, SRMR < .08 and CFI > .90. In addition, standardised residuals and modifications indices were checked for values greater than a magnitude of 2.00 and 3.84 respectively for one-factor models, and values greater than a magnitude of 2.58 and 10.00 for multi-factor models. Furthermore, an adjustment to the $\chi^2$ statistic was used, namely the Bollen-Stine bootstrap $p$, when the assumption of multivariate normality was violated.

Chapter summary

This chapter has discussed the conduct of the studies, including the details of the participants and the instruments used. For instance, the first study involved a sample of TAFE students who were administered standardised educational tests, intelligence screening tests and a comprehensive intelligence assessment. The aim was to examine the correspondence between intelligence screening tests and comprehensive intelligence assessments. The same screening tools were administered to sample of Years 5 and 6 students from Victorian Government schools in study two. In addition, a questionnaire that comprised measures of student engagement, family cohesion, external control, internal control and coping style was administered twice over the school year. The statistical analyses have also been outlined in this chapter, including the use of crosstabulations to examine the correspondence between intelligence tests, the use of t-tests and MANOVAs to compare mean scores between students classified with LDs and students and their peers and SEM to establish a measurement model and test a structural model. The results from study one are presented in the following chapter.
Chapter 5: Results from study one

Introduction

In Chapter 2, it was argued that the administration of comprehensive individual intelligence tests for the purpose of determining students with learning disabilities (LDs) is frequently time-consuming, expensive and impractical. These assessments can take up to three hours to complete, cost hundreds of dollars per assessment and must be administered on a one-on-one basis by a registered psychologist. Moreover, the results from these assessments are often not transferred to classroom teachers or are presented in a manner that classroom teachers are not able to comprehend and utilise. Therefore, it was argued that the use of comprehensive individual intelligence tests as part of a LD assessment is not appropriate for assessing intelligence in mainstream schools, especially in the first instance.

This chapter examines alternative methods for screening students for LDs using teacher administered educational and intelligence tests. Standardised educational tests were administered to students to detect low achievement in reading and spelling. These same students were then administered intelligence screening tests in class groups and individually in order to determine whether they were in the normal range of intelligence. Students who were found to have low educational achievement and were not below average in intelligence were classified as demonstrating unexpected underachievement due to the presence of possible LDs. The classification of students using these approaches was then compared to the determinations of students with LDs based on an independent, comprehensive intelligence assessment administered by a registered psychologist. A substantial correspondence in the classification of students between the two assessments would indicate that teacher administered screening tools may be a valid way of screening students for possible LDs in mainstream schools.

The results from study one are presented in four sections. In the first section, selected observations from the administration of the individual intelligence screening test (i.e., KBIT-2), reading accuracy tasks and handwriting samples are documented. The second section presents the scores from the educational tests, intelligence screening tests and comprehensive intelligence assessments. In the third section, the results from
crosstabulations examining the correspondence between intelligence screening tests and comprehensive intelligence assessments are reported. The proportion of students classified into the low achievement group, possible LDs group or the expected achievement group using comprehensive intelligence assessments and intelligence screening tests are presented in the fourth section.

**Sample Recruitment**

The costs associated with independently assessing participants via comprehensive intelligence assessments meant that it was not feasible to obtain a large sample for the current study. Indeed, one of the difficulties of conducting research in the area of LDs is finding a sample of students with LDs. Typically, this type of research would involve assessing a large sample of students in order to identify a small cohort of students with LDs. However, according to Neuman (2006), a researcher may use purposive sampling, or selecting cases with a specific purpose in mind to select members of a difficult to reach population such as students with LDs. Hence, the uniqueness of this particular sample should not be underestimated.

Participants involved in the current study were enrolled in a program for students who had dropped out of school and were suspected as having LDs. However, students who have experienced years of unexpected underachievement are often resistant to any form of assessment which may highlight their learning problems. Hence, prior to the study, the students enrolled in this program attended a two-day camp about LDs. At this camp, a guest speaker spoke to the students about his personal experience with LDs and the importance of its identification. Students also engaged in a number of activities aimed at developing coping strategies to succeed in tertiary education. It was only after this camp that most of the students were comfortable to talk about LDs and were open to the idea of taking part in this study.

This difficult-to-find population, albeit small, presented an ideal sample to trial a set of teacher administered intelligence tests and compare them with an independent comprehensive intelligence assessment undertaken by educational psychologists. A
substantial correspondence between the two assessments would indicate that teacher administered screening tools may be a valid way of screening students for possible LDs in mainstream schools.

Following the two-day workshop, participants were recruited via letters sent to all parents of students under 18 years of age who were enrolled in a Technical and Further Education (TAFE) program for school dropouts to return to education. Students for whom parent consent had been obtained gave their assent to complete the tests that formed part of this study. Participants over the age of 18 years also gave their consent to participate in the study. The response rate from the parents and students was over 90 percent. Data were collected from 27 participants. However, data from three participants were excluded because these students were identified as having severe emotional problems during the comprehensive intelligence assessment and the definition of LD excludes emotional disturbance as a possible cause of LD. Two participants were also excluded because they were absent during the administration of both educational tests. The final sample comprised 18 males (82%) and four females who ranged in age from 15 to 18 years ($M = 16.37$ years, $SD = .71$ years). Over 40 percent of participants were enrolled in a media course, a further 36 percent were enrolled in a trade course and the remaining were enrolled in a hospitality course. Participants were almost exclusively from Anglo-Saxon backgrounds and came from a rural part of Victoria, which is a low to middle socio-economic area.

Data Collection

The total time taken for all testing, including the administration, scoring, interpretation and report writing was around three months. Participants completed two educational tests, namely the PAT-R (ACER, 2001) and the SAST (Westwood, 2005), a comprehensive intelligence assessment including either the WISC-IV (Wechsler, 2003) or WAIS-III (Wechsler, 1997), and two intelligence screening tests, the KBIT-2 (Kaufman & Kaufman, 2004) and the SPM (Raven et al., 2000). Participants were group-administered the educational tests and the SPM by their classroom teacher. This was followed by the administration of the KBIT-2. While the KBIT-2 could readily be administered by a classroom teacher, in this study it was individually administered by either the author or by
another PhD candidate in psychology because the classroom teachers had not completed the additional training needed to administer the KBIT-2. This training relates to administering, scoring and interpreting standardised tests used in special education.

Additional information was also collected, including informal measures of reading accuracy and a handwriting sample. This additional information was used to support the identification of possible LDs. For instance, the assessment of reading accuracy involved the participant reading aloud one of the passages from the PAT-R to a teacher where the teacher noted which words were pronounced incorrectly or were skipped altogether. It was expected that students with LDs would make more reading errors compared to students with expected achievement. A handwriting sample was also obtained to inspect legibility, spelling, punctuation and grammar.

Following the educational and intelligence tests, participants were then independently assessed for LDs using a comprehensive intelligence test that was administered by registered educational psychologists. Depending on their age, participants were administered either the WISC-IV or WAIS-III. Younger participants completed the WISC-IV. The results for each student were presented in an individual report that included scores for the FSIQ, the VIQ and PIQ for the WAIS-III and the four index scores for the WISC-IV. Reports also included discussion and suggestions sections in which the discussion section provided an interpretation of the scores and the suggestions section offered educational recommendations.

**Selected observations from the administration of the KBIT-2**

Prior to administering the KBIT-2, time was spent trying to establish rapport with the participant. In many cases, this was quite a difficult task given that some participants were resistant to testing yet were indicating willingness to participate in the study. During the rapport building stage and the actual administration of the KBIT-2, a number of observations highlighted the difficulties associated with individual assessments for LDs in a group of disengaged youth. Specific observations included the following:
One of the participants appeared to experience substantial word retrieval problems. When asked the question, what do you call a painting of a person? the participant responded by saying “port, port, portograph…uh passport”. The participant noted how frustrating it was to know the answer was portrait but not be able to say it. He also shared that finding the correct word to say was an ongoing problem and that “sometimes I don’t know why I bother”.

During the assessment, another of the participants declared “sorry, I can’t concentrate well”. In fact, the time taken to administer the KBIR-2 to this participant was substantially longer compared to the other participants as regular breaks were required to keep the participant engaged.

One participant commented during the presentation of the non-verbal subtest that „things on the page were starting to move”. The participant was questioned as to whether or not he needed glasses. He responded by saying that his eyesight had been tested on a number of occasions and that “there is nothing wrong with my eyes”.

Initial resistance to the one-on-one testing that is required for the KBIT-2 administration was common amongst the participants. The participant who was possibly the most resistant to testing, walked into the room, sat down with his arms crossed and did not make eye contact with the tester. When asked about secondary school, he was quick to respond that he did not enjoy school and particularly disliked the teachers. It was only after a conversation about horses that the participant relaxed and was open to the assessment. However, this process of establishing some rapport before testing was quite time consuming. This might highlight that teachers who already have relationships with students might be in a better position to administer the KBIT-2. Furthermore, at the conclusion of one of the assessments, one of the testers said to a participant that “you are a smart young man and I wish you all the best in your studies at TAFE”. After hearing this comment, the participant became visibly emotional and responded by saying “nobody has ever called me smart before”.
The selected observations underscore the difficulties associated with individual assessments for LDs. These include the difficulty establishing rapport with participants who may be opposed to such testing, the difficulty encouraging participants to persist with challenging tasks and the emotional sensitivity and vulnerability of the participants who have underachieved at school. The next section will highlight a selection of errors from the informal reading and handwriting assessments.

**Selected reading accuracy errors**

Some of the reading accuracy errors noted by the teachers during the informal reading task are displayed below:

One of the participants read the word “setting” as “sitting”, “descended” as “discovered”, “bearing” as “during”, “journal” as “general” and “suggest” as “succeed”.

Another participant read the word “generally” as “gangrally”, “paler” as “plain”, “addition” as “addiction”, “descended” as “discarded” and “bearing” as “bringing”. “paler” as “pearl”, “plain” as “plan”, “confident” as “confirmed”, “sought” as “shout” and “partly” as “practically”.

One of the participants read the word “generally” as “gentry”, “addition” as “addiction”, “there” as “they”, “even” as “ever”, “descended” as “decided” and “century” as “cemetery”.

Another participant read the word “setting” as “starting”, “confident” as “confined” and “sought” as “south”.

A participant read “officers” as “offence”, “paler” as “pearl”, “sight” as “sign” and “excitement” as “extreme”. He also omitted two sentences during the reading exercise.

One participant read the word “addition” as “aditon”, “far” as “fair”, “sound” as “sand”, “sighted” as “straight”, “descended” as “destiny”, “filled” as “failed”,
From these observations, it is clear that a number of students experienced substantial reading accuracy difficulties. This is indicative of the specific LD known as dyslexia, which is characterised by inaccurate word reading. Such difficulties are also likely to hamper reading comprehension.

**Selected handwriting samples**

Each of the handwriting samples were inspected for legibility, spelling, punctuation and grammar. A selection of the samples is provided:

“In the future I hope to be a machanice”

“Im doing [the program] year a and the and when I finish I wont to go and do car machenic”

“Im doing trade this year and I hope to do leandscapeing and own my own busness”

“I go to TAFE to lern trades and to help to get me an apreniship….I injoy TAFE veary much”

“As Im not shore of what I want to do when I’m older…I’m sticken at my curnt job to work my way up”

“Im doing meida”

“Im doing the trade class her at TAFE… I would like to be a machanic in the army”

“I would like to be a macanic and do an aprenaship”
These observations highlight some of the spelling and writing difficulties experienced by participants. In particular, handwriting samples consisted of poor spelling and grammar, mistakes in punctuation (e.g., omitted apostrophes) and inappropriate letter sizes and shapes. Taken together, information from the observations and handwriting samples provide supporting evidence for possible LDs in reading, spelling and writing.

**Correspondence between comprehensive intelligence assessments and intelligence screening tests**

Scores on the educational tests, intelligence screening tests and comprehensive intelligence assessments were recoded into dichotomous variables with scores classified either below or above specified cut-off values. It is important to note that the SAST is based on a normative sample of 6 to 16 year olds. However, the current sample included participants who were older than 16 years. For this reason, it was not possible to use the spelling age cut-off of two or more years below chronological age for the older students. Given the mean age of the sample was approximately 16 years, a spelling age cut-off of 14 years (168 months) was used where scores below this cut-off indicated poor spelling. The specified cut-off values for each of the tests are shown in Table 2. For participants who were less than 16 years of age, the cut-off value was set at a spelling age that was two years below their chronological age.

The dichotomous variables were then used to allocate participants into one of three achievement groups, namely a low achievement (LA) group, a group of students with unexpected underachievement (i.e., possible LDs) and an expected achievement (EA) group. Specifically, participants who scored below the cut-offs on either the PAT-R or the SAST, and who scored below the cut-offs on the WISC-IV or WAIS-III were classified into the LA group. In other words, students who scored below the cut-offs on one or both the educational tests and the intelligence tests were classified as demonstrating expected low achievement. In contrast, participants who also scored below the cut-offs on the PAT-R or the SAST, but who scored above the cut-offs on the WISC-IV or WAIS-III were classified into the LD group. The discrepancy between intellectual ability and educational achievement was criteria for indicating unexpected underachievement.
Table 2

Specified cut-off scores for the Educational Tests, Comprehensive Intelligence Assessments and Intelligence Screening Tests

<table>
<thead>
<tr>
<th>Test</th>
<th>Cut-off</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAT-R</td>
<td>Less than 25&lt;sup&gt;th&lt;/sup&gt; percentile (normed)</td>
</tr>
<tr>
<td>SAST</td>
<td>Spelling age of 14 years</td>
</tr>
<tr>
<td>WISC-IV</td>
<td>Less than FSIQ of 80</td>
</tr>
<tr>
<td>WAIS-III</td>
<td>Less than FSIQ of 80</td>
</tr>
<tr>
<td>KBIT-2</td>
<td>Less than IQ composite score of 80</td>
</tr>
<tr>
<td>SPM</td>
<td>Less than 10&lt;sup&gt;th&lt;/sup&gt; percentile</td>
</tr>
</tbody>
</table>


Finally, participants who scored above specified cut-offs on the educational tests were classified into the EA group. The classification process was then repeated twice using firstly the KBIT-2 instead of the WISC-IV or WAIS-III as the measure of intelligence, and secondly using the SPM. The means and standard deviations for the reading, spelling and intelligence tests can be seen in Table 3.

Based on the specified cut-off scores (see Table 2), 45 percent of participants were identified with low achievement in reading comprehension on the PAT-R and 68 percent of participants identified with low achievement in spelling on the SAST. In total, 73 percent of participants were found to demonstrate low achievement in reading comprehension and/or spelling, which means that almost three quarters of the sample had substantial reading or spelling difficulties, or difficulties in both areas.

The results from the comprehensive intelligence assessments revealed that 15.4 percent and 14.3 percent were identified as having low intelligence on the WISC-IV and WAIS-III respectively. When combining these results, it was revealed that 15 percent of the participants did exhibit low intelligence based on their scores on the WISC-IV/WAIS-III. Moreover, nearly five percent of participants were identified with low intelligence on the
Table 3

*Means and Standard Deviations for the Educational Tests, Comprehensive Intelligence Assessments and Intelligence Screening Tests*

<table>
<thead>
<tr>
<th>Test</th>
<th>M</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAT-R</td>
<td>34.15</td>
<td>22.48</td>
<td>20</td>
</tr>
<tr>
<td>SAST</td>
<td>144.09</td>
<td>30.83</td>
<td>22</td>
</tr>
<tr>
<td>WISC-IV</td>
<td>92.08</td>
<td>9.60</td>
<td>13</td>
</tr>
<tr>
<td>WAIS-III</td>
<td>92.14</td>
<td>9.94</td>
<td>7</td>
</tr>
<tr>
<td>KBIT-2</td>
<td>92.14</td>
<td>8.61</td>
<td>22</td>
</tr>
<tr>
<td>SPM</td>
<td>42.86</td>
<td>6.22</td>
<td>21</td>
</tr>
</tbody>
</table>

*Note.* PAT-R = Progressive Achievement Test in Reading; SAST = South Australian Spelling Test; WISC-IV = Wechsler Intelligence Scale for Children – Fourth Edition; WAIS-III = Wechsler Adult Intelligence Scale – Third Edition; KBIT-2 = Kaufman Brief Intelligence Test – Second Edition; SPM: Standard Progressive Matrices. *** = p < .001; ** = p < .01; * = p < .05

KBIT-2 and almost 30 percent of participants identified with low intelligence on the SPM.

The results from crosstabulations that examined the correspondence between the combined WISC-IV/WAIS-III scores and the scores on the KBIT-2 and SPM are displayed in Table 4. As can be seen in Table 4, all of the participants who scored above the cut-off on the WISC-IV/WAIS-III also scored above the cut-off on the KBIT-2. However, two participants who scored below the cut-off on the WISC-IV/WAIS-III, scored above on the cut-off on the KBIT-2. These participants were classified as *false positives*, which suggests that these students would have been incorrectly classified as having possible LDs rather than demonstrating low achievement if the KBIT-2 was used as a measure of intelligence.

