New Zealand Primary School Teachers' Knowledge and Perceptions of Attention-Deficit/Hyperactivity Disorder (ADHD)

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ABSTRACT

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common, unremitting, and controversial childhood disorders, which affects between 1% and 7% of New Zealand children. It leads to impairments in the individual's key life activities, including social relations, academic, family, and vocational functioning, self sufficiency, as well as adherence to social regulations, norms, and laws. Teachers play a central role in the referral, diagnosis, treatment, and monitoring of students with ADHD. Research examining teachers' knowledge of ADHD however, has led to some uncertainty as to whether teachers have the level of knowledge about the disorder needed to support ADHD learners. The present study had two main objectives. It examined the knowledge and perceptions of attention-deficit/hyperactivity disorder held by primary school teachers in New Zealand and sought to determine whether teacher characteristics, such as demographic variables and experiences of students with ADHD, are associated with teachers' knowledge of ADHD. Eighty-four primary school teachers completed a postal survey containing demographic information and the Knowledge Of Attention Deficit Disorders Scale (KADDS). Results indicated that teachers answered an average of 35% of questions correctly on the KADDS. Teachers' scored significantly higher on the Symptoms/Diagnosis subscale compared to the Associated Features and Treatment subscales. All teachers in the present study reported that they believed ADHD impacts on the educational experiences of students diagnosed with the disorder. Most teachers had received no pre-service or in-service training about ADHD, and 90% of teachers wanted more training on ADHD. The majority of teacher characteristics examined were unrelated or only weakly related to teachers' knowledge of ADHD. However, the number of students with ADHD teachers' had

taught, participation in an individual behaviour plan (IBP), and participation in an individual education plan (IEP), were significantly and moderately related to higher KADDS total and Symptoms/Diagnosis scores. The results of this study suggest that New Zealand primary school teachers do not in fact have the level of knowledge about the disorder required to effectively participate in the referral, diagnosis, treatment, or monitoring of students with ADHD. Implications for educational psychology practice and directions for future research are discussed. Strengths and limitations of the study are also considered.

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I dedicate this thesis to my beautifully 'diffabled' nephew Akram, and all students with ADHD. I hope this research improves their quality of life.

CHAPTER 1

INTRODUCTION

Background of the Study

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common unremitting, and controversial childhood disorders, receiving large amounts of attention from researchers, the general public, and media in the last three decades (Funk, 2011; Kauffman & Landrum, 2009; Nigg, 2001; Sciutto & Feldhamer, 2005). Between 1% and 7% of New Zealand children are affected by ADHD (Anderson, Williams, McGee, & Silva, 1987; Lee, 2003, as cited in Curtis, Pisecco, Hamilton, & Moore, 2006; Goldman, Genel, Bezman, & Slanetz, 1998), making ADHD the most common diagnoses given to children in child and adolescent mental health services in New Zealand (Ministry of Health [MOH], 2001). Attention-deficit/hyperactivity disorder is a neurobiological/developmental disorder characterised by developmentally inappropriate behaviour (American Psychiatric Association [APA], 2000) with deficits in behavioural inhibition, sustained attention, resistance to distractions, and self-regulation (Rief, 2005). The disorder results in impairments in the individual's key life activities, including social relations, academic, family, and vocational functioning, self sufficiency, as well as adherence to social regulations, norms, and laws (Barkley, 2006). Although ADHD is a mental disorder that is usually first diagnosed in infancy, childhood, or adolescence (APA, 2000), evidence suggests that in 50 - 65% of cases, children diagnosed with the disorder continue to report considerable symptoms in adulthood (Weiss & Hechtman, 1993). Attention-deficit/hyperactivity disorder has a significant impact on society due to its financial cost, the stress it places on parents and teachers alike, the undesirable academic and

vocational outcomes it is linked to, and the damage it has on the sufferer's self esteem (Faraone & Biederman, 1999).

Students with ADHD

Children spend the majority of their time in classrooms and other school contexts in which they are expected to: comply with rules, behave in a socially desirable manner, partake in educational activities , and refrain from disrupting the learning or activities of other students who they share their educational environment with (Kleynhans, 2005). Due to the increasing adoption of an inclusive education approach to the education of students with special educational needs, the majority of children with ADHD in New Zealand, as well as the rest of the world, are currently educated in regular classrooms (Mitchell, 2010).

Symptoms of ADHD are more apparent in school settings, as the classroom environment requires that students behave in ways that are incompatible with these defining symptoms (Kos, Richdale, & Hay, 2006). Behaviours displayed by students with ADHD often get in the way of classroom and social activities, are disruptive to the teaching process, and hamper students' learning (Barkley, Murphy, & Fischer, 2010; DuPaul & Stoner, 2003; Koch, 1999).

In addition, students with ADHD often lack study skills, do poorly on tests or exams, have difficulties organising their assignments, desks, and notebooks, and are inattentive during group discussions or teacher instruction (DuPaul & Stoner, 2003). As a result, students affected by ADHD are at a high risk of academic underachievement, despite generally being of average or above-average intelligence (Mash & Wolfe, 2005; Spencer, Biederman, & Mick, 2007; Zentall, 2006). Children with ADHD necessitate greater amounts of attention than their classmates, a succession of organizational and structural modifications, and greater contribution

by teachers (Soroa, Gorostiaga, & Balluerka, 2012). The likelihood of academic underachievement increases when the student's disorder is unrecognised and not managed in a suitable manner (Barkley, 2006; Green & Chee, 1997). Experiencing school difficulties, academic underachievement, and problems with peers, not only lowers students with ADHD's self esteem (Danckaerts et al., 2010), but may effect a teacher's self-esteem as well (Glass, 2001; Glass & Wegar, 2000). Based on estimates of the disorders' prevalence, each classroom contains at least one child with ADHD, making the reduction of classroom impairments of children with ADHD an area of concern for all educational staff (Fabiano & Pelham, 2003).

Concerns about ADHD usually first appear during the early years of formal schooling, as the deficits linked to the disorder have a detrimental impact on academic performance and result in disruptive behaviour in the classroom (Searight, 2008). Teachers are often the first people to suspect that a child has ADHD (Tannock & Martinuseen, 2001). In addition, evidence suggests that they are the most common initial referral source, advising parents to obtain an assessment for their child (Snider, Busch, & Arrowood, 2003; Stroh, Frankenberger, Wood, & Pahl, 2008; Vereb & DiPerna, 2004). Furthermore, teachers' referrals for assessment of suspected ADHD have frequently been employed as a predictor of a student's symptoms. Due to their daily contact with children in a range of clinically relevant situations, teachers are considered to be among the most important sources of information during the initial assessment of ADHD (Pelham, Gnagy, Greenslade, & Milich, 1992). The significance of teachers' contribution to the diagnostic process becomes even more evident when considering the requirement outlined in the diagnostic criteria in the Diagnostic and Statistical Manual for Mental Disorders (DSM, APA, 2000) that the that the core symptoms of ADHD be present in two or

more settings (usually at home and school) (Wolraich et al., 2003), and the absence of medical tests to screen for ADHD (Kleynhans, 2005; Perold, Louw, & Kleynhans, 2010). A study conducted by Carey (1999), which involved 401 primary care paediatricians, found that more than half of them based their diagnosis of ADHD on school reports alone. Thus as informants, teachers need to be provided with accurate information about the disorder. They need to understand how to distinguish between ADHD and typical childhood behaviour (Kauffman & Landrum, 2009; Sciutto, Terjesen, & Bender-Frank, 2000). Inadequate or incorrect knowledge concerning the nature of ADHD may contribute to the over-identification or under-identification of children with ADHD (Sciutto & Feldhamer, 2005). Misdiagnosis and subsequent overdiagnosis of ADHD subjects children whose meet the criteria for the disorder to more criticism, and causes the legitimacy of their problems to be questioned (Glass & Wegar, 2000).