Three-quarters of the participants who scored above the cut-off on the WISC-IV/WAIS-III also scored above the cut-off on the SPM. However, not only were there two false positives using the SPM, the results also revealed four *false negatives* using the SPM where students that scored above the cut-off on the WISC-IV and/or WAIS-III scored below the cut-off on the SPM. These students would have been incorrectly classified in the low achievement group if the SPM was being used as a measure of intelligence, which has more serious implications that are addressed in the discussion.
Table 4

*A comparison between Scores on the Comprehensive Intelligence Assessments and Intelligence Screening Tests*

<table>
<thead>
<tr>
<th></th>
<th>WISC-IV / WAIS-III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Below cut-off</td>
</tr>
<tr>
<td><strong>KBIT-2</strong></td>
<td></td>
</tr>
<tr>
<td>Below cut-off</td>
<td>1</td>
</tr>
<tr>
<td>Above cut-off</td>
<td>2</td>
</tr>
<tr>
<td><strong>SPM</strong></td>
<td></td>
</tr>
<tr>
<td>Below cut-off</td>
<td>1</td>
</tr>
<tr>
<td>Above cut-off</td>
<td>2</td>
</tr>
</tbody>
</table>

*Note.* WISC-IV - Wechsler Intelligence Scale for Children – Fourth Edition; WAIS-III = Wechsler Adult Intelligence Scale – Third Edition; KBIT-2 = Kaufman Brief Intelligence Test – Second Edition; SPM: Standard Progressive Matrices. Sample sizes for the KBIT-2 and SPM were \( N = 20 \) and \( N = 19 \) respectively.

Further investigation of the indices from the WISC-IV/WAIS-III results was that participants who were found to be false negatives when including the SPM tended to score lower on the working memory index (WMI) and/or processing speed index (PSI) scores on the WISC-IV. Of the two false negatives, one participant had completed the WISC-IV, one had a WMI score of 86 and a PSI score of 68 compared a verbal comprehension index (VCI) score of 100 and a perceptual reasoning index (PRI) score of 104. The other participant had a WMI score of 77 and a PSI of 68 while scoring 95 and 102 on VCI and PRI respectively. The remaining two false negatives completed the WAIS-III and reported lower VIQ scores (86, 88) compared to PIQ scores (90, 95). Although the WAIS-III also has four index scores, some of the subtests (e.g., letter number sequencing, symbol search) that are used to form these scores were not administered. Thus, only the VIQ and PIQ scores were available. Taken together, these findings suggest that general intelligence scores from the screening tests may be affected by specific processes such as working memory and processing speed.
Group membership

On the basis of the specified cut-offs on the educational and intelligence tests, a large proportion of students were classified with possible LDs. This was the case when using either the comprehensive intelligence tests or the intelligence screening tests. As can be seen from Table 5, while 11 of the 20 (55.5%) students who completed the WISC-IV or WAIS-III were classified as having possible LDs 15 out of 22 students (68.2%) and 9 out of 21 students (45.5%) were similarly identified using the KBIT-2 and SPM respectively. There were also similar prevalence rates for the students identified with EA using the different intelligence measures (see Table 5).

Overall, the results of the first study showed that almost three quarters of the sample demonstrated poor reading and/or spelling. A comparison of the results from the intelligence screening tests and comprehensive intelligence assessments revealed a substantial correspondence between the tests. In particular, 94 percent and 75 percent of the sample who scored above the specified cut-off on the comprehensive assessment also scored above the cut-off on the individually-administered KBIT-2 and group-administered SPM respectively. This provides preliminary evidence for the validity of using the KBIT-2 and limited evidence for using the SPM as measures of intelligence for the screening of students with LDs.

Table 5

Proportion of Students classified into Low Achievement, possible Learning Disabilities and Expected Achievement groups

<table>
<thead>
<tr>
<th></th>
<th>WISC-IV/WAIS-III</th>
<th>KBIT-2</th>
<th>SPM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=20</td>
<td>N=22</td>
<td>N=21</td>
</tr>
<tr>
<td>LA</td>
<td>3</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Possible LDs</td>
<td>11</td>
<td>15</td>
<td>9</td>
</tr>
<tr>
<td>EA</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Note. LA = Low Achievement; LDs = Learning Disabilities; EA = Expected Achievement
Discussion

The aim of this study was to examine the validity of using teacher administered educational and intelligence tests to screen students for possible LDs. To this end, participants completed standardised reading and spellings tests, an individual and a group-administered intelligence test as well as a comprehensive intelligence assessment. Moreover, informal reading and handwriting assessments were also collected. The results showed a substantial correspondence between intelligence screening tests that can be administered by a classroom teacher and comprehensive intelligence assessments conducted by an independent registered psychologist. Based on these screening tools, as expected, it was found that a large proportion of the sample was identified with possible LDs.

The correspondence between the comprehensive intelligence assessments and intelligence screening tests is consistent with the findings of previous research (Canivez, 1996; Canivez et al., 2001). Canivez (1996) examined the concurrent validity of the K-BIT in a sample of 75 USA elementary school students with LDs and found a strong correlation ($r = .82$) between the IQ composite on the K-BIT and the FSIQ on the WISC-III. Canivez et al. (2001) examined the construct validity of the K-BIT and WISC-III in a sample of 278 USA schoolchildren receiving special education assessments and found a strong correlation ($r = .89$) between the two tests. The correspondence between the intelligence screening test and comprehensive intelligence assessments can be attributed to the fact that both provide measures of general intelligence, which can be defined as an underlying factor that explains behaviours on a range of ability tests (Kaplan & Saccuzzo, 2005). This explanation also applies to the SPM as it provides a measure of the educative component of general intelligence, which is the ability to forge new insights and identify relationships (Raven et al., 2000). Rogers and Holmes (1987) also found a strong correlation ($r = 0.80$) between the SPM and the WISC-R for a stratified sample of children aged between seven and 11 years. In sum, these results suggest that both the KBIT-2 and the SPM are measuring a similar construct as the WISC-IV and WAIS-III, namely general intelligence, and that these intelligence screening tests are valid measures of general intelligence.
Despite the substantial correspondence between the comprehensive assessments and screenings tools, there were some discrepancies (i.e., false negatives, false positives). Four false negatives were found using the SPM as a measure of intelligence. This implies that had the SPM been used as the sole measure of intelligence, these four students would have been incorrectly identified as having expected low achievement when, in fact, they demonstrated unexpected underachievement. This suggests that these students may be misidentified with generally low intelligence instead of having possible LD, which has serious implications. For instance, teachers may perceive these students as being less capable than what they actually are, which may translate to teachers providing inappropriate accommodations. For example, students with expected low educational achievement due to low intelligence may need modifications to their work to make it less challenging in order for students to be able to complete it. However, students with LDs do not need their work to be made easier. Instead, students with LDs need adjustments to be made to teaching methods and modes of assessment to make their work more accessible.

One explanation for these discrepancies relates to differences between general versus specific intelligences. For instance, the results of the current study showed that four students who were identified as false negatives reported lower working memory and processing speed index scores compared to their verbal comprehension and perceptual reasoning index scores. It is plausible that a very low score in a specific cognitive process would be enough to reduce the overall general intelligence score, which may cause a score to move from above to below the specified cut-off. In relation to the SPM, the ability to solve the visual puzzles may be affected by limited working memory and slow processing speed.

In support of this explanation, Fiorello et al. (2007) examined whether the WISC-IV was best represented as a general intelligence score or by specific index scores. In a sample of 221 participants identified with LDs, ADHD or Traumatic Brain Injury (TBI), Fiorelli et al. found that unique (i.e., specific) and not shared (i.e., general) variance explained more of the variance in FSIQ for children with LDs ($N = 128$). Moreover, children with LDs consistently scored lower on their working memory index and processing speed index.
compared to their scores on the verbal comprehension index and perceptual reasoning index. This is consistent with the findings of Mayes and Calhoun (2007) who compared WISC-III and WISC-IV predictors of LDs in a sample of 678 children with ADHD. Over 75 percent of the sample was identified with LDs, as they scored significantly lower on the WIAT subtests than predicted by their FSIQ. A discriminant function analysis revealed that working memory and processing speed were the strongest predictors of LDs. Hence, it appears that one of the limitations of using intelligence screening tests is that some of the variation in general intelligence can be explained by specific cognitive processes, and that low scores in a specific cognitive process such as working memory and processing speed can result in low scores on assessments such as the SPM.

In relation to the two false positives, it is less clear why students who scored below the cut-off on the WISC/WAIS also scored above the cut-off on the KBIT-2 and SPM. A false positive would mean that a student would be incorrectly identified with unexpected underachievement when he/she has actually shown low achievement. As there were only two false positives and no obvious trend in the results, a possible explanation is the presence of measurement error in psychological testing. For instance, classical test theory is based on the assumption that a person has a true score, which would be obtained if there were no errors in measurement (Kaplan & Saccuzzo, 2005). However, because measures are imperfect, there are differences between the true score and the observed score (Kaplan & Saccuzzo, 2005). The difference between the true score and observed score results from measurement error (Kaplan & Saccuzzo, 2005). Although both the K-BIT and SPM have robust psychometric properties (see Chapter 2) they still contain measurement error, which could account for the discrepancies between intelligence scores. This is not to imply that comprehensive intelligence tests such as the WISC-IV and WAIS-III do not include measurement error, but they are considered the „gold standard” of intelligence tests. As such, it would be reasonable to expect that there would be some variation in intelligence scores between the comprehensive intelligence assessment administered by a registered psychologist and the teacher administered intelligence screening test. However, these few discrepancies should not be taken as an argument for not utilising intelligence screening
tools. In contrast, a substantial correspondence between the comprehensive intelligence assessment and teacher administered intelligence tests was revealed.

It may be that teacher administered screening tools needs to be supplemented with some informal measures of reading, spelling and writing. The results from this study did include information from informal measures of reading accuracy and handwriting samples. This information was used to provide further evidence for the reading and spelling problems experienced by the participants. For instance, participants who scored below the cut-off on the reading comprehension test tended to demonstrate more reading accuracy errors. Also, participants who scored below the cut-off on the spelling tests also made various spelling errors in their handwriting sample. These observations could be used to provide further support for the decision to administer an intelligence screening test to a student in order to screen for possible LDs. Equally, the information from the informal measures could be used to inform teachers on the nature of the reading and spelling errors, which would influence the selection of appropriate accommodations.

Based on the results of the current study, the KBIT-2 is the preferred intelligence screening measure since it was associated with less false negatives compared to the SPM. However, it should be noted that this sample comprised older adolescents who had dropped out of school. Therefore, further comparisons are needed in a sample of primary school students to determine whether the KBIT-2 remains the preferred option for screening intelligence levels in mainstream classrooms.

**Limitations of the study**

Despite the importance of the findings, there were a number of limitations to the current study. The sample size was necessarily small. Accordingly, there were not enough participants in the study to use the Pearson’s chi-square test, which is the appropriate test for determining whether there is a significant relationship between two categorical variables (Field, 2005). According to Field, one assumption of the chi-square test is that expected frequencies should be greater than five. Although it is accepted that large samples can have up to 20 percent of expected frequencies below five, this is not the case for small
samples as the result is a loss of power. Since the findings relating to the correspondence between the comprehensive intelligence assessment and the intelligence screening tests are based on the relationship between two dichotomous variables, they need to be interpreted with caution.

It should be noted that screening students for possible LDs is not appropriate for students with other problems (e.g., emotional problems) who would require a formal psychological assessment. Three participants were identified in the current study with possible emotional disturbances and were subsequently omitted from the analysis. These students would require a registered psychologist to assess and discern between their educational and psychological issues in order to provide appropriate interventions and treatments for each. Importantly, it needs to be highlighted that skilled teachers are able to provide suitable educational interventions for students with LDs. However, teachers are limited in their abilities to assess and treat emotional problems. This would be the domain of a registered psychologist. Currently, students with suspected emotional problems by the teacher would be referred to a psychologist who would perform a clinical assessment.

Chapter summary

The results of this study found a substantial correspondence between intelligence screening tests and comprehensive intelligence assessments. Despite the presence of a small number of discrepancies, teacher administered intelligence screening tests provide a valid method of measuring intelligence as part of the screening process for students with possible LDs. This is especially the case for the KBIT-2. In other words, the use of teacher administered screening tools is a more feasible approach for assessing students for possible LDs. Further justification is needed to warrant the use of the SPM as an intelligence screening test in schools. The next chapter will use these same teacher administered educational and intelligence tests to screen students for possible LDs in a sample of Years 5 and 6 students drawn from Victorian government primary schools.
Chapter 6: Results from study two

Introduction

Several studies have examined the relationships between coping resources and how different coping resources influence coping styles for students in the general student population. However, there has been limited research focusing on the coping behaviours of students with LDs, especially for students in primary years in Australian schools. In Chapter 3, it was argued that students with LDs may experience adverse outcomes because they have fewer resources to invest in the coping process. Yet there is a paucity of research using regression or structural equation models to explain how coping resources influence the coping styles of students with LDs. In the previous chapter, it was argued that teacher administered educational tests and intelligence screening tests provide a valid method for screening students for possible LDs. Given the costs and practicalities, these same screening tools are used in this study to determine the prevalence of students with possible LDs.

There are five aims of this chapter. The first aim was to examine the correspondence between scores on the individually-administered and group-administered intelligence tests. The second aim was to determine the prevalence of students with possible LDs in the upper levels of Victorian Government primary schools using the teacher administered screening tools that were validated in the previous chapter. The third aim was to test the structure of coping and establish a full measurement model of important coping resources and outcome, namely student engagement, family cohesion, control-related resources, coping styles and not coping. The fourth aim was to examine mean differences in each of the coping resources and coping outcome between students classified with possible LDs and students with expected achievement. The final aim was to test cross-sectional and longitudinal meditational models of coping resources in which internal resources mediate the relationship between external resources and coping styles, and, in turn, that coping styles predict the outcome of not coping.

The chapter initially examines the correspondence between the individually-administered KBIT-2 and the group-administered SPM. On the basis of their scores from
the educational and intelligence tests, students were then classified into one of three groups, namely a low achievement group, a group of students with possible LDs and an expected achievement group. The structure of coping was tested and a measurement model for the constructs of interest in the study was established. An important goal was to examine whether indicators contributed uniquely to the latent variables they were intended to represent and whether latent variables were distinct from each other. After establishing a full independent-cluster measurement model, invariance testing was performed in order to test whether the relationships between latent variables and indicators were the same for the different groups of students. Following this, the chapter reports the results of mean comparisons between students with possible LDs and students with expected achievement for each of the coping resources and coping outcome. Finally, cross-sectional and longitudinal structural models are then tested. Consistent with the integrated theoretical model described in Chapter 3, a proposed model of coping resources was developed that hypothesised that student engagement would be positively associated with productive coping and negatively associated with non-productive coping. It was hypothesised that family cohesion would be positively associated with productive coping and negatively associated with non-productive coping. It was also predicted that external and internal control behaviours would be positively associated with productive coping and negatively associated with non productive coping behaviours. Furthermore, it was hypothesised that external and internal control would mediate the relationships between external resources and coping styles, and, in turn, that productive and non-productive coping styles would predict not coping. The chapter concludes by reporting the results of the cross-sectional and longitudinal structural models.

Method

Participants were recruited via consent forms sent to 577 parents from eight Government primary schools in two separate outer urban areas in Melbourne, Victoria. The response rate was 62%. All students also gave their assent to participate in the research. One hundred and fifty-three participants did not complete the educational tests, either because they were absent during the administration of the tests or because they had moved to secondary school and were unable to be re-tested. Of the 346 participants who completed
the educational tests, 14 did not complete the Time 1 questionnaire and 42 participants did
not complete the Time 2 questionnaire. Hence, the final sample comprised 290 participants
who ranged in age from 10.08 to 12.83 years ($M = 11.50$, $SD = .63$). Females comprised
51.7 percent ($n = 150$) of the sample and 49 percent of the sample ($n = 142$) were in Year 5.
Participants were from 26 classes across eight Victorian Government schools with an
average class size of 22 students.

Participants were group-administered the PAT-R and SAST by their respective
classroom teachers. Students who were found to have scored below the specified cut-offs
on the PAT-R and/or the SAST were also administered the KBIT-2 and SPM to determine
whether low achievement was unexpected. The SPM was group-administered by the
classroom teacher. Given that classroom teachers had not completed the additional training
needed to administer the KBIT-2, it was administered by either the PhD candidate in
psychology or a registered clinical psychologist. Scores on the educational tests and
intelligence screening tools were recoded into dichotomous variables with values classified
either below or above the specified cut-off values. The specified values were less than 25th
percentile on the PAT-R, two or more years behind chronological age on the SAST, an IQ
composite score greater than 80 on the KBIT-2 and less than the 10th percentile on the
SPM. Similar to study one, the dichotomous variables were used to allocate participants
into one of three groups, namely a group of students with low achievement, a group of
students with possible LDs and expected achievement group.

Participants also completed a questionnaire measuring different coping resources on
two occasions in the school year, once in either Term 1 or Term 2 and again in Term 3 or
Term 4 respectively. Questionnaires were administered to participants during school hours
by their classroom teacher. Instructions and questionnaire items were read aloud to the class
where participants could follow along with the class or proceed at their own pace.