It is important to note that the ultimate goal of a diagnosis is to inform the development of treatment plans and increase the chances of successful outcomes by utilising the information gathered during the assessment process (DuPaul & Stoner, 2003). The classroom is a setting where children spend extensive time learning and developing adaptive skills. It develops into a valuable and suitable setting in which interventions that facilitate the personal, social, and academic growth of students with ADHD can be introduced (Miranda, Presentación, & Soriano, 2002). Thus teachers are often assigned the task of implementing educational and behavioural interventions for students with ADHD in the classroom (DuPaul & Stoner, 2003; Snider et al., 2003). Teachers are also usually expected to monitor progress made by the student as a result of treatment, even when they have not implemented it (Tannock & Martinussen, 2001). For example, although teachers do not prescribe

stimulant medication, the New Zealand Ministry of Health (MOH, 2001) stresses the importance of monitoring symptoms and side effects closely when a child is prescribed stimulant medication, and that this should be informed by observations and reports from parents and teachers when possible. Thus teachers require knowledge about the symptoms or behaviours being targeted by the treatment. The success of school interventions for ADHD is largely dependent on teachers (Miranda et al., 2002) and their knowledge of the disorder (Kleynhans, 2005). Researchers have found that where teachers have a poor understanding of the nature, course, outcome, and causes of the disorder, and hold misperceptions about appropriate interventions, attempts to establish behaviour management programs within that classroom will have little positive impact (Pfiffner, Barkley, & DuPaul, 2006).

Knowledge and Perceptions of ADHD

A multitude of studies has been conducted on the subject of ADHD, with the amount growing rapidly during the last three decades (Lazarus, 2011; Sciutto & Feldhamer, 2005). Prior research has for the most part been related to assessment (e.g., Angello et al., 2003; Carey, 1999; Hartnett, Nelson & Rinn, 2004), treatment (e.g., Fabiano & Pelham, 2003; Miranda et al., 2002; Moline & Frankenberger, 2001) and the aetiology of the disorder (e.g. Barkley, 1998, 2006). In addition, a large amount of literature on comorbid disorders exists (e.g., Biederman, Faraone, Mick, Moore, & Lelon, 1996; Jensen, Martin & Cantwell, 1997). Educational research on ADHD has generally centred on the academic and social difficulties students with the disorder are faced with in a classroom setting (e.g., DuPaul & Eckert, 1997a; Pfiffner et al., 2006).

There has also been a remarkable increase in the amount of media coverage of the disorder, which has amounted to greater public awareness of ADHD, and

subsequent concern over misdiagnosis (Sciutto & Feldhamer, 2005). To respond to the growing controversies surrounding the disorder, a consortium of 84 leading international scientists released an international Consensus Statement on ADHD in 2002, which addressed the press (Barkley et al., 2002). This was driven by a concern that the media's constant misportrayal of ADHD might prevent thousands of people experiencing problems from seeking treatment for their condition. The purpose of this statement was to provide accurate scientific knowledge on a recognised disorder and the detrimental impact it has on the lives of people affected by this condition.

Despite the immense amount of research, literature, and information on ADHD, the disorder is often misunderstood; "it is a disability plagued by misconceptions and myths" (Gargiulo, 2010, p.241). The behaviour of a child with ADHD is often misinterpreted by parents and professionals alike who perceive the child to be bad-mannered, disobedient and lazy (Lazarus, 2011). Attention-deficit/hyperactivity disorder is considered to be a genuine and severe condition by some individuals. However, many people question the legitimacy of the disorder, viewing it as an attempt to justify parents' or teachers' inadequacies, and ease them of the responsibility and blame for the child's atypical behaviour (Bateman, 1992; Gargiulo, 2010). Some consider ADHD to be a product of organic and biological functions, while others consider environmental factors, such as the parent-child relationship to be the underlying cause of the disorder (Dennis, Davis, Johnson, Brooks & Humbi, 2008). According to some, proper discipline at home and quality instruction at school would put an end to the problems associated with ADHD in the vast majority of cases (Allen, 1995; Armstrong, 1996; Lloyd, Stead, & Cohen, 2006). Others perceive ADHD as a real neurodevelopmental disability that cannot

be cured (Accardo, Blondis, Whitman & Stein, 2000; Barkley, 2006; Tannock, 1998). Differences of opinion among professionals, and lack of clarity among the public concerning the disorder, have been noted at virtually every point of both research and practice (Hallahan & Cottone, 1997; Hallahan, Kauffman, Weiss, & Martinez, 2005).

Teachers' Knowledge about ADHD

Research examining teachers' knowledge of ADHD has led to some uncertainty as to whether teachers have the level of knowledge about the disorder needed to carry out the large and important roles they play in the referral, diagnosis, treatment, and monitoring of the ADHD (Garcia, 2009; Perold et al., 2010). Prior studies examining teachers' knowledge about ADHD have consistently revealed that a lack of attention to the disorder exists in pre-service and in-service teacher training, despite teachers expressing a desire for more education and training on the subject matter (Bekle, 2004; Holowenko & Pashute, 2000; Jerome, Gordon, & Hustler, 1994). Not surprisingly, research indicates that many educators have a weak understanding of, and hold several specific inaccurate beliefs about the symptoms, nature, course, prognosis, aetiology, and treatment of ADHD (Jerome et al., 1994; Pfiffner et al., 2006; Sciutto et al., 2000; Snider et al.; 2003; West, Taylor, Houghton, & Hudyma, 2005). For example, there is considerable evidence that teachers' commonly believe that sugar intake and other dietary modifications impact ADHD symptoms (e.g., Bekle, 2004; Bussing, Scoenberg, & Perwein, 1998; DiBattista & Shepherd, 1993; Jerome et al., 1994).

Inaccurate information about ADHD may result in unsuccessful interventions for children affected by the disorder (DuPaul & Eckert, 1997b). Teachers' misperceptions about treatment for ADHD can have a particularly detrimental

impact on the wellbeing of the child, as these may be passed on to parents. Parents of children with ADHD frequently seek information about the disorder from schools (Bussing et al., 1998). However, research has found that teachers provide incorrect and unsuitable advice to parents of students with ADHD, which parents often follow (DiBattista & Shepherd, 1993). For example, teachers who incorrectly believe that diet has an impact on ADHD symptoms may advise parents to make changes to the child's diet, and parents may follow this advice (DiBattista & Shepherd, 1993). Treatments consisting of dietary modifications can be expensive, offer false hope for a quick cure, and consequently delay the delivery of evidence-based treatments, whose efficacy is documented (Mash & Wolfe, 2002). It is therefore imperative for teachers to have sufficient and suitable knowledge about the symptoms/diagnosis, aetiology, and course of the disorder so they can offer correct and useful advice (Kleynhans, 2005).

Experts have suggested many other ways in which teachers' knowledge of ADHD may have implications for students with ADHD, although evidence to support these proposals is scarce. In a study examining teachers knowledge and attitudes towards ADHD in one of the largest cities in Iran, a significant positive association between knowledge and attitude was found (Ghanizadeh, Bahredar, & Moeinia, 2006). The authors of this study concluded that a relationship between knowledge of and attitudes towards ADHD could be interpreted to mean that teachers with greater knowledge of ADHD also have a more tolerant attitude. These results were consistent with those obtained by Bekle (2004), in a study of practicing and student teachers in Perth, Australia. In this Australian study, teachers with greater knowledge of ADHD in both samples viewed students with ADHD in a more favourable light. There is also evidence to suggest that teachers' perceptions of their

competence mediate their attitudes (Brophy & McCaslin, 1992; Li, 1985; Rizzo & Vispoel, 1991). For example, results of a study conducted by Rizzo and Vispoel (1991) involving 94 physical education teachers indicated that teachers who reported feeling more competent in their ability to teach students with disabilities expressed more favourable attitudes towards teaching this population of students.