Results

The results for this chapter are separated into six sections. The first section
describes the data screening and assumption testing. Since the study was a hierarchical
design, the next section examined the contribution of classroom and school level effects to the overall variance of the dependent variables in the model. In the third section, results from the educational tests and intelligence screening tests are presented. This includes the means, standard deviations, correlations and one sample t-tests. Based on these scores, students were classified into one of the three groups. Measurement models were then specified and evaluated using the baseline data in the fourth section, whereupon invariance testing was performed for the different groups of students. The fifth section compared mean differences in coping resources and the outcome of coping between students classified with possible LDs and students with expected achievement using independent group t-tests, multivariate analysis of variance (MANOVA) tests and multivariate analysis of covariance (MANCOVA) tests. Finally, cross-sectional and longitudinal structural models were specified where the relationships between external resources and coping styles were hypothesised to be mediated by internal resources, and, in turn, coping styles predicted not coping. These models were tested for both groups of students and the results reported.

Data screening and assumption testing

Prior to analysis, data were screened for out-of-range values, outliers and missing data (Tabachnick & Fidell, 2006). Frequencies and descriptive statistics were generated for each variable and a random sample of 10 percent of participants checked for data entry errors. Standardised z scores were produced for each of the coping resources to check for outliers and revealed no values greater than a magnitude of 3.29. Moreover, Mahalanobis distances were used to check for multivariate outliers. When a multivariate outlier was identified, analyses were conducted with and without the outlier to determine whether the presence of the outlier had a substantial effect on the results of the analyses. The decision was made to retain the outlier if it did not have a substantial effect on the results of the analyses.

The Missing Value Analysis, available in SPSS 16.0, was used to determine whether missing data from the questionnaires was missing completely at random (MCAR), missing at random (MAR) or missing not at random (MNAR). Little’s MCAR was interpreted at the $p < .001$ level because MCAR is a more rigid requirement than MAR.
The results showed that Little’s MCAR statistic was not significant, $\chi^2(19338) = 22651.97, p = .013$. Hence, the remaining cases were defined as at least MAR.

Twenty percent of participants in the sample did not complete both questionnaires. A one-way independent groups MANOVA found no significant difference between students who completed both Time 1 and Time 2 questionnaires and students who did not complete the Time 2 questionnaire, $Wilks’ \lambda = 0.94, F(16,243) = 1.03, p = .43$ in baseline levels of coping resources. Since those 56 students who did not complete both questionnaires had more than 25 percent missing data, they were subsequently deleted from further analyses. The amount of missing data for the remaining participants ranged from 0 to 11 percent with over 50 percent of participants found to have no missing data. In terms of the missing data for individual variables, 23 percent of the variables had no missing data, 33 percent of the variables had missing data from one participant, 22 percent had missing data from two participants, 13 percent of variables had missing data from three participants and 8 percent of variables had missing data from 4 participants. Two variables had missing data from 5 and 8 participants respectively. However, no variables had more than 8 participants with missing data. Participants with less than 25 percent missing data had their missing data replaced with the Expectation Maximisation (EM) algorithm available in SPSS Version 16.0.

Visual inspection of histograms and normality plots revealed relatively normal distributions for student engagement, family cohesion, internal control, productive coping, non-productive coping and not coping. However, the external control variable was found to be negatively skewed with skewness and kurtosis values of -1.31 ($SE = .14$) and 2.63 ($SE = .29$) respectively (see Figure 3). Transformations were used to attempt to rectify the problem, including the reflect and logarithm transformation and the reflect and inverse transformation, which are the specific transformations recommended for dealing
with substantial and severe negative skewness respectively (Tabachnick & Fidell, 2006). Despite this, in both cases, the transformed external control remained negatively skewed and was subsequently omitted from further analyses. Multivariate normality was assessed using Mardia’s Coefficient available in AMOS, which is just for multivariate kurtosis. For analyses where the assumption of multivariate normality was violated, the Bollen-Stine bootstrapping method available in AMOS was used to produce an adjusted model test statistic, the Bollen-Stine bootstrap $p$.

**Analysis of hierarchical effects**
A Variance Components Analysis (VCA) using Maximum Likelihood (ML) estimation was performed to estimate the contribution of classroom and school level effects to the explained variance on the dependent variables in the proposed model. The variables Class Group and School were selected as random-effects factors in order to measure the variance that is unique to the classroom and school levels, while the independent variables
for a given dependent variable were selected as covariates. For example, student engagement and family cohesion were independent variables when internal control was a dependent variable. The results are shown in Table 6.

As can be seen in Table 6, classroom level effects ranged from 0 to 4.47 percent and school effects ranged from 0 to 2.20 percent. Given that neither classroom level nor school level effects explained more than 10% of the variance in any of the dependent variables, the data were treated as independent observations.

**Scores on educational tests and intelligence screening tests**

One of the aims of the current study was to determine the prevalence of LDs in a sample of Years 5 and 6 students in Victorian Government schools. To this end, educational and intelligence screening tests were administered. The means, standard deviation and intercorrelations for the educational and intelligence screening tests are provided in Table 7.

The results from the educational tests found that 34.7 percent and 21.1 percent of participants scored below the specified cut-offs on the PAT-R and SAST respectively. These results indicate that almost 35 percent of students scored below the 25\textsuperscript{th} percentile on the PAT-R, highlighting an additional 10 percent of students who scored lower than expected, given the cut-off of the 25\textsuperscript{th} percentile. When combining the results of the reading

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>Classroom Effect</th>
<th>School Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Control</td>
<td>3.76%</td>
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</tr>
<tr>
<td>Productive Coping</td>
<td>0.71%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Non-productive Coping</td>
<td>4.47%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Not Coping</td>
<td>0.55%</td>
<td>2.20%</td>
</tr>
</tbody>
</table>

*N = 290*
Table 7

*Means, Standard Deviations and Inter-correlations for Educational and Intelligence Screening Tests*

<table>
<thead>
<tr>
<th>Tests</th>
<th>M</th>
<th>SD</th>
<th>N</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PAT-R</td>
<td>38.89</td>
<td>25.76</td>
<td>285</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. SAST</td>
<td>138.87</td>
<td>28.50</td>
<td>280</td>
<td>.55***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. KBIT-2</td>
<td>95.18</td>
<td>12.52</td>
<td>115</td>
<td>.49***</td>
<td>.31***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. SPM</td>
<td>39.31</td>
<td>7.64</td>
<td>164</td>
<td>.32***</td>
<td>.23**</td>
<td>.53***</td>
<td></td>
</tr>
</tbody>
</table>

*Note:* PAT-R = Progressive Achievement Test in Reading; SAST = South Australian Spelling Test; KBIT-2 = Kaufman Brief Intelligence Test – Second Edition; SPM: Standard Progressive Matrices. *** = p < .001; ** = p < .01; * = p < .05

and spelling tests, a total of 41.3 percent of participants were identified with low achievement in reading comprehension and/or spelling. Correlations between the educational and intelligence tests revealed a moderate strength association between scores on the PAT-R and scores on the SAST, a weak to moderate association between scores on the PAT-R and scores on the KBIT-2 and a weak association between the scores on PAT-R and scores on the SPM. Weak correlations were found between scores on the SAST and scores on the KBIT-2 and the SPM. Furthermore, a moderate strength association was found between scores on the KBIT-2 and scores on the SPM.

Four one-sample t-tests were conducted to compare the performance of participants on the educational and intelligence tests with published norms. This was designed to provide an indication of the representativeness of the sample. The mean PAT-R score of 38.89 for participants in the current study was found to be significantly lower than the mean score (M = 54.40) from the published norms, $t(284) = 10.16, p < .001$. The mean IQ composite score on the KBIT-2 for participants was also found to be significantly lower than the mean IQ composite (M = 101) expected for individuals at this age, $t(114) = 4.99, p < .001$. Furthermore, the mean raw score on the SPM for students in the current study was significantly lower than the normed mean raw score for individuals at this age, $t(163) = 4.51, p < .001$. No significant difference was found between the mean spelling age for participants and the normed mean spelling age (M=134.40) for students at the same chronological age, $t(280) = -.63, p = .51$. From these results, participants in the current
study reported lower levels of reading comprehension and general intelligence compared to published norms.

**Correspondence between individually- and group-administered intelligence tests**

A substantial correspondence was found between scores on the KBIT-2 and scores on the SPM. Based on the specified cut-off values, a Pearson’s $\chi^2$ test revealed a significant relationship between the two intelligence measures, $\chi^2(1) = 12.91$, $p < .05$ (see Table 8). Given that 94 of the 103 participants were similarly classified using the individual and group-administered intelligence screening tests, it was decided that the group-administered SPM does provide a valid measure of intelligence and is the preferred option to screen students for possible LDs as it is a more practical, less expensive and less time-consuming method for screening students for possible LDs compared to individual testing.

**Group membership**

Of those students who scored below the specified cut-offs on one or both educational tests, 7.6 percent of participants scored below the specified cut-offs on the SPM and were classified in the LA group, while 33.4 percent scored above the specified cut-off on the SPM and were classified in the possible LDs group. Over half of the participants (58.4%) scored above the specified cut-offs on the educational tests and were classified in the EA group. The remaining participants (1.4%) could not be classified because they had

<table>
<thead>
<tr>
<th>Table 8</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A Comparison between Scores on the Individually-administered Intelligence Test and Scores on the Group-administered Intelligence Test</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Below cut-off</td>
</tr>
<tr>
<td>Above cut-off</td>
</tr>
</tbody>
</table>

not completed either of the intelligence screening tests. Thus, the findings from the teacher administered screening tools indicated that around one-third of participants demonstrated unexpected underachievement in reading or spelling, or both, which is indicative of possible LDs.

An important issue to consider was the inclusion of students who speak English as a second language (ESL) in the sample. As mentioned in Chapter 4, one of the clusters from which the sample was drawn contained students with ESL, while the other cluster consisted of predominantly students from Anglo-Saxon backgrounds. A Pearson’s $\chi^2$ test was performed to examine whether the cluster location was associated with the classification of students into groups. The resulted revealed no significant relationship, $\chi^2(2) = .28, p = .872$. Participants from the cluster containing students with ESL were no more likely to be classified with possible LDs than participants from the cluster including students with predominantly an Anglo-Saxon background. The next section documents the results pertaining to the coping behaviours of students with possible LDs.

**Unidimensionality of measures**

The main purpose of this chapter was to examine the coping behaviours of students with possible LDs by testing a proposed model of important coping resources using SEM. Prior to testing a structural model, it was important to specify a measurement model in order to assign meaning to the constructs (Anderson & Gerbing, 1998). Moreover, a measurement model also enables sources of misfit in the model to be identified due to operationalisation of the constructs (Mulaik & Millsap, 2000). For the current study, scree plots and one-factor congeneric models were specified to determine the unidimensionality of the latent variables with at least a five-point response scale.

**Student engagement**

The four variables associated with student engagement, namely peer connectedness, teacher connectedness, school connectedness and motivation were assessed for unidimensionality. A one-factor congeneric model with four items was specified to measure peer connectedness and found the data fit the model well, $\chi^2(2) = 2.26, p = .324$, SRMR
For teacher connectedness, a five-item one-factor congeneric model provided a good fit to the data, \( \chi^2(5) = .75, p = .980, \text{SRMR} = .007, \text{RMSEA} = .000 \) and CFI = 1.000. The data was also found to fit the one-factor congeneric model with four items for school connectedness, \( \chi^2(2) = 14.60, \text{Bollen-Stine } p = .035, \text{SRMR} = .023, \text{RMSEA} = .148 \) and CFI = .983. Furthermore, a four-item one-factor congeneric model for motivation provided a good fit to the data, \( \chi^2(4) = 13.42, \text{Bollen-Stine } p = .077, \text{SRMR} = .030, \text{RMSEA} = .141 \) and CFI = .976. In all four models, factor loadings were significant and ranged from 0.43 to 0.84 for peer connectedness, 0.59 to 0.77 for teacher connectedness, 0.77 to 0.89 for school connectedness and 0.64 to 0.83 for motivation. Cronbach’s alpha internal consistency reliabilities for peer connectedness, teacher connectedness, school connectedness and motivation were 0.67, 0.79, 0.90 and 0.84 respectively. Given that each of these variables were found to be unidimensional, internally consistent item parcels were used to represent indicators of student engagement.

**Coping strategies**

Since the coping styles used from the ACS (Frydenberg & Lewis, 1993) consist of different coping strategies, scree plots and one-factor congeneric models were also specified for each of the coping strategies to establish unidimensionality. A one-factor congeneric model with four items was specified for Work Hard and the data did not fit the model well, \( \chi^2(2) = 14.44, p = 001, \text{SRMR} = .054, \text{RMSEA} = .147 \) and CFI = .916. An inspection of the standardised residuals revealed a value of 2.38 between items CCS 13 and CCS 25, indicating that the model was not accounting for the covariation between these two items. When the content of these items was examined, the wording of CCS 25 included a comparison between work hard and going out and playing, while the other items that form the work hard coping strategy only referred to working hard. As such, CCS 25 was deleted. The model was respecified and revealed an adequate fit to the data (see Table 9). One-factor congeneric models for wishful thinking and tension reduction found items with .21 and .25 factor loadings respectively. As these factor loadings were below 0.3, it was decided to delete these items as they were not strong indicators of their intended construct (Field, 2005).
In addition, a one-factor congeneric model of the not cope items was specified with five items. The data did not fit the model well, $\chi^2(5) = 50.90$, $p < .001$, SRMR = .096, RMSEA = .178 and CFI = .711. An inspection of the standardised residuals revealed values of 3.44 between CCS 4 and CCS 9, 3.45 between CCS 4 and CCS 18, and 2.46 between CCS 9 and CCS 18. Furthermore, the eigenvalues suggested a two-factor solution. An examination of the content of the items indicated two distinct types of items. For instance, whereas items CCS 4 (“There is nothing I can do so I don’t do anything”), CCS 9 and CCS 18 referred to not coping, CCS 15 (“I get headaches or stomach aches”) and CCS 27 (“I get sick”) related to physical symptoms that might result from not coping. It was decided that the two items related to physical symptoms would be deleted. A respecified model with three items indicated an adequate fit to the data. The final outcomes are shown in Table 9.

Based on the findings supporting unidimensional measurement, internally consistent item parcels were used to represent the different coping strategies, namely solve the problem, work hard, focus on the positive, seeking recreational diversions for the productive coping style, wishful thinking and ignore the problem for avoidance coping, self-blame, keep to self and tension reduction for the non-productive coping style and not cope for not coping. The internal consistency reliabilities for each of the strategies were consistent with previous studies using the same measure and can be seen in Table 9.

**Testing the structure of coping**

As mentioned in Chapter 3, the structure of coping has varied in terms of the number of underlying coping factors. Based on previous research, it was decided to specify a four-factor model of coping, namely productive coping, avoidance coping, non-productive coping and not coping. More specifically, the productive coping factor would consist of solve the problem, work hard, focus on the positive and seek recreational diversions; wishful thinking and ignore the problem would form the avoidance coping factor; non-productive coping would be captured through self-blame, keep to self and tension reduction; and not cope would form the not coping factor. This model can be seen in Figure 4.
Table 9

Test Statistics and Model Fit Indexes for Item Parcels representing different Coping Strategies from the Children’s Coping Scale

<table>
<thead>
<tr>
<th>Variable</th>
<th>$\chi^2$</th>
<th>Df</th>
<th>$p$</th>
<th>SRMR</th>
<th>RMSEA</th>
<th>CFI</th>
<th>$\alpha$</th>
<th>FLs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solve the Problem</td>
<td>6.78</td>
<td>5</td>
<td>.237</td>
<td>.029</td>
<td>.035</td>
<td>.991</td>
<td>.70</td>
<td>.47-.63</td>
</tr>
<tr>
<td>Work Hard$^a$</td>
<td>1.03</td>
<td>1</td>
<td>.311</td>
<td>.016</td>
<td>.000</td>
<td>1.00</td>
<td>.67</td>
<td>.61-.68</td>
</tr>
<tr>
<td>Focus on positive</td>
<td>1.64</td>
<td>2</td>
<td>.440</td>
<td>.016</td>
<td>.000</td>
<td>1.00</td>
<td>.65</td>
<td>.43-.67</td>
</tr>
<tr>
<td>Seek Recreation</td>
<td>20.78</td>
<td>9</td>
<td>.243$^b$</td>
<td>.043</td>
<td>.067</td>
<td>.966</td>
<td>.72</td>
<td>.31-.78</td>
</tr>
<tr>
<td>Wishful Thinking</td>
<td>7.68</td>
<td>2</td>
<td>.225$^b$</td>
<td>.037</td>
<td>.099</td>
<td>.952</td>
<td>.61</td>
<td>.42-.61</td>
</tr>
<tr>
<td>Ignore the Problem</td>
<td>0.98</td>
<td>2</td>
<td>.612</td>
<td>.013</td>
<td>.000</td>
<td>1.00</td>
<td>.62</td>
<td>.43-.64</td>
</tr>
<tr>
<td>Tension Reduction$^a$</td>
<td>2.46</td>
<td>1</td>
<td>.117</td>
<td>.031</td>
<td>.071</td>
<td>.972</td>
<td>.50</td>
<td>.46-.59</td>
</tr>
<tr>
<td>Self-Blame</td>
<td>0.94</td>
<td>2</td>
<td>.625</td>
<td>.011</td>
<td>.000</td>
<td>1.00</td>
<td>.80</td>
<td>.63-.77</td>
</tr>
<tr>
<td>Keep to Self</td>
<td>5.15</td>
<td>2</td>
<td>.076</td>
<td>.028</td>
<td>.074</td>
<td>9.86</td>
<td>.71</td>
<td>.36-.77</td>
</tr>
<tr>
<td>Not Cope$^a$</td>
<td>2.08</td>
<td>1</td>
<td>.149</td>
<td>.027</td>
<td>.061</td>
<td>.984</td>
<td>.56</td>
<td>.52-.56</td>
</tr>
</tbody>
</table>

Note. $^a$Two factor loadings were constrained to create a degree of freedom. $^b$Bollen-Stine $p$. $\alpha =$ Cronbach’s alpha; FLs = Factor Loadings.