A recent Australian study conducted by Ohan, Cormier, Hepp, Visser, and Strain (2008) investigated the relationships between teachers' knowledge of ADHD and behaviour towards students with ADHD. Ohan and colleagues classified their sample of 140 primary school teachers into three groups: high, average, and low knowledge based on their responses to a survey that measured their knowledge about ADHD. Participants also answered questions relating to vignettes they had read about hypothetical students affected by the disorder. Teachers with high levels of ADHD knowledge more frequently reported that they would refer a student for assessment either directly or by advising parents to seek assessment, and considered assessment services beneficial to students with the ADHD, than teachers with low knowledge. However, the results of this study also suggested that greater knowledge of ADHD might have a detrimental effect, as teachers with greater knowledge of ADHD had less confidence in their ability to manage children with ADHD in the classroom.

It is reasonable to expect teachers' knowledge of and attitudes towards students with ADHD to have some bearing on their ensuing behaviour (Glass & Wegar, 2000). Indeed, research indicates that many teachers behave in a manner that is consistent with their attitudes (Alderman & Nix, 1997; DiBattista & Shepherd, 1993; Greene, 1995, 1996), and that teachers are inclined to oppose novel ideas and approaches that are not in line with their belief systems (Westwood, 1996). For

example, it is unlikely for a teacher to use psychological interventions to treat the behavioural symptoms of student with ADHD if he/she believes that the disorder is caused by chemical imbalances in the brain (Kos et al., 2006). In their cross-national study, Curtis and colleagues (2006) concluded that the amount of knowledge about ADHD that a teacher holds influences their acceptance of various treatments for the disorder. This belief is in line with Reimers, Wacker, and Koeppl's (1987) model of treatment acceptability. According to this model, greater understanding of the problem and treatment leads to increased treatment acceptability, compliance, effectiveness, and integrity. Researchers who have investigated treatment acceptability have found that an individual's knowledge about a specific treatment is positively related to their rating of that treatment's acceptability (Elliott, 1988; Miltenberger, 1990). Thus, teachers who disagree with a recommended treatment may refuse to implement it, fail to implement it in the optimal manner, or are unable to complete the intervention (Eckert & Hintze, 2000; Wilson & Jennings, 1996). There is some evidence to suggest that when treatment integrity is compromised, the effectiveness of treatment is affected (Wickstrom, Jones, LaFleur, & Witt, 1998; Wilson & Jennings, 1996).

Inclusion of all children in the classroom has given rise to several new challenges for teachers. The subsequent diversification of their roles has led many teachers to experience increasing pressure (Avramidis, Bayliss, & Burden, 2000; Clayton, 1996; Forlin, 1997; Long, 1995; McKinnon & Gordon, 1999; Paterson & Graham, 2000; Schloss, 1992). Research conducted by Greene, Beszterczey, Katzenstein, Park, and Goring (2002) revealed that elementary school teachers experienced more stress when interacting with students affected by ADHD than when interacting with other students in the classroom. These teachers also

considered the experience of teaching students with the disorder to be considerably more stressful than teaching their non-ADHD classmates. There is some evidence to suggest that teachers who have larger gaps in their knowledge and understanding of ADHD are faced with greater challenges when working with students who have the disorder (Brook, Watemburg, & Geva, 2000; Ghanizadeh et al., 2006; Sze, 2009). There is some evidence stemming from literature on included students with disabilities that indicates that the attitudes that teachers hold and the degree of frustration they feel could affect the quality of their teaching (Cook, 2001).

Teachers play a central role in the referral, diagnosis, treatment, and monitoring of students with ADHD. Given the reportedly inadequate training provided to teachers in the area of ADHD, and the potential implications of inadequate or inaccurate knowledge about the disorder, it is of vital importance that school teachers' knowledge and perceptions regarding ADHD are examined and understood.