A ML CFA was used to evaluate the four-factor model and found that the model was a good fit to the data, $\chi^2(30) = 57.38$, $p = .002$, SRMR =.052 , RMSEA = .074 and CFI = .928. An inspection of the structure coefficients revealed a .53 factor loading on the Non-productive coping style for the not cope coping strategy, which was .01 larger than the smallest factor loading from the strategies that were intended to capture the Non-productive coping style. However, this was a very small difference. As such, discriminant validity between the coping factors was assumed. Significant factor inter-correlations of -.53 and -.76 were found respectively between not coping and the productive coping and non-productive coping styles. Avoidance coping was positively associated with non-productive coping ($r = .71, p < .001$) and not coping ($r = .48, p < .01$). Furthermore, non-productive coping and not coping was strongly associated ($r = .79, p < .001$). However, there was no significant association between productive coping and avoidance coping ($r = .00, p = 1.00$). The factor pattern and structure coefficients for the four-factor model can be seen in Table 10.
An independent-cluster measurement model

After establishing that variables were unidimensional and deciding that there was discriminant validity between the hypothesised coping factors, a seven-factor independent-cluster measurement model including student engagement, family cohesion, internal control, productive coping, avoidant coping, non-productive coping and not coping was specified. The purpose of establishing a full measurement model was to ensure that indicators contributed uniquely to the latent variables they were expected to represent and that latent variables were distinct from each other.
Table 10

*Factor Pattern and Structure Coefficients for the Four-factor Model*

<table>
<thead>
<tr>
<th>Coping Strategies</th>
<th>Four-factor Model</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Productive</td>
<td>Avoidant</td>
<td>Non-productive</td>
<td>Not Coping</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coping</td>
<td>Coping</td>
<td>Coping</td>
<td>Coping</td>
<td>Coping</td>
<td>Coping</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P</td>
<td>S</td>
<td>P</td>
<td>S</td>
<td>P</td>
<td>S</td>
</tr>
<tr>
<td>Solve the Problem</td>
<td>.74</td>
<td>.74</td>
<td>.0*</td>
<td>.00</td>
<td>.0*</td>
<td>-.39</td>
<td>.0*</td>
</tr>
<tr>
<td>Work Hard</td>
<td>.61</td>
<td>.61</td>
<td>.0*</td>
<td>.00</td>
<td>.0*</td>
<td>-.32</td>
<td>.0*</td>
</tr>
<tr>
<td>Focus on the Positive</td>
<td>.73</td>
<td>.73</td>
<td>.0*</td>
<td>.00</td>
<td>.0*</td>
<td>-.38</td>
<td>.0*</td>
</tr>
<tr>
<td>Seek Recreation</td>
<td>.58</td>
<td>.58</td>
<td>.0*</td>
<td>.00</td>
<td>.0*</td>
<td>-.31</td>
<td>.0*</td>
</tr>
<tr>
<td>Wishful Thinking</td>
<td>0*</td>
<td>.00</td>
<td>.62</td>
<td>.62</td>
<td>0*</td>
<td>.44</td>
<td>0*</td>
</tr>
<tr>
<td>Ignore the Problem</td>
<td>0*</td>
<td>.00</td>
<td>.39</td>
<td>.39</td>
<td>0*</td>
<td>.28</td>
<td>0*</td>
</tr>
<tr>
<td>Self-blame</td>
<td>0*</td>
<td>-.40</td>
<td>.54</td>
<td>.76</td>
<td>.76</td>
<td>0*</td>
<td>.60</td>
</tr>
<tr>
<td>Keep to Self</td>
<td>0*</td>
<td>-.31</td>
<td>.42</td>
<td>.59</td>
<td>.59</td>
<td>0*</td>
<td>.47</td>
</tr>
<tr>
<td>Tension Reduction</td>
<td>0*</td>
<td>-.27</td>
<td>.37</td>
<td>.52</td>
<td>.52</td>
<td>0*</td>
<td>.41</td>
</tr>
<tr>
<td>Not Cope</td>
<td>0*</td>
<td>-.56</td>
<td>.35</td>
<td>.53</td>
<td>.73</td>
<td>.73</td>
<td></td>
</tr>
</tbody>
</table>

*Note:* P = Pattern coefficient; S = Structure coefficient. Table values are standardised parameter estimates. Asterisked values are parameters fixed at reported levels to identify the model. Factor correlations were free to be estimated. All pattern coefficients were significant.

The factors in the model were measured using single indicator latent variables or item parcels. For instance, single indicator latent variables were used for the unidimensional constructs in the model, namely family cohesion, internal control and not coping. This involved specifying values for the factor loading and measurement error variance (Munck, 1979). Based on Munck’s formula, the factor loading was calculated by multiplying the standard deviation by the square-root of the Cronbach’s alpha value. The measurement error variance was calculated by squaring the standard deviation and multiplying the squared value by one minus Cronbach’s alpha. For example, the standard deviation of internal control was .53 and the Cronbach’s alpha was .90. Thus, the factor loading was calculated by multiplying .53 by the square root of .90, which equalled .50.
The measurement error variance was calculated by multiplying \( .53^2 \) by \( (1-.90) \), which equalled .03. These values are specified in Figure 5.

In addition to the single indicators, item parcels were used to represent the multidimensional constructs in the model such as student engagement, productive coping, avoidance coping and non-productive coping. Inter-correlations between the factors in the measurement model were free to be estimated. A CFA using ML estimation was conducted and found the model did adequately fit the data, \( \chi^2(86) = 226.34, p < .001, \) SRMR = .056, RMSEA = .075 and CFI = .914. An inspection of the standardised residuals identified two values over 2.58, which were associated with the coping strategies wishful thinking and ignore the problem. For instance, standardised residuals of 2.81 and 2.70 were found between wishful thinking and work hard and ignore the problem and tension reduction respectively. Since the model was not accounting for some of the covariation associated with these pair of observed variables, and given that wishful thinking and ignore the problem are both related to avoidance coping, it was decided to omit these variables from the model.

The measurement model was respecified without the avoidance coping strategies wishful thinking and ignore the problem and provided a better fit to the data, \( \chi^2(65) = 154.17, p < .001, \) SRMR = .068, RMSEA = .069 and CFI = .940. Although a standardised residual of 2.72 was found between peer connectedness and self-blame, the decision was made to retain both variables on theoretical grounds as they represent important aspects of the underlying factors student engagement and non-productive coping respectively. Similar to the four-factor model of coping, inspection of the structure coefficients also revealed that note cope (.60) was loading on the Non-productive coping factors, Again, as this value slightly exceeded the smallest loading (.51), discriminant validity between the factors was assumed. All factor pattern coefficients (see Table 11) and factor inter-correlations (see Table 12) were found to be significant.
Figure 5: A Seven-factor Independent-cluster Measurement Model
### Table 11

**Factor Pattern and Structure Coefficients for Six-factor Independent-cluster Measurement Model**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Student Engagement</th>
<th>Family Cohesion</th>
<th>Internal Control</th>
<th>Productive Coping</th>
<th>Non-productive Coping</th>
<th>Not Coping</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P</td>
<td>S</td>
<td>P</td>
<td>S</td>
<td>P</td>
<td>S</td>
</tr>
<tr>
<td>Peer Connectedness</td>
<td>.70</td>
<td><strong>.70</strong></td>
<td>0*</td>
<td>.40</td>
<td>0*</td>
<td>.42</td>
</tr>
<tr>
<td>Teacher Connectedness</td>
<td>.79</td>
<td><strong>.79</strong></td>
<td>0*</td>
<td>.45</td>
<td>0*</td>
<td>.48</td>
</tr>
<tr>
<td>School Connectedness</td>
<td>.77</td>
<td><strong>.77</strong></td>
<td>0*</td>
<td>.44</td>
<td>0*</td>
<td>.47</td>
</tr>
<tr>
<td>Motivation</td>
<td>.72</td>
<td><strong>.72</strong></td>
<td>0*</td>
<td>.41</td>
<td>0*</td>
<td>.44</td>
</tr>
<tr>
<td>Family Cohesion</td>
<td>0*</td>
<td>.43</td>
<td>.76</td>
<td></td>
<td><strong>.76</strong></td>
<td>0*</td>
</tr>
<tr>
<td>Internal Control</td>
<td>0*</td>
<td>.57</td>
<td>0*</td>
<td>.45</td>
<td>.95</td>
<td><strong>.95</strong></td>
</tr>
<tr>
<td>Solve the Problem</td>
<td>0*</td>
<td>.59</td>
<td>0*</td>
<td>.47</td>
<td>0*</td>
<td>.55</td>
</tr>
<tr>
<td>Work Hard</td>
<td>0*</td>
<td>.49</td>
<td>0*</td>
<td>.40</td>
<td>0*</td>
<td>.46</td>
</tr>
<tr>
<td>Focus on the Positive</td>
<td>0*</td>
<td>.53</td>
<td>0*</td>
<td>.43</td>
<td>0*</td>
<td>.50</td>
</tr>
<tr>
<td>Seek Recreation Diversions</td>
<td>0*</td>
<td>.45</td>
<td>0*</td>
<td>.36</td>
<td>0*</td>
<td>.42</td>
</tr>
<tr>
<td>Self-blame</td>
<td>0*</td>
<td>-.27</td>
<td>0*</td>
<td>-.52</td>
<td>0*</td>
<td>-.37</td>
</tr>
<tr>
<td>Keep to Self</td>
<td>0*</td>
<td>-.17</td>
<td>0*</td>
<td>-.33</td>
<td>0*</td>
<td>-.23</td>
</tr>
<tr>
<td>Tension Reduction</td>
<td>0*</td>
<td>-.19</td>
<td>0*</td>
<td>-.37</td>
<td>0*</td>
<td>-.26</td>
</tr>
<tr>
<td>Not Cope</td>
<td>0*</td>
<td>-.35</td>
<td>0*</td>
<td>-.47</td>
<td>0*</td>
<td>-.38</td>
</tr>
</tbody>
</table>

*Note: P = Pattern coefficient; S = Structural coefficient. Table values are standardised estimates. Asterisked values are parameters fixed at reported values to identify the model. Factor correlations were free to be estimated. All pattern coefficients are significant.*
The measurement model was also tested separately for both students classified with possible LDs ($\chi^2(65) = 110.29$, Bollen-stine $p = 127$, SRMR = .068, RMSEA = .085 and CFI = .924) and students with EA ($\chi^2(65) = 142.32$, $p < .001$, SRMR = .064, RMSEA = .085 and CFI = .910) and was found to fit the data for both groups.

**Model invariance for group membership**

An important step for multiple group analyses involves establishing invariance to ensure that underlying constructs have the same meaning for different groups, thus allowing comparisons between groups (see Chapter 4). Invariance testing was performed on the measurement model using the steps outlined in Cunningham (2009). An omnibus test of the equality of covariance matrices was performed to determine whether the variances and covariances for each group are drawn from the sample population. A $\Delta \chi^2$ test between the unconstrained model and the structural covariances model was found to be significant ($\Delta \chi^2(91) = 144.86$, $p < .001$), indicating that equal variances and covariances cannot be assumed. Hence, additional testing was needed.

Table 12

*Inter-correlations for the Six-factor Independent-cluster Measurement Model for Students with Learning Disabilities and Students with Expected Achievement.*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Student Engagement</td>
<td>-</td>
<td>.63***</td>
<td>.60***</td>
<td>.78***</td>
<td>- .55***</td>
<td>- .66***</td>
</tr>
<tr>
<td>2. Family Cohesion</td>
<td>.50***</td>
<td>-</td>
<td>.53***</td>
<td>.59***</td>
<td>- .71***</td>
<td>- .61***</td>
</tr>
<tr>
<td>3. Internal Control</td>
<td>.66***</td>
<td>.49***</td>
<td>-</td>
<td>.71***</td>
<td>- .63***</td>
<td>- .63***</td>
</tr>
<tr>
<td>4. Productive Coping</td>
<td>.77***</td>
<td>.63***</td>
<td>.70***</td>
<td>-</td>
<td>- .50***</td>
<td>- .76***</td>
</tr>
<tr>
<td>5. Non-Productive Coping</td>
<td>-.14</td>
<td>-.62***</td>
<td>-.37**</td>
<td>- .28*</td>
<td>-</td>
<td>.78***</td>
</tr>
<tr>
<td>6. Not Coping</td>
<td>-.27</td>
<td>-.72***</td>
<td>-.45**</td>
<td>- .64***</td>
<td>.57***</td>
<td>-</td>
</tr>
</tbody>
</table>

$N = 290$. * = $p < .05$; ** = $p < .01$; *** = $p < .001$. Correlations below the diagonal relate to students with possible LDs ($n = 97$). Correlations above the diagonal relate to students with expected achievement ($n = 167$).
A test of configural invariance showed that the unconstrained model provided an adequate fit to the data, $\chi^2(130) = 252.69$, $p < .001$, SRMR = .068, RMSEA = .060 and CFI = .916, supporting configural invariance. Nested model comparisons revealed a non-significant difference between the unconstrained model and the measurement weights model ($\Delta\chi^2(8) = 12.32$, $p = .138$), but a significant difference between the unconstrained model and the measurement intercepts model, $\Delta\chi^2(19) = 32.36$, $p = .026$. These findings indicate that metric invariance was established, but not scalar invariance. However, given that the test for scalar invariance was close to the significance test value of .05, it was decided to assume scalar invariance and allow mean comparisons.

Mean differences in coping resources

In order to test whether students classified with possible LDs have fewer coping resources compared to students with expected achievement, independent groups t-tests, one-way independent groups MANOVAs and one-way independent groups MANCOVAs were performed to examine whether there were significant mean differences in external resources, internal resources, coping styles and the outcome of coping between the two groups of students. The means and standard deviations for each of the variables for both groups at time 1 and time 2 are provided in Table 13.

For the external resources, the variables peer connectedness, teacher connectedness, school connectedness, motivation and family cohesion were the dependent variables and group membership was the independent variable. The one-way MANOVA revealed a significant difference in the mean levels of coping resources between the two groups of students, $\text{Wilks' } \lambda = 0.95$, $F(5, 258) = 2.73$, $p = .02$, $\text{partial } \eta^2 = .02$. Follow-up univariate tests showed significant differences in school connectedness ($F(1, 262) = 4.26$, $p = .04$, $\text{partial } \eta^2 = .02$) and motivation ($F(1, 262) = 13.03$, $p < .001$, $\text{partial } \eta^2 = .05$) between the two groups of students. In other words, students classified with possible LDs were less connected to school and less motivated to perform well at school compared to students with expected achievement. However, no significant mean differences were found in peer connectedness ($F(1, 262) = 2.27$, $p = .13$), teacher connectedness ($F(1, 262) = 1.98$, $p = .16$) or family cohesion ($F(1, 262) = .27$, $p = .60$).
Table 13

Means and Standard Deviations for Item Parcels for Students with possible Learning Disabilities and Students with Expected Achievement at Time 1 and Time 2.

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</table>

$N = 290$
An independent groups t-test found no significant mean difference in internal control ($F(1, 262) = .04, p = .97$) between the two groups. With regards to the coping styles in the model, the coping strategies of solve the problem, work hard, focus on the positive, seek recreational diversions, self-blame, keep to self and tension reduction were the dependent variables and group membership the independent variable. No significant difference was found in the mean levels of the coping strategies in the model between students classified with possible LD and students with expected achievement, $Wilks' \lambda = 0.97, F(7, 256) = 1.32, p = .24$, partial $\eta^2 = .02$. However, a significant difference was found in the mean levels of the outcome variable of not coping, $t(262) = 2.65, p = .009$. This indicates that students classified with possible LDs reported giving up more frequently than students with expected achievement.

A series of MANCOVA tests were performed on the corresponding time 2 variables after controlling for the time 1 variables to examine whether there were significant changes over time in mean levels of coping resources and coping outcome between the two groups. However, no significant mean differences were found in external resources ($Wilks' \lambda = 0.97, F(5, 253) = 1.51, p = .19$) or coping styles, ($Wilks' \lambda = 0.98, F(7, 249) = .78, p = .60$). Independent groups t-tests also revealed no significant mean difference in internal control ($t(262) = .43, p = .97$) and not coping ($t(262) = 1.92, p = .06$) at time 2.