Statement of the Problem

Despite the existence and availability of many empirical studies examining the causes, assessment, associated issues, and treatment of ADHD, relatively few studies have examined teachers' knowledge of and perceptions of the disorder, or linked these to teacher characteristics. The results of these studies have been mixed due to methodological differences between the studies (Kos et al., 2006). Teachers' knowledge of ADHD has been measured using a variety of instruments. The true psychometric properties of many of these instruments remain unclear due to a lack of adequate empirical testing (Anderson, Watt, Noble, & Shanley, 2012). Teacher knowledge of ADHD has been evaluated in several countries and regions including the United States, Canada, the Middle East, Australia, Europe, and Asia, and Africa

(e.g. Akram, Thomson, Boyter, & McLarty, 2009; Bekle, 2004; Brook et al., 2000; Ghanizadeh et al., 2006; Havey, 2007; Holst, 2008; Hong, 2008; Jerome et al., 1994; Kos, Richdale, & Jackson, 2004; Nur & Kavakci, 2010; Ohan et al., 2008; Perold et al., 2010; Syed & Hussein, 2010; West et al., 2005). However, only one study investigating teacher knowledge of ADHD in New Zealand has been reported (Curtis et al., 2006).

Research examining cultural variations in teachers' knowledge and attitudes about ADHD is scarce (Ghanizadeh et al., 2006). Cultural variability may influence access to care. For example, educational policies in the United States and New Zealand differ significantly. The United States adopts a categorical model of service delivery (Curtis, Moore, & Hamilton, 2000, as cited in Curtis et al., 2006). New Zealand policies, for instance the Special Education 2000 policy for inclusive education (Ministry of Education [MOE], 1995) on the other hand, refrain from providing a set definition for student disability and condemn the use of categorical labels in schools to encourage "need-based," "non-categorical services" (Ballard, 1993; Fraser & Moltzen, 2000; MOE, 1996; Mitchell, 2000). In addition, teachers' conceptualisations of ADHD are impacted by cultural and environmental dimensions (Ghanizadeh et al., 2006)."Historically there have been differences regarding how ADHD has been conceptualized in the U.S. and N.Z." (Curtis et al., 2006, p.173). For example, researchers from the U.S. generally view ADHD to be a specific medical condition, which commonly coexists with learning difficulties (APA, 1994; Barkley, 1998). On the other hand, some researchers in New Zealand have maintained that ADHD behaviours are a product of academic failure or learning difficulties (McGee & Share, 1988; Stanton, Feehan, McGee, & Silva, 1990).

Evidence also suggests that cross-national differences exist concerning teachers' acceptance of treatments for ADHD. In the study conducted by Curtis and colleagues (2006), differences between the New Zealand and U.S. sample of teachers were observed for both behavioural and pharmacological interventions. Specifically, the New Zealand sample of teachers considered both these forms of intervention to be less acceptable, effective, and to have less timely effects than teachers in the U.S. sample. The New Zealand sample of teachers also scored significantly lower on a measure of knowledge than the U.S. sample. In light of these cultural differences, it is reasonable to assume that one cannot generalise the results of previous international research examining teachers' knowledge of ADHD to a New Zealand population. Given New Zealand's commitment to inclusive education, and the prevalence of ADHD in New Zealand, conducting a study in New Zealand seemed valuable.

Purpose of the Study

The purpose of this study was to examine the knowledge and perceptions of attention-deficit/hyperactivity disorder held by primary school teachers in New Zealand. A second purpose was to determine whether teacher characteristics, such as how many years a teacher has been teaching, their level of education (e.g., bachelor's degree, master's degree), the amount of pre-service or in-service training on the topic of ADHD they received, amount of experience with ADHD, are associated with teachers' knowledge of ADHD.

Significance of the Study

Although one study has been undertaken in New Zealand (Curtis et al., 2006), the information it provided about teachers' knowledge of ADHD in New Zealand was limited (the authors only reported a total score for knowledge) due to its

methodology, and focus on other areas