In sum, students classified with possible LDs reported lower mean levels of student engagement and higher mean levels of not coping compared to students with expected achievement. In particular, students with possible LDs reported lower mean levels of motivation and school connectedness and utilised more of the not coping outcome compared to students with expected achievement. These findings suggest that students with LDs have fewer coping resources and frequently give up more compared to other students.

**The structural model of coping resources**

Based on the integration of the COR model (Hobfoll, 1989; 2001) and the CCAD model (Skinner & Wellborn, 1997) put forward in Chapter 3, it was hypothesised that internal resources would mediate the relationship between external resources and coping styles, which in turn, would predict not coping. In this study,
cross-sectional and longitudinal structural models were specified to test the proposed model, which are presented separately in this section. Each of these models is discussed below in this section. The inter-correlations of the item parcels used to represent student engagement, family cohesion, internal control, productive coping, non-productive coping and not coping for time 1 and time 2 can be seen in Table 14 and Table 15 respectively.

The cross-sectional models

The cross-sectional model was estimated for both groups of students separately. That is, ML estimation was used to estimate the structural model for students classified with possible LD and was found to fit the data well, $\chi^2(69) = 113.00, p = .001$, SRMR = .047, RMSEA = .081 and CFI = .926. However, a closer inspection of the standardised parameter estimates for the structural model revealed a potential suppressor variable. Specifically, the path from family cohesion to non-productive coping had a beta weight of $\beta = .71$, even though the raw correlation between the measures was $r = 0.61$. The larger beta value can be attributed to correlations between family cohesion and other variables in the model, which enhances the beta value. As such, family cohesion was omitted. The respecified structural model provided an adequate fit to the data, $\chi^2(60) = 95.90, p = .002$, SRMR =.073, RMSEA = .079 and CFI = .935. More specifically, the results showed that student engagement had a significant direct effect on productive coping and an indirect effect on productive coping through internal control (Indirect effect: $\beta = .23, p = .08$), albeit not significant using Sobel’s (1982) test. Moreover, student engagement was not directly or indirectly ($\beta = -.31, p = .12$) related to non-productive coping. In total, the model explained 44 percent of the variance in internal control, 64 percent of the variance in productive coping, 14 percent of the variance in non-productive coping and 73 percent of the variance in not coping. Standardised parameter estimates for students classified with possible LDs are displayed in Figure 6.

The respecified model was also found to be a close fit to the data for students with expected achievement, $\chi^2(60) = 138.37, p < .001$, SRMR =.067, RMSEA = .089 and CFI = .903. The results showed that student engagement had significant direct effects on productive coping and non-productive coping, but the indirect effects via internal control on productive coping (Indirect effect: $\beta = .22, p = .06$) and non-productive coping (Indirect effect: $\beta = -.28, p = .08$) were not found to be significant.
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</table>

Note: * = p < .05; ** = p < .01; *** = p < .001. Correlations below the diagonal relate to students with possible LDs (n = 97). Correlations above the diagonal relate to students with expected achievement (n = 167).
Table 15  
**Inter-correlations for Items Parcels for Student Engagement, Family Cohesion, Internal Control and Coping Strategies at Time 2**

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*Note: * = p < .05; ** = p < .01; *** = p < .001. Correlations below the diagonal relate to students with possible LDs (n = 97). Correlations above the diagonal relate to students with expected achievement (n = 167).
Figure 6. Cross-sectional Structural Models

Note. Panel A is for students with possible LDs (n = 97); Panel B is for students with expected achievement (n = 167). All factor loadings were significant at p < .001. For standardised parameter estimates, *** = p < .001; ** = p < .01; * = p < .05
The model explained 36, 69, 43 and 77 percent of the variance in internal control, productive coping, non-productive coping and not coping respectively. The standardised parameter estimates for students with expected achievement can also be seen in Figure 6.

The results from the structural model testing indicate that student engagement was a coping resource that promoted the use of productive coping strategies for both groups of students. Not only did higher levels of student engagement correspond to the use of more productive coping strategies, higher levels of student engagement were also related to a greater ability to control one’s thoughts, feelings and behaviours. In addition, higher levels of internal control were associated with the use of more of productive coping strategies and fewer non-productive strategies for students for both groups of students. However, there was a significant difference between the two groups for the direct effect between student engagement and non-productive coping. While this path was significant for students with expected achievement, it was not significant for students classified with possible LDs. This implies that higher levels of student engagement were associated with the use of fewer non-productive coping strategies only for those students with expected achievement. Finally, the use of productive and non-productive coping strategies were respectively negatively and positively associated with not coping for both groups of students.

*Testing for mediation*

One approach to test for mediation in a cross-sectional design is to use the $\Delta \chi^2$ test, which involves subtracting the $\chi^2$ value and degrees of freedom values associated with the reduced or mediated model from those same values that are related to the full model. Hence, in order to test whether internal control mediates the relationship between external resources and coping styles, the full model was compared with the reduced model in which the direct effects from student engagement to productive coping and from student engagement to non-productive coping in the full model were fixed (see Figure 7). This was completed separately for both groups of students.
Figure 7: Reduced Structural Models

Note. Panel A is for students with possible LDs (n = 97); Panel B is for students with expected achievement (n = 167). All factor loadings were significant at p < .001. For standardised parameter estimates, *** = p < .001; ** = p < .01; * = p < .05
The results showed a significant difference between the full model and the reduced model for students with possible LD, $\Delta \chi^2(2) = 18.12, p < .001$. Moreover, a significant difference between the two models was also found for students with expected achievement, $\Delta \chi^2(2) = 36.60, p < .001$. These findings suggest some of the paths from the full model remain significant, which means that internal control only partially mediated the relationship between external resources and coping styles.

**The longitudinal structural model**

Consistent with the approach to testing a mediational model using two waves of data put forward by Cole and Maxwell (2003), paths were specified from the time 1 independent variables to the time 2 mediator controlling for the time 1 mediator, and paths from the time 1 mediator to the time 2 dependent variables controlling for the time 1 dependent variables. Based on the hypotheses, student engagement at time 1 predicted internal control at time 2. Internal control at time 1 predicted the time 2 measures of productive coping and non-productive coping. Furthermore, productive and non-productive coping at time 1 predicted not coping at time 2. The associations between the time 1 constructs were also free to be estimated (see Figure 8).

Given the small sample of students, steps were taken to minimise the ratio of participants to free parameters. Firstly, both groups of students were collapsed into one group and the longitudinal model estimated. Secondly, the use of single indicator latent variables was abandoned because it is invalid to constrain variances (i.e., standard deviations) across time. Instead, item parcels were used for the variables in the model, including internal control and not coping. Thirdly, factor loadings for each of the time 1 and corresponding time 2 item parcels were fixed to equality as longitudinal models assume invariance across time.

The results from the longitudinal structural model revealed a close fit to the data, $\chi^2(283) = 467.17, p < .001$, SRMR = .052, RMSEA = .048 and CFI = .952. As can be seen by the standardised parameter estimates in Figure 8, although student engagement at time 1 did not have a significant direct effect on internal control at time 2, internal control at time 1 did have a significant direct effect on productive coping and non-productive coping at time 2. Moreover, both productive coping and non-productive coping at time 1 had a significant direct effect on not coping at time 2. Students who
reported higher levels of internal control tended to use more productive coping strategies and fewer non-productive coping strategies. Overall, the model explained 32, 38, 43 and 29 percent of the variance in internal control, productive coping, non-productive coping and not coping respectively at time 2. In light of the results from the cross-sectional model, these findings reinforce the importance of internal control as a key resource for students.

**Chapter summary**

One of the aims of this study was to determine the prevalence of students with LDs in a sample of Years 5 and 6 students from Victorian Government primary schools.
using teacher administered screening tools. It was found that around one-third of students demonstrated unexpected underachievement in reading and spelling. The main purpose of this study was to examine the coping behaviours of students with LDs through establishing an independent-cluster measurement model of coping resources and coping outcome, comparing mean scores between students classified with possible LD and students with expected achievement for each of the coping resources, and testing cross-sectional and longitudinal structural models of coping resources. It was hypothesised that internal resources would mediate the relationship between external resources and coping styles, and, in turn, coping styles would predict the outcome of coping.

In sum, evidence was found to support the independent-cluster measurement model. Students classified with possible LDs reported lower means levels of student engagement and higher mean levels of not coping compared to students with expected achievement. No significant mean differences were found in family cohesion, internal control, productive and non-productive coping. Furthermore, the results from the cross-sectional model indicated that internal control partially mediated the relationship between student engagement and productive coping for both groups of students. However, internal control did not mediate the relationship between student engagement and non-productive coping for students classified with LDs. Finally, the results from the longitudinal structural model provide some evidence for the mediational model where internal control at time 1 had a significant direct effect on productive and non-productive coping at time 2. The results presented in this chapter conclude the analyses for this research. The next chapter presents a detailed discussion of the findings in relation to the research questions and hypotheses. The theoretical and practical implications, limitations of the research and directions of future research will also be presented in the final chapter.
Chapter 7 – General Discussion and Conclusion

Introduction

The purpose of the current research was to test an alternative method for screening students for possible LDs that is more feasible in terms of time, cost and practicalities, as well as to examine coping behaviours for students classified with possible LDs. The first aim was to examine the validity of using teacher administered educational and intelligence tests to screen students for possible LDs. Screening tools were administered to a sample of Years 5 and 6 students in Victorian Government schools with the purpose of determining the prevalence of LDs. Another aim was to establish a full measurement model of important coping resources and coping outcomes, namely student engagement, family cohesion, external control, internal control, productive coping, avoidance coping, non-productive coping and not coping. The fourth aim was to examine mean differences in each of the coping resources between students classified with possible LDs and students with expected achievement. It was hypothesised that students with possible LDs would report lower mean levels of student engagement, external control, internal control and productive coping, and higher levels of non-productive coping, avoidance coping and not coping compared to students with expected achievement. Given the lack of regression and structural equation models to explain the coping behaviours of students with LDs in the literature, the final aim was to test cross-sectional and longitudinal models of coping resources in which it was hypothesised that internal resources would mediate the relationship between external resources and coping styles, which, in turn, predict not coping.

This chapter discusses each of the research questions and specific hypotheses in relation to the findings of the studies. This is followed by the practical and theoretical implications of the findings. The chapter concludes by documenting the limitations of the current research, outlining recommendations for future research and summarising the contribution of the research.

The correspondence between measures of intelligence

The identification of LDs requires the administration of educational and intelligence tests by a registered psychologist where the aim is to determine whether
students demonstrate a discrepancy between educational achievement and intellectual ability. However, one limitation of this approach is that comprehensive intelligence assessments are expensive, time-consuming and impractical. For example, the administration of comprehensive intelligence tests can take several hours to administer and write a follow up report and costs several hundreds of dollars. The outcome of this is that students with LDs are frequently not being identified. As such, an alternative method for assessing students for LDs using intelligence screening tests was proposed.

In a small sample of students who were enrolled in a program for Technical and Further Education (TAFE) students who had dropped out of school and were suspected of having LDs, scores from standardised reading and spelling tests as well as intelligence tests administered in class groups and individually were compared to the classifications of a comprehensive assessment conducted by an independent, registered psychologist. The results revealed a substantial correspondence between intelligence screening tests and comprehensive intelligence assessments, which is consistent with the findings of Canivez and colleagues (Canivez, 1996; Canivez et al., 2005). Despite some discrepancies, preliminary evidence supported the use of the KBIT-2. There was also limited evidence to support the use of the SPM to measure intelligence as part of a screening process for students with LDs. The results also support the hypothesis that an underlying cause of school dropout is LDs (see Dunn et al., 2004) with over half of the sample identified with possible LDs.

The results from the primary school sample where the correspondence between the individually-administered and group-administered intelligence tests was examined revealed a significant relationship between the two intelligence tests. In particular, it was found that over 95 percent of the participants who scored above the cut-off on the KBIT-2 also scored above the cut-off on the SPM, which indicated convergent validity between the two measures. Given that group testing has a number of practical advantages such as being more cost-effective and less time consuming than individual testing, it was decided to use the group-administered test as a measure of intelligence in this study.
Prevalence of learning disabilities

Due to the definitional problems associated with LDs, and specifically the confusion between learning difficulties and LDs, it has been difficult to ascertain an exact prevalence rate of LDs in Australian schools. One of the aims of this research was to provide an estimate of the prevalence of LDs in Victorian Government schools. Based on the group-administered educational and intelligence tests, the proportion of students classified as having low achievement, possible LDs and expected achievement among the sample of Years 5 and 6 students from Victorian Government schools was 8, 33 and 58 percent respectively. While it was expected that 25 percent of the sample would score below the 25th percentile in reading, 8 percent of students were classified with low achievement and 33 percent were found to underachieve in reading and spelling. Thus, after taking into account the 8 percent of students with low achievement and 17 percent of the 33 percent of students who were underachieving, the remaining 16 percent of students were classified with possible LDs. This prevalence rate is consistent with previous studies that found prevalence rates of LDs between 5 and 15 percent (Prior et al., 1995; Westwood & Graham, 2000) and highlights that a significant proportion of students continue to experience reading and spelling difficulties despite having intelligence levels in the normal range.

Although it is possible that some of the students classified with possible LDs have other explanations for their low educational achievement (e.g., emotional and behavioural problems, poor school attendance), it seems reasonable to assume that a large proportion of these Victorian students who are in Years 5 and 6 have already received in-class support and have undergone three waves of intervention in their schooling. As mentioned previously (see Chapter 2), first-wave teaching refers to effective whole class teaching in the early of primary school (Rohl, 2000). Students who do not respond to whole class teaching are often referred to a second-wave early intervention program, which is typically Reading Recovery (RR) in Victorian schools (Rohl, 2000). Reading Recovery is an intensive program that consists of 30 minute one-to-one sessions with a qualified RR teacher on a daily basis for up to 20 weeks. Once again, students who do not respond to individual interventions are provided with ongoing support in the mainstream classroom as a third-wave of support (Rohl, 2000). Yet, in spite of these interventions, the findings from the current study indicated that
approximately 16 percent of students continued to unexpectedly underachieve in language related areas such as reading and spelling. Indeed, these students experienced learning difficulties that were resistant to intervention and permanent in nature, which is indicative of LDs.

The measurement of coping resources

The literature review revealed that the structure of coping has varied in terms of the number of underlying coping factors and the content that forms these coping factors. In general, conceptual models have proposed two main factors to represent coping actions, including problem and emotion-focused (Lazarus & Folkman, 1984), primary and secondary-control coping (Rothbaum et al., 1982) and approach and avoidance coping (Roth & Cohen, 1986). In contrast, empirical studies have shown up to four or five factors best represent the structure of coping (Ayers et al., 1996; Connor-Smith et al., 2000). In this study, three factors were specified, namely productive coping, avoidance coping and non-productive coping, and a separate outcome variable called not coping. The productive coping style comprised the coping strategies of solve the problem, work hard, focus on the positive and seeking recreational diversions. Avoidance coping comprised the coping strategies wishful thinking and ignore the problem. The non-productive coping style included the strategies self-blame, keep to self and tension reduction. Finally, the outcome of not coping comprised the coping strategy not cope.

Initially, a ML CFA did provide support for the four-factor model of coping. However, when these four factors were entered into an independent-cluster model with other coping resources (e.g., student engagement), the two coping strategies associated with the avoidance factor, wishful thinking and ignore the problem, were found to be sources of misfit in the model. More specifically, the measurement model did not account for the covariation between multiple pairs of observed variables that involved wishful thinking and ignore the problem. This suggests that the model did not support a separate avoidance factor that comprised these two coping strategies. One explanation for this relates to perceptions of external control. For instance, individuals who believe that they are unable to control a given situation may be more likely to utilise avoidance coping such as wishful thinking and ignoring the problem. These strategies may be very
effective in these situations (Cunningham, 2001). However, in a controllable situation, this is not an effective way of coping. In this study, external control was found to be severely negatively skewed with a majority of participants scoring high on the PCSC (Weisz et al., 1994). This indicates that students believed that they had control over the external situation, which may have resulted in the lack of avoidance coping. For this reason, the decision was made to omit the items associated with avoidance coping from the model, even though avoidance coping appears in the literature as one method that students with LDs utilise to cope with stress.

A six-factor independent-cluster measurement model was established in which student engagement and family cohesion were positively associated with internal control and productive coping, and negatively associated with non-productive coping. Internal control was positively associated with productive coping and negatively associated with non-productive coping. A negative association was found between productive coping and non-productive coping. Furthermore, productive coping and non-productive coping were negatively and positively associated with not coping respectively. An important finding from the model was the evidence to support a structure of coping that included productive coping, non-productive coping and the outcome variable of not coping. This was consistent with the findings of Frydenberg and Lewis (2002) who tested a similar structure of coping in a sample of Australian managers using the Coping Scale for Adults (CSA: Frydenberg & Lewis, 1997). In both cases, it appears that items relating to the strategy not cope are conceptually and empirically distinct from the other non-productive coping strategies. This is important to know as it implies that the use of productive and non-productive coping strategies can predict why people give up.

As mentioned earlier, external control was not included in the measurement model as it was found to be severely negatively skewed, indicating that most participants responded high to the items on the Perceived Control Scale for Children (PCSC; Weisz et al., 1994). Despite the use of transformations, the data remained skewed. There are many possible explanations for such a finding. For instance, it may be that children at this age tend to believe they can control their external environment no matter what the situation. Equally, it may be that the four-point response format ranging from very false to very true was not appropriate for participants in the current
study and that more response options were needed. It has been established that scale format can influence responses (see Podsakoff et al., 2003) and that the number of responses impacts the reliability and validity of the scale (Lozano et al., 2008). As such, future research may consider the appropriateness of the item response format for the PCSC (Weisz et al., 1994) using Rasch analysis (Fox & Jones, 1998). This is because Rasch analysis can be used to check whether the scoring and summing of items for a particular questionnaire is suitable to the data collected.

Mean levels of coping resources

Learning disabilities can be particularly stressful. In fact, LDs are often associated with a number of adverse outcomes, such as school dropout, unemployment, juvenile delinquency and criminal conviction and mental health problems (Prior, 1996). In this study, it has been argued that students with LDs have fewer resources to invest in the coping process. A comparison of the mean scores for each of the coping resources and the outcome of coping revealed that students classified with possible LDs reported lower mean levels of student engagement and higher levels of not coping compared to students with expected achievement. These mean differences were significant. In particular, students with LDs were less motivated, less connected to school and reported giving up more frequently than students with expected achievement. No significant differences were found in family cohesion, internal control and reliance on productive or non-productive coping strategies.

The findings relating to reduced motivation for students with possible LDs are consistent with Sideridis (2006). According to Sideridis (2006), students with LDs who feel obliged to perform well on a task tend to experience a fear of being negatively judged, resulting in task avoidance. For example, in the classroom, students who are motivated by the need to avoid negative evaluations either avoid tasks or show less persistence compared to other students. These students only choose easy tasks that are guaranteed of success or excessively difficult tasks in which failure does not reflect their ability (Dweck, 1986). This finding is consistent with the COR model (Hobfoll, 1989; 2001) in which students with LDs have invested effort with the expectation of gaining good results, but instead, continued to underachieve in reading and spelling. Investing resources has resulted in further resource loss and has not translated into
expected resource gain, which is stressful. The COR model predicts that individuals are motivated to minimise resources loss in response to stress. Hence, it is not surprising that students with LDs who continue to underachieve in reading and spelling minimise their resource loss by reducing their motivation to perform well at school.

Students with possible LDs were also found to be less connected to school compared to students with expected achievement. This result supports the findings of Eisenberg et al. (2003) where students who experienced low academic achievement were less connected to school. In line with the explanation for reduced motivation, school may be a place where students with LDs are not gaining sufficient resources, but are instead losing resources. According to the COR model, individuals can conserve resources by re-evaluating the value of resources that are threatened or lost (Hobfoll, 1989). Therefore, one way of protecting their pool of resources is for students to devalue the importance of education and thus disconnect from school.

Contrary to expectations, no significant mean differences were found in internal control and productive and non-productive coping styles between the two groups of students. The absence of a significant difference in internal control between students classified with possible LDs and students with expected achievement was contradictory to the findings of Firth et al. (2007). The difference in findings between the two studies may be related to the use of different populations. For instance, the current study consisted of a sample of primary school students, whereas the study by Firth et al. was based on a sample of secondary school students. It is plausible that primary school students with LDs still believe they can control their internal thoughts, feelings and behaviours but secondary students with LDs have had additional years of frustration and anxiety at school and subsequently believe they are not in control of their internal states. This may also explain some of the poor mental health outcomes that occur later in life for students with LDs (Raskind et al., 1999).

The findings of no significant mean differences in productive and non-productive coping styles between the two groups of students may be explained by the fallback hypothesis (Frydenberg & Lewis, 2004; Lewis & Frydenberg, 2002; Rothbaum et al., 1982). While it was anticipated that students with LDs would utilise fewer productive and more non-productive coping strategies than students with expected
achievement, the fallback hypothesis posits that all students initially employ productive coping strategies, but will resort to using non-productive coping strategies if productive ones are not effective. For example, students with LDs may attempt to utilise productive coping strategies such as solve the problem and work hard, but have to rely on internalising coping strategies such as self-blame and withdrawing from others in order to cope. One interpretation of this finding is that students with LDs find it difficult to utilise problem solving skills due to their permanent processing problems (Cheshire & Campbell, 1997). Essentially, students with LDs will do whatever they can to cope, even if it involves using strategies that are less adaptive.

It is important to note that investing resources to cope can deplete resources and that those students with fewer resources are vulnerable to further resource loss (Hobfoll, 1989, 2001). This can lead to students not having sufficient resources to counteract further loss, which initiates a loss spiral. It is during a loss spiral that students use high risk coping strategies such as giving up on school and dropping out. Indeed, this may explain the findings of the current research in which students with possible LDs reported giving up more frequently compared to their peers. For instance, students with LDs initially attempt to deal with their problems by investing resources in the form of problem solving and working hard. However, if this is not effective, students will utilise whatever resources they have available to them to cope, even if it involves blaming themselves or keeping to themselves. These findings suggest that there is a point at which students classified with possible LDs tend to give up, which implies that they no longer believe they have the resources to cope.

The results pertaining to family cohesion showed no significant mean difference between students classified with possible LDs and students with expected achievement. One interpretation of this result is that all children in primary school rely on their family as a source of support. Cunningham (2002) found that family support was an important coping resource for students in primary school from the general student population. In contrast, other studies have shown that secondary students from the general student population rate having friends and being close to one friend as more important than parent support (McKenzie et al., 2004). Thus, it may be that mean differences in family cohesion would appear later on as adolescents in secondary school turn to their peers for support to deal with their problems. Future studies should test for an interaction
between group membership and age when examining mean differences in family cohesion.

Overall, the results from the examination of mean differences were partially consistent with the hypotheses. While students with LDs reported lower levels of student engagement and higher levels of not coping compared to students with expected achievement, there were no significant differences in mean levels of family cohesion, internal control, productive and non-productive coping styles. These findings suggest that students with LDs have lower mean levels of some important coping resources compared to students with expected achievement.

**Testing the proposed mediational model**

In Chapter 3, it was argued that a limitation in the LD and coping literature has been the propensity to use mean comparison studies and not regression or SEM studies. In other words, previous studies have compared mean scores in important resources across students with and without LDs but have not tested how these resources relate to each other. To address this gap in the literature, a proposed model of coping resources and coping outcome was tested using SEM with cross-sectional and longitudinal data. The results from the initial cross-sectional structural model identified family cohesion as a potential suppressor variable. For instance, the standardised parameter estimate between family cohesion and non-productive coping was larger than the raw correlation between the two variables. This result was attributed to the correlations between family cohesion and other variables in the model. As such, the variable family cohesion was omitted from the structural model. The results for the respecified model indicated that internal control partially mediated the relationship between external resources and coping styles, which is consistent with previous studies (e.g., Cunningham, 2002; Cunningham et al., 2004). In particular, internal control partially mediated the relationship between student engagement and productive coping for both groups of students, which indicates that student engagement is a protective resource for all students. However, while internal control also partially mediated the relationship between student engagement and non-productive coping for students with expected achievement, no significant direct effect was found in the path from student engagement to non-productive for students classified with possible LDs. This finding suggests that
student engagement is a protective resource against the use of non-productive coping strategies for students with expected achievement, but not for students with possible LDs. Given that students with expected achievement reported higher mean levels of student engagement, it may be that school provides students with expected achievement with the resources to avoid using non-productive coping strategies. Yet regardless of how engaged students with LDs are with school, they still utilise non-productive coping strategies in order to cope with stress.

The results from the cross-sectional model also showed that higher levels of internal control were associated with the use of more productive coping strategies and fewer non-productive coping strategies. This is consistent with other studies (e.g., Cunningham, 2002; Cunningham et al., 2004) that have shown internal control to be associated with coping behaviours. The findings from this study provide support for the notion of control-related resources as key resources (Hobfoll, 2002). It seems as though students from both groups who were able to control their thoughts, feelings and behaviours were more capable of utilising productive coping strategies and minimising the use of non-productive coping strategies, which, in turn, reduced the likelihood of giving up. Moreover, the results from the longitudinal structural model provided further support emphasising the importance of internal control where internal control at time 1 was significantly associated with productive and non-productive coping at time 2 after controlling for productive and non-productive coping at time 1. Therefore, building key resources such as internal control may be the focus of interventions in schools as they help students to utilise what resources they have available to them to cope. In addition, higher levels of productive coping and non-productive coping were negatively and positively associated with not coping respectively for both groups of students. Essentially, students who utilised more productive coping strategies were more capable of coping, while students who relied on non-productive coping strategies tended to report giving up.

**Implications of the research**

The results of the two studies conducted as part of this research have important theoretical and practical implications for the screening of students for possible LDs in Australian schools as well as understanding how students with LDs cope. In this
section, the implications of the research are separated into policy implications, practical implications for practitioners and theoretical implications.

Implications for policy

The decision to put LDs on the agenda for education in Australian schools depends on policymakers. For instance, there has been a shift toward inclusive education in Australia, which should mean that LDs are a mainstream classroom issue. Yet, in reality, this is not the case. Not only is there no national definition of LD in Australia (Watson & Boman, 2005), there is little emphasis on the identification of students with LDs. Hence, the result is that students with LDs continue to remain unidentified and unsupported in the mainstream classroom. This has serious implications since LDs are associated with adverse outcomes including school dropout, unemployment, juvenile delinquency and criminal conviction, and mental health problems (Prior, 1996). Therefore, there is a critical need for a national definition of LD to be established (Watson & Boman, 2005). This would affirm the neurological and permanent nature of LDs, allow communication between teachers and other professionals who work in schools, provide a consistent definition to accurately determine the prevalence of LDs in Australian schools and enable teachers to refer to effective teaching strategies as well as appropriate accommodations that are known to work for students with LDs.

Although Victorian students with LDs are not specifically recognised in the Blueprint for Education and Early Childhood Development (DEECD, 2008), the Blueprint does contain policy that is relevant for students with LDs. For instance, the Blueprint states that there will be a focus on “accurate and timely assessment so students’ progress can be monitored and support provided as soon as it is needed” (p.25) and that there will be “…strategies in place to ensure that our system can meet the diverse needs of all our children and young people” (p.31). This suggests that screening students for possible LDs and providing students with appropriate accommodations is consistent with the Blueprint policy. This thesis has argued for the use of group-administered educational and intelligence tests to screen students for possible LD and should be viewed as an essential part of core practice and as not add-on to everyday practice.
Given that students with LDs in Australian schools spend most of their time in the mainstream classroom, the classroom teacher is a critical resource for students with LDs (Watson & Boman, 2005). However, teachers are often unaware of neurological and permanent nature of LDs, which is largely due to a lack of professional training about LDs. For instance, White and Elkins (2000) examined the scope of a variety of pre-service primary education courses across Australia and found training related to teaching students with learning difficulties and disabilities was only present in a minority of programs. This finding is consistent with Rohl and Greaves (2005) who reported that teachers are not well prepared to teach students who find it difficult to learn. There is also a lack of professional development for classroom teachers about LDs. Moreover, in a study examining teacher evaluations of a professional development program about LDs (Munyard, Sullivan, Skues & Cunningham, 2007), the results showed that teachers were largely positive about the program with some qualitative comments rating the overall program including “At last, I feel as though there is something I can do to identify these students with learning disabilities” (p.226) and “Enlightening - providing a very different way of looking at children in my grade” (p.226). The authors put forward that one of the reasons for the positive evaluations was that the program addressed a cohort of students whom teachers readily identified, but know little, if anything, about these students. Hence, it is vital that the phenomenon of LDs be included in all pre-service teacher training programs and that practising teachers receive PD on LDs to ensure that all teachers are provided with much needed information on LDs.

**Implications for practitioners**

An important practical implication from the findings of this study is that group-administered screening tools that can be administered by classroom teachers provide a more time and cost-effective means of screening students for possible LDs. Since schools do not have the resources to necessarily have students with possible LDs individually assessed, using group-administered tests means that whole classrooms can be screened for possible LDs. Given the prevalence rate of students with LDs was 16 percent in this study, there may be, on average, up to four students per class who would require a comprehensive intelligence assessment. Such assessments would take up to 12 hours to administer with many more hours of report writing. Multiply this by the
number of classes in a school and it is evident that individual assessments are not a feasible way of identifying students with LDs in mainstream schools.

Another benefit for a teacher administering screening tools is that it may challenge the belief systems of some teachers who are often unaware that students with LDs have intelligence levels in the normal range. As mentioned previously (see Chapter 2), teachers incorrectly attribute low intelligence to students with LDs (Watson & Bond, 2007). However, allowing teachers to screen students for LDs is likely to change how teachers think and behave toward students with LDs when they realise that some of their students do not have low intelligence, but instead, have a specific reading and/or spelling problem. Consequently, teachers who understand that students with possible LDs do not have below average intelligence will be more likely to make adjustments to teaching methods and modes of assessment so that work is more accessible for these students rather than modifying work so that it is less challenging.

Screening for LDs would indicate which of those students that teachers need more information about in order to support their learning needs. According to Westwood (2001a), teachers can obtain further information through direct observation, analysis of work samples, diagnostic interviews and informal and formal testing. For instance, observations can be used to assess a particular skill and can be used in situations such as listening to a student read aloud. The appraisal of work samples enables teachers to inspect the quality of a student’s work and whether or not he/she finds a particular skill difficult. The findings from study one indicated that low achievement on the reading and spelling tests was supported by the information extracted from the reading accuracy task and handwriting sample. Students who made more reading accuracy errors did not perform well on the reading comprehension test. Moreover, students who made a number of spelling errors did not score well on the spelling test. This information could also be used to inform decisions about appropriate accommodations for students with LDs.

An advantage of having teachers screen students for possible LDs is that it reduces the number of assessments required for school psychologists to complete. This would free up time for psychologists to perform other important duties, including providing counselling to students, organising group programs for students, organising
workshops and providing information to students, keeping up with current research that is relevant for practicing in schools and conducting research in schools (Thielking & Jimerson, 2006). However, in such cases where students also demonstrate emotional and behavioural issues or other problems that may explain underachievement, a psychologist would need to conduct an assessment to separate educational from psychological issues. For instance, in study one, three students were found to have emotional problems during the comprehensive assessment and were subsequently not included in the analyses. While these students may have had LDs, teachers are limited in their abilities to assess students for emotional problems, which is really the domain of a psychologist. In other words, teacher screening should, at the very least, be considered the first option during the identification for LDs. This would allow teachers who have received training about LDs to provide suitable support for these students earlier. In the event where a student has other possible causes for their reading and spelling problems, students should be referred to a psychologist for a comprehensive assessment.

The identification of students with LDs is essential as it would lead to the provision of appropriate accommodations for those same students (Nunez et al., 2005). Some examples of accommodations include extra time, oral presentation of materials, reading aloud, the use of simplified language and speech recognition software (see Fuchs et al., 2001 for a list of accommodations). For instance, when a student is identified with a reading comprehension problem, there are a number of possible accommodations a teacher could provide, including the oral presentation of materials or allowing the student to read aloud. The choice of accommodation depends on what is being assessed. Fletcher et al. (2006) provide a clear example involving the reading of instructions on a math test. For instance, if the aim of the assessment is to measure mathematics ability, then reading the instructions on the test to the student does not invalidate the test. That is, students who are poor in reading but strong in maths will perform better on the test if they do not have to read it. Yet it is important to highlight that this accommodation does not make a difference to the test performance of students who do not have reading difficulties. As such, it could be argued that reading the instructions to the student omits a source of measurement that can be ascribed to his/her LD, thus providing a more valid assessment of mathematics ability. In contrast, if reading comprehension is being assessed, then reading the material to the student is inappropriate because it now becomes a measure of listening comprehension, not
reading comprehension. Alternatively, allowing the student to read aloud, which can help to keep information in working memory longer, can aid reading comprehension without compromising the validity of the accommodation.

In addition to enabling students to participate more in the classroom and demonstrate their true knowledge and abilities, providing accommodations to students with LDs may also serve to improve the quality of teacher-student relationships. According to Watson and Boman (2005), “it is the classroom teacher who deals with these students on a daily basis. It is their relationship with these students, their attitudes towards them, and their teaching practices which seem to make a difference to academic achievement and the willingness of these students to remain at school” (p.45). As noted earlier, students with LDs tend to report poorer quality relationships with teachers compared to students with expected achievement (Al-Yagon & Mikulincer, 2004; Murray & Greenberg, 2006). Interviews with students who have LDs have highlighted the importance of teachers who provide accommodations. For instance, Kortering and Braziel (1999) interviewed 52 Year 9 students from the US with a range of disabilities, including LDs (N = 33) and found that one of the best parts of school was a particular teacher who wanted to help. Indeed, students recommended that teachers need to be more helpful in terms of assisting students to understand how to do their work as well as being more cooperative.

Watson (2007) conducted semi-structured interviews with six Australian secondary students with LDs and found that students spoke positively of teachers who were caring and knowledgeable. Moreover, students had poor relationships with teachers who were resistant to providing accommodations and did not understand their learning needs. Although no significant mean difference in teacher connectedness was found between the two groups of students in the current study, one explanation may be that the current research was based on a sample of primary school students, which is in contrast to the previous research that did find a significant difference in teacher relationships using a secondary school sample. A key difference between the two settings is that primary school students have predominantly one teacher for a majority of the school day, while secondary school students have several teachers who teach different subjects. This makes it more difficult for secondary teachers to establish relationships with students compared to primary teachers. Perhaps secondary teachers
could take multiple subjects in the earlier years of secondary schools so that they spend more time with the same students.

**Implications for schools**

The findings from the current research indicate that students with possible LDs have fewer resources to invest in the coping process. In particular, they are less motivated to perform well at school, feel less connected to school and give up more frequently compared to students with expected achievement. As such, it is important for school interventions to build the coping resources of students with LDs.

There is evidence to support the use of school programs that build the coping resources of students with LDs. For instance, Firth et al. (2008) investigated the effect of a coping program and teacher feedback program on perceived control and productive coping. The coping program was designed to develop personal control and productive coping skills for students. Meanwhile the teacher feedback program was based on providing strategy-based feedback to students and encouraging students to persist and generate alternative strategies. A significant increase was found in perceived external control for those students who completed the coping program. However, no significant differences were found in productive coping, although a trend was found for an increase in productive coping. According to Cunningham et al. (2002), who examined the effectiveness for a universal school-based prevention program that was designed to increase the coping resources for students in late primary school, enhancing coping resources may be achieved through low-cost, non-intrusive school programs that utilise structures and systems already in place in the school. Therefore, there is a need for a school-based program that can be administered by teachers to build the coping resources of students with LDs, with a particular focus on student engagement and internal control.

An example of effective school practice for students with LDs was identified in a large secondary school in metropolitan Melbourne. In this school, students complete educational and cognitive tests to identify possible LDs. An experienced teacher in the school with expertise in LDs has initiated an elective option named study group to support the learning needs of students. The focus of the study group is on meeting the
expectations of the mainstream curriculum, with students being directly taught important learning, organisational and problem solving skills. For four periods per week, students can work on their curriculum tasks in a small group of about 12 students. The study group co-ordinator is responsible for the development of learning profiles which summarise the results of students” screening tests and provide suggestions for accommodations for students within the mainstream classroom. These profiles are shared with teachers through the school’s intranet to promote the use of appropriate teaching.

**Implications for the measurement of coping**

The findings of this study provide support for an alternative structure of coping for those in late primary school. In contrast to previous studies that have specified two factors using the ACS (Frydenberg & Lewis, 1993) or a subset of strategies taken from the ACS (i.e., CCS: Cunningham, 2002), there was support for a three-factor model in which productive and non-productive coping predicted the outcome of not coping. This was consistent with a study using an adult population (Frydenberg & Lewis, 2002). However, given the lack of studies that have specified and tested this particular three-factor structure in a younger sample, future studies should subject this model to further empirical testing with a sample of young people in late childhood and early adolescence.

**Implications for resource-based models of coping**

The integration of the COR model (Hobfoll, 1989; 2001) with the CCAD model (Skinner & Wellborn, 1997) was empirically tested using cross-sectional and longitudinal structural equation models. It was hypothesised that the relationship between student engagement and coping styles would be mediated by the key resource internal control, and, in turn, productive and non-productive coping styles would predict the outcome of coping. The results from the cross-sectional structural model partially supported the mediational model. Student engagement was directly associated with productive coping for both groups of students. Moreover, internal control partially mediated the relationship between student engagement and productive coping for both groups. Although internal control partially mediated the relationship between student engagement and non-productive coping for students with expected achievement, it did
not partially mediate the same relationship for students classified with possible LDs. It is plausible that students with expected achievement have more available resources at school compared to students with possible LDs, and that these resources directly reduce the use of non-productive coping strategies. The results from the longitudinal model also provided some support for the mediational model. Overall, this study has provided some support for the use of resource-based models to explain the coping behaviours of students in Years 5 and 6, including those students classified with possible LDs.

**Limitations of the study and future research**

One of the main limitations of the alternative method for screening students for possible LDs was that it was a one-off assessment based on screening tools and thus included measurement error. In order to be more confident about accurately identifying students with LDs, results from the teacher administered screening tools could be combined with other information. This could be achieved through utilising the National Assessment Program – Literacy and Numeracy (NAPLAN) results. As of 2008, students in Years 3, 5, 7 and 9 across Australian schools have been assessed using standardised tests in reading, language conventions, numeracy and writing. These tests are designed to monitor the progress of students over time and compare student achievement against national standards. The NAPLAN results could be used in conjunction with the proposed screening method in order to provide more evidence for possible LDs. For instance, students who are found to be in the lower bands on the NAPLAN at Year 3 and 5 and who scored below specified cut-offs on standardised reading and spelling tests have demonstrated a pattern of low educational achievement. Of these low achieving students, those who score above specified cut-offs on intelligence screening tests exhibit unexpected underachievement, which is indicative of LDs. Future studies could use the NAPLAN results as a test of whether students respond to interventions where students who continue to score in the lower bands of these tests have not responded to intervention.

It should be underlined that students were classified with possible LDs using screening tools and not comprehensive evaluations. As such, the presence of measurement error may have resulted in a small number of false positives and false negatives. This does not mean that comprehensive intelligence assessments are without measurement error. However, these assessments are considered the „gold standard” in
intelligence testing. Students classified with LDs in this study may have also included some of those students with emotional and behavioural problems, students with poor school attendance and students who speak English as a second language (ESL). However, it is noteworthy that no significant difference was found in the number of students who were classified with possible LDs across the two clusters. This is important given that one of the clusters consisted of students from multicultural backgrounds while the other cluster had very few students with ESL. Based on the evidence for the validity of the screening tools found in study one, it is clear that a significant proportion of Years 5 and 6 students continue to experience unexpected underachievement in reading and spelling.

As with all self-report studies, there is the potential for common method biases (Podsakoff et al., 2003). One limitation of the current research relates to item characteristics. Although items were read aloud to students, this does not ensure that students comprehended and interpreted the items correctly. This may have resulted in participants developing their own idiosyncratic understanding of the items, which make comparisons between students less meaningful. In addition, it is sometimes the case where students respond to items in order to present themselves in a more favourable light (i.e., social desirability), or, they have a tendency to agree or disagree with items regardless of the content of the items (i.e., acquiescence). To check for possible response sets, questionnaires were visually inspected. Moreover, the location of measurement and the manner in which data are obtained may also be a source of common method variance (Podsakoff et al., 2003). Since measures for the independent and dependent variables for the current study were obtained in the classroom setting exclusively using self-report questionnaires, it may be that some of the variance between variables is due to the shared contextual influences. In order to account for some of the common method variance, error terms for the same variable at time 1 and time 2 were freely estimated in the longitudinal structural model. Future studies may consider using a triangulation approach by asking teachers to rate the coping resource levels of students (e.g., student engagement, productive coping strategies) as a way of increasing validity. This approach would be one way of controlling for common method variance (Campbell & Fiske, 1959).
Another limitation of this study was the sample size. Of the 290 students involved in the current study, 167 were classified with expected achievement and 97 were identified with possible LDs. The remaining students, who were identified with low achievement or were unable to be classified, were not included in the analyses. Although 167 students is considered in the medium range of sample sizes for SEM, the 97 students with possible LDs is considered small (Kline, 2005). Future studies would be recommended to use a larger sample size of \( N > 500 \) in combination with strategies to reduce the number of parameters to be estimated, such as single indicator latent variables or item parcelling.

A further limitation of the study was the use of only two waves of data to test a mediational model. Although mediation can be tested using two waves of data based on the half-longitudinal design, it assumes that the degree to which a set of variables predicts change in another set of variables remains stable over time, an assumption known as stationarity (Cole & Maxwell, 2003). However, if the stationarity assumption is violated, then the estimation of the mediated effect is biased. Three waves of data is the preferred option because the assumption of stationarity can be tested.

Although the cross-sectional structural model provided an adequate fit to the data, it is only one plausible representation of the relationships between the variables. Other possible representations that reproduce the same predicted correlations or covariances but have a different combination of specified paths between the observed variables are known as equivalent models (Kline, 2005). Moreover, there are also non-equivalent models that could conceivably fit the data (Kline, 2005; Tomarken & Waller, 2003; Weston & Gore, 2006). In order to demonstrate whether the proposed model is the preferred representation of the relationships between variables, future studies should propose and test several plausible equivalent and alternative models. Additionally, one way to be more certain of the causal direction is to utilise an intervention design that includes experimental and control groups as well as pretest and posttest measures of the variables of interest (Neuman, 2006). For instance, an intervention that targets a particular variable could be administered to the experimental group. Prior to the intervention, baseline measures of all the variables could be taken and these same variables measured again following the completion of the intervention. A comparison
between the experimental and control groups would provide information relating to the effect of manipulating one variable on the other variables.

A final limitation involves the substantial likelihood that important variables were omitted from the model. For example, if a variable is omitted from a model but is in fact correlated with some of the independent variables in the model, the parameter estimates in the model will be biased and estimates of the standard errors will be inaccurate compared to what they would have been in a correctly specified model (Tomarken & Waller, 2003). In this study, family cohesion and external control were omitted from the model as the former was found to be a suppressor variable and the latter was severely negatively skewed. Although the decision to omit both variables from the proposed model was based on the intention to yield more accurate and meaningful results, this may in fact impact the interpretation of the causal structure of the model.

Since the evidence to support using screening tools as an alternative was based on a sample of older adolescents, there is a need for future research to validate these findings in samples of Years 5 and 6 students and younger student populations. Moreover, the findings from study one, in which working memory and processing speed were very low for students who were identified as false negatives, suggest that informal measures of these specific cognitive processes could be developed and included into the battery of screening tools to reduce false negatives. This would extend on the findings of the current research. These tests would need to be designed for a teacher to administer so that they could be administered alongside the screening tools. For example, one way to measure working memory is a digit-span test. This recommendation is based on the assumption that the information from informal assessments may serve to highlight the processing problem and the need for certain accommodations.

There is also a need for future research to examine the effectiveness of providing accommodations to students with LDs in terms of their educational achievement and mean levels of important coping resources. It is recommended that students be screened for possible LDs using the standardised educational and intelligence tests. The classifications of students into groups would be combined with
additional information from observations and work samples could also be used to support the identification of students with possible LDs. Using this information, teachers can develop appropriate accommodations for each student based on specific profiles. Prior to providing accommodations to students, baseline measures of educational achievement and coping resources should be obtained. Following a specified period of time, students would then complete the measures again in order to check for significant changes over time.

It may be also worthwhile to consider using latent growth curve (LGC) models to monitor educational achievement for students over the course of their schooling. For instance, LGC models allow change over time to be measured in a continuous variable in terms of whether a significant overall change has occurred, whether there is significant variability in individual change trajectories among a student’s observations and if a relationship exists between baseline values and change over time (Martens & Haase, 2006). The achievement trajectories for different groups of students such as students with LDs or students who have received certain interventions could also be examined (Elkins, 2007).

Conclusion

The primary purpose of this research was to test an alternative method for screening students for possible LDs using teacher administered educational and intelligence screening tests as well as to examine the coping behaviours of students with LDs using SEM. There were a number of important contributions of the current research.

One contribution was the evidence to support the validity of an alternative method for screening students for possible LDs using group-administered educational and intelligence tests that can be administered by classroom teachers. This means that teachers could screen whole classrooms for possible LDs and identify students who demonstrate unexpected underachievement in reading and spelling. Such identification would lead to improved teacher-student relationships and more appropriate teaching.

A second contribution was the identification of approximately 16 percent of the Years 5 and 6 students with possible LDs. Despite the availability of in-class support as
well as whole class, small group and individual interventions in Victorian primary schools, students continued to demonstrate unexpected underachievement in reading and spelling, which is consistent with the permanent nature of LDs. In addition, the identification of over half of the TAFE students with possible LDs provided support for the notion that an underlying reason of school dropout is LDs.

A third contribution was establishing a measurement model which can be used to explain coping for students classified with possible LDs in Australian schools. During this process, evidence was found to support an alternative structure of coping in which productive and non-productive coping predicted the outcome of not coping. When this model was combined with important coping resources such as student engagement and internal control, the overall measurement model provided discriminant validity for the constructs in the model.

A fourth contribution was that students classified with possible LDs have lower mean levels of some important coping resources compared to their peers. In particular, students with LDs were less motivated, less connected to school and were more inclined to give up than students with expected achievement.

Finally, using SEM to test the proposed model with cross-sectional and longitudinal data for students classified with possible LDs provided a theoretical contribution to knowledge. The results from the cross-sectional model indicated that student engagement promoted the use of productive coping for student classified with possible LDs. Moreover, internal control was found to be an important key resource for students with LDs as it was positively and negatively associated with productive and non-productive coping respectively, which, in turn, predicted not coping. The longitudinal model also provided some support for the mediational model where internal control at time 1 was significantly associated with productive and non-productive coping at time 2.

Final comment

The integrated model that was used in the current study has much to offer as a theoretical framework to explain the coping behaviours of students with LDs in the
future. Indeed, the resource-based model is consistent with a metaphor proposed by Richard Lavoie that uses poker chips to explain how students with LDs cope at school. In a Public Broadcasting Service (PBS) video titled, „When the Chips are Down” (PBS, 2005), Lavoie posits that poker chips represent an individual’s self-esteem where some students have more poker chips than others. In his view, students with LDs have fewer poker chips compared to their peers, which implies that they have fewer poker chips to invest at school. As a result, students with LDs are more likely to be passive and not risk their limited poker chips in order to gain poker chips. Unfortunately, this means that school is not a place where students with LDs gain sufficient rewards. Therefore, it is the responsibility of government departments, schools, teachers, other professionals who work in schools and parents to ensure that we give students with LDs more poker chips through identification and providing appropriate support.
References


Appendix A

Swinburne University of Technology

Human Research Ethics Committee Certificate of Approval

<table>
<thead>
<tr>
<th>Project Title:</th>
<th>Increasing student rates through engaging and empowering students with learning difficulties</th>
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<tbody>
<tr>
<td>HREC Register No.:</td>
<td>05/37</td>
</tr>
<tr>
<td>Chief Investigator:</td>
<td>Cunningham, Dr E</td>
</tr>
<tr>
<td>Other Investigators:</td>
<td>Ms Lyndall Sullivan</td>
</tr>
<tr>
<td></td>
<td>Ms Kay Munyard</td>
</tr>
<tr>
<td></td>
<td>PhD Student (to be named)</td>
</tr>
<tr>
<td>For period from:</td>
<td>07-Nov-05</td>
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<tr>
<td>To:</td>
<td>30-Jun-06</td>
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<tr>
<td>Approved for (max):</td>
<td>750 male participants</td>
</tr>
<tr>
<td>and</td>
<td>750 female participants</td>
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</table>

Approval is granted subject to the following conditions:
Researchers are required to immediately report anything which might warrant review of ethical approval of the protocol, including: (a) serious or unexpected adverse effects on participants; (b) proposed changes in the protocol; and (c) unforeseen events that might affect continued ethical acceptability of the project. If the research project is discontinued before the expected date of completion researchers must inform the HREC.

A progress report must be submitted annually.
A final report must be submitted at the conclusion of the project.
Special Conditions as indicated below.

Signature: [Signature]
Professor K. Pratt
Chair, Human Research Ethics Committee
Monday, 28 November 2005
SOS003126

Dr Everarda Cunningham, et al
Research and Development Division
Swinburne University of Technology
PO Box 218
LILYDALE 3140

Dear Dr Cunningham, et al

Thank you for your application of 3 November 2005 in which you request permission to conduct a research study in government schools titled: *Increasing student retention rates in Victorian rural and metropolitan areas through engaging and empowering students with learning difficulties.*

I am pleased to advise that on the basis of the information you have provided your research proposal is approved in principle subject to the conditions detailed below.

1. Should your institution's ethics committee require changes or you decide to make changes, these changes must be submitted to the Department of Education and Training for its consideration before you proceed.

2. You obtain approval for the research to be conducted in each school directly from the principal. Details of your research, copies of this letter of approval and the letter of approval from the relevant ethics committee are to be provided to the principal. The final decision as to whether or not your research can proceed in a school rests with the principal.

3. No student is to participate in this research study unless they are willing to do so and parental permission is received. Sufficient information must be provided to enable parents to make an informed decision and their consent must be obtained in writing.

4. As a matter of courtesy, you should advise the relevant Regional Director of the schools you intend to approach. An outline of your research and a copy of this letter should be provided to the Regional Director.
5. Any extensions or variations to the research proposal, additional research involving use of the data collected, or publication of the data beyond that normally associated with academic studies will require a further research approval submission.

6. At the conclusion of your study, a copy or summary of the research findings should be forwarded to the Research and Development Branch, Department of Education and Training, Level 2, 33 St Andrews Place, GPO Box 4367 Melbourne 3001.

I wish you well with your research study. Should you have further enquiries on this matter, please contact Chris Warne, Project Officer, Research on (03) 9637 2272.

Yours sincerely,

Dr John McSwiney
Assistant General Manager (Acting)
Research and Innovation Division

18/11/2005

enc
Appendix B

PARENT/GUARDIAN INFORMATION SHEET

Increasing Student Retention Rates through Engaging and Empowering Students with Learning Difficulties

Principal researcher: Dr Everarda Cunningham, Swinburne University of Technology

Your son/daughter is invited to participate in a research project that is explained below.

If you would like this information and consent form in another language, please ask your son or daughter's teacher.

Thank you for taking the time to read this Information Sheet.

What is an information statement?
An information statement explains what the research project is about and what you are being asked to do if you want your son or daughter to take part. Please read this information carefully. You can also ask your school or your child’s teacher more about the project. Once you have understood what the project is about and if you would like your child to take part please sign the consent form at the end of this statement and return it to your child’s school.

What is the research project about?
In partnership with the Department of Education and Training and with the support of the Australian Research Council, this study will look at the effect of academic results and sense of being connected at home and at school on students’ decisions to stay at school. During the study, your child’s teacher(s) will take part in a professional development program that provides teachers with a better understanding of learning difficulties and how they can make changes in their classrooms so that students with learning difficulties are more likely to succeed with school work. Students with learning difficulties are students who are smart yet have trouble with an area of school work such as reading, writing, spelling or maths. If you are a parent of a child with learning difficulties or suspect your child might have learning difficulties, you will also be invited to come to two sessions to discuss ways in which you can help your child. This study is very important and will look at how knowledge of learning difficulties and classroom changes influence how young people cope and what effects their decisions to stay at school.

Who is in charge of the research?
Dr Everarda Cunningham is the Manager of Research and Development at Swinburne University, Lilydale, and has conducted research in schools for the past ten years. She was a secondary school teacher for more than 20 years.

Why are you being asked to participate?
We hope that the findings from this study will be helpful to your school and other schools in helping teachers make changes to the way they teach in the classroom so that your son or daughter and future students get a better education. In particular, we hope that classrooms will be better places for students with learning difficulties. We also hope that providing better educational
programs and policies that meet the needs of all students will decrease the number of students who drop out of school.

What are you being asked to do?
We are asking permission for your son/daughter to complete a questionnaire during class time twice a year for the next two years. The questionnaire takes about 30 minutes to complete and measures students’ sense of belonging at school and at home, their coping strategies and how long they intend to remain at school. The questions have been given to students of this age frequently and they are easy to do. There are no right or wrong answers and all questions require either a number to be circled or a tick in a box. A copy of the questionnaire is available at the school office. We are also asking for your consent to access certain information the school already collects about students, such as test scores and attendance records.

Teachers regularly assess whether students may have a learning difficulty and therefore your son or daughter will be asked to complete a brief 15 minute spelling test and a 40 minute reading test that their teacher will give them during normal class time. Based on these test results teachers will conduct some further screening tests for learning difficulties for some students. Teachers may then refer a small number of students to Education Department psychologists for a more comprehensive test for the presence of learning difficulties.

What are the possible risks?
There are no perceived risks associated with the research. If your son/daughter does not want to answer any of the questions, they are free to leave questions blank. Taking part in this study is completely voluntary. If you give your consent for your son or daughter to take part, you may withdraw your consent at any time by contacting either the school or the university researchers.

Will the information be confidential and how will you find out the results of the study?
All information obtained in connection with this study that can identify your son or daughter will remain confidential. To maintain confidentiality the data from your son/daughter will be given a research code in place of their names. Only the university researchers involved in the study will have access to these research codes and all of the results will be kept in cabinets and stored in password protected databases. By law, this information must be kept for five years after which it will then be destroyed (shredded or erased). At the end of the study, reports will be prepared for each of the schools taking part and for the Department of Education and Training. The results of this study may also be published in scientific journals and newspapers. In all instances, only group data will be presented and no individual will be identifiable. The overall results from this study will be available through your school at the end of the project.

Where to from here?
If you agree to your son/daughter taking part in this study, please fill-in the attached consent form and then ensure that the form is returned to your school. Without the completed form your son or daughter will not be permitted to participate.

Questions about the study
If you have any queries or would like more information about this study, please contact your school or contact Dr. Everarda Cunningham at Swinburne University on 9215 7316 or by email on ecunningham@swin.edu.au

Should you have any complaint about the manner in which this research was completed, please write to: The Chair, Human Research Ethics Committee, Swinburne University of Technology, PO Box 218, Hawthorn, Victoria, 3122.

Please keep this information sheet for your own records.

In anticipation of your participation, thank you for your assistance.
Increasing student retention rates through engaging and empowering students with learning difficulties

CONSENT FORM

I have read and understood the Information Sheet, which I retain for my records, and I understand that the project will be explained to my son/daughter after I have given my consent. I understand that the information provided is confidential, and that no individual information will be disclosed. I understand that neither my son/daughter, their teachers, nor I will be given individual information. Any questions I have asked have been answered to my satisfaction. I agree to allow

........................................................................................................
(insert name of son/daughter )

........................................................................................................
(insert Form/Class of son/daughter )

to participate in this project, realising that I may withdraw my consent at any time. I also understand that my son/daughter can refuse to participate, and that s/he can also withdraw consent at any time.

I agree that research data collected for the study may be published or provided to other researchers on the condition that anonymity is preserved and that individual participants cannot be identified.

NAME OF PARENT/GUARDIAN.................................................................
(please print)

SIGNATURE.............................................................................DATE..........
INTRODUCTION

This questionnaire booklet will take approximately 30 minutes to complete. Your teacher will read the questions aloud to the class. You can wait for your teacher to read the question or you can work through the booklet at your own pace. The questions are meant to be answered quickly and easily. If you don’t understand a particular question, just put your hand up and your question will be answered.

You will be asked questions about your preferred method of coping, your feelings about school, your family and how long you intend to stay at school. Please answer these questions as honestly and quickly as you can.

Research has shown that your FIRST response is usually the most accurate. Therefore don’t spend too much time thinking about the questions.

Remember there are no right or wrong answers, just your opinions.

adolescent coping scale

On the next two pages there are different ways young people your age might cope with lots of different concerns or problem and questions. We want to know the things you do to deal with your concerns or problems.

In the questionnaire work down the page and circle the number 1, 2, 3, 4, or 5 as you do each question. The ‘1’ means you never do it, the ‘2’ means you do it rarely, the ‘3’ means you sometimes do it, the ‘4’ means you do it often and the ‘5’ means you use that way of coping a lot. Again, there are no right or wrong answers. Just put a circle around the number that fits the best for you.
ADOLESCENT COPING SCALE

Remember: you are thinking about the things you do to deal with concerns or problems

I do this …

1 = Never  2 = Rarely  3 = Sometimes  4 = Often  5 = A lot

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   | 1. Work at solving what's causing the problem | 1 | 2 | 3 | 4 | 5 | 17. Do well in what I am doing | 1 | 2 | 3 | 4 | 5 |
|   | 2. Keep up with my work | 1 | 2 | 3 | 4 | 5 | 18. I just give up | 1 | 2 | 3 | 4 | 5 |
|   | 3. Play sport | 1 | 2 | 3 | 4 | 5 | 19. Think that I make things difficult for myself | 1 | 2 | 3 | 4 | 5 |
|   | 4. There is nothing I can do so I don't do anything | 1 | 2 | 3 | 4 | 5 | 20. Daydream about how well things will turn out | 1 | 2 | 3 | 4 | 5 |
|   | 5. Try to have a cheerful outlook on life | 1 | 2 | 3 | 4 | 5 | 21. Ignore the problem | 1 | 2 | 3 | 4 | 5 |
|   | 6. Cry or scream | 1 | 2 | 3 | 4 | 5 | 22. Blame myself | 1 | 2 | 3 | 4 | 5 |
|   | 7. Hope for the best | 1 | 2 | 3 | 4 | 5 | 23. Don't let others know how I am feeling | 1 | 2 | 3 | 4 | 5 |
|   | 8. Go out and play and forget about my problems | 1 | 2 | 3 | 4 | 5 | 24. Make an effort to ‘block out’ the problem | 1 | 2 | 3 | 4 | 5 |
|   | 9. I don't know what to do about this problem | 1 | 2 | 3 | 4 | 5 | 25. Work instead of going out and playing | 1 | 2 | 3 | 4 | 5 |
|   | 10. Work at solving the problem as best I can | 1 | 2 | 3 | 4 | 5 | 26. Keep my feelings to myself | 1 | 2 | 3 | 4 | 5 |
|   | 11. Keep fit and healthy | 1 | 2 | 3 | 4 | 5 | 27. I get sick | 1 | 2 | 3 | 4 | 5 |
|   | 12. Remember those who are worse off so that my troubles don't seem so bad | 1 | 2 | 3 | 4 | 5 | 28. Make time for enjoyable activities (e.g., sport, drawing, games) | 1 | 2 | 3 | 4 | 5 |
|   | 13. Work hard | 1 | 2 | 3 | 4 | 5 | 29. Avoid being with people | 1 | 2 | 3 | 4 | 5 |
|   | 14. Do some exercise, for example, running, skating, sport, riding | 1 | 2 | 3 | 4 | 5 | 30. Take my frustrations out on others | 1 | 2 | 3 | 4 | 5 |
|   | 15. I get headaches or stomach aches | 1 | 2 | 3 | 4 | 5 | 31. Wish a miracle would happen | 1 | 2 | 3 | 4 | 5 |
|   | 16. Think about what I am doing and why | 1 | 2 | 3 | 4 | 5 | 32. See myself as being to blame | 1 | 2 | 3 | 4 | 5 |
|   | 33. Listen to other people's opinions and try to take them into account | 1 | 2 | 3 | 4 | 5 | 40. Change the amount I eat, drink or sleep | 1 | 2 | 3 | 4 | 5 |
|   | 34. Criticise or put myself down | 1 | 2 | 3 | 4 | 5 | 41. Shut myself off from the problem so that I can avoid it | 1 | 2 | 3 | 4 | 5 |
|   | 35. Find a way to relax; e.g., listen to music, read a book, play a musical instrument, watch TV | 1 | 2 | 3 | 4 | 5 | 42. Imagine that things will work out | 1 | 2 | 3 | 4 | 5 |
|   | 36. Hope that the problem will sort itself out | 1 | 2 | 3 | 4 | 5 | 43. Find a way to let off steam, for example, cry, scream, fight | 1 | 2 | 3 | 4 | 5 |
|   | 37. Look on the bright side of things | 1 | 2 | 3 | 4 | 5 | 44. Be happy with the way things are | 1 | 2 | 3 | 4 | 5 |
|   | 38. Don't tell others about my problem | 1 | 2 | 3 | 4 | 5 | 45. Think of different ways of dealing with the problem | 1 | 2 | 3 | 4 | 5 |
|   | 39. Put the problem out of my mind | 1 | 2 | 3 | 4 | 5 |

If there are other things that you do to cope when you have problems with other kids, you might like to write them here.

Adapted from the Adolescent Coping Scale (Frydenberg & Lewis, 1993) and printed with permission from E. Frydenberg, 2002.
STUDENTS ATTITUDES TO SCHOOL QUESTIONNAIRE

Read each sentence and think about how well you think the sentence fits for you. You may ‘strongly disagree’ with some; ‘strongly agree’ with others or something in between. For each one, put a circle around the score that best says how the statement fits for you. Again, there are no right or wrong answers.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I have not been bullied at my school recently</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2.</td>
<td>I get on well with others at my school</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3.</td>
<td>I respect myself</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4.</td>
<td>My teachers listen to what I have to say</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5.</td>
<td>I like school</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6.</td>
<td>I don’t feel lost at this school</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7.</td>
<td>I try very hard at school</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>8.</td>
<td>I feel I have much to feel proud of</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>9.</td>
<td>I am usually not deliberately left out of things</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>10.</td>
<td>My teachers acknowledge me when I do well</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>11.</td>
<td>I enjoy the work I do at school</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>12.</td>
<td>I am keen to do extremely well at my school</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>13.</td>
<td>I feel that I have a number of good qualities</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>14.</td>
<td>I have not been deliberately hit or kicked by another student recently</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>15.</td>
<td>At this school there is a teacher who cares about me</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>16.</td>
<td>I am accepted by others at this school</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>17.</td>
<td>Learning in my school is fun</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>18.</td>
<td>Doing well in my school is extremely important to me</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>19.</td>
<td>I take a positive attitude towards myself</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>20.</td>
<td>I like my teachers this year</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>21.</td>
<td>On the whole I am satisfied with myself</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>22.</td>
<td>I look forward to going to school</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>23.</td>
<td>Other students never spread rumors about me at my school</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>24.</td>
<td>Continuing or completing my education is very important to me</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>25.</td>
<td>My teachers understand my point of view</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>26.</td>
<td>I have not been teased recently at my school</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

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1 D.E.E.T Victoria: Social Questionnaire for Secondary Students
SELF-EFFICACY SCALE

Read each sentence and think about how well you think the sentence fits for you. Some of the statements may be ‘very right’ for you, some may be ‘right’, some may be ‘wrong’, and others will be ‘very wrong’ for you. For each one, put a tick in the column that best says how the statement fits for you. Again, there are no right or wrong answers.

<table>
<thead>
<tr>
<th></th>
<th>Very Wrong</th>
<th>Wrong</th>
<th>Right</th>
<th>Very Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>There are lots of things I can do to feel better when bad things happen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>I have a number of ways of staying calm that I know will help me cope</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>When I’m in a bad mood I can usually snap out of it</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>I have a number of good ways that will help me deal with any tough times</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>I can usually stop myself from thinking about my problems.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>I have a number of ways that help me relax when things are tough.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>If I know I’m thinking negative or silly thoughts I can usually stop myself.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Even when things are difficult I can usually keep calm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>When bad things happen I have a number of ways that help me think more clearly about them</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>I can usually talk myself out of feeling bad</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>If I start to worry about something I can usually get my mind off it and think of something nicer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>I have a number of ways which help me relax when I get uptight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>If things get tough I know there are things I can do to help myself</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>I can usually control the way I think</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>No matter what happens to me I know I can deal with my feelings and cope</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2 Short version of the Children’s Internal Coping Self-Efficacy Scale (Cunningham, 2002)
PERCEIVED CONTROL SCALE (PCS)

Read each sentence and think about how well you think the sentence fits for you. Some of the statements may be ‘very true’ for you, some may be ‘sort of true’, some may be ‘sort of false’, and others will be ‘very false’ for you. For each one, put a tick in the column that best says how the statement fits for you. Again, there are no right or wrong answers.

<table>
<thead>
<tr>
<th></th>
<th>Very false</th>
<th>Sort of false</th>
<th>Sort of true</th>
<th>Very true</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I can get good grades if I try.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. I can make friends with other kids if I really try.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I can <strong>not</strong> stay out of trouble no matter how hard I try.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4. I can do well on tests at school if I study hard.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I can <strong>not</strong> get other kids to like me no matter how hard I try.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Even if I try to follow the rules I will get in trouble for my behaviour.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. I can get good marks for my homework if I really work at it.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>8. If other kids are mean to me, I can <strong>not</strong> make them stop.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>9. If I try to behave, adults will like the way I act.</td>
<td></td>
<td></td>
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<tr>
<td>10. I can <strong>not</strong> succeed at school no matter how hard I try.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>11. I can be popular with kids my age, if I really try.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Even if I try to act right, I will still get yelled at for the things I do.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. I can <strong>not</strong> get good grades no matter how hard I try.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. I can get other kids to like me if I try.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. If I try hard to behave the right way, I will not get yelled at.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. I can <strong>not</strong> get good marks for my homework, even if I work hard at it.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. I can <strong>not</strong> make friends with other kids no matter how hard I try.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. I can stay out of trouble if I really try.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. I can not get good marks for my homework, even if I work at it.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. If other kids are mean to me, I can get them to be nice.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Even if I try to behave, adults won’t like the way I act.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. I can succeed in school if I try.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. Even if I try, I can <strong>not</strong> be popular with kids my age.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. If I try to behave, I can keep myself out of trouble.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^{3}\) The Perceived Control Scale for Children (Weisz, Southam-Gerow, & Sweeney, 1998).
About your family

Decide which of these statements are true for your family and which are false by putting a circle around T (true or mostly true) and F (false or mostly false).

1. Family members really help and support one another…………………T  F
2. We often seem to be killing time at home………………………………T  F
3. We put a lot of energy into what we do at home………………………T  F
4. There is a feeling of togetherness in our family………………………T  F
5. We hardly ever volunteer when something has to be done at home…..T  F
6. Family members hardly ever back each other up………………………T  F
7. There is very little group spirit in our family…………………………T  F
8. We really get along well with each other………………………………T  F
9. There is plenty of time and attention for everyone in our family……..T  F

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*Short Version of the Family Environment Scale  (Moos & Moos, 1994)*
A few more questions about you and your family

1. Date of birth: ……………………  2. Gender: M F  (Please Circle)
2. Class group: ……………………  4. School: ………………………………………

You have reached the end of the questionnaire.
Your answers are very important to us.
Thank you for participating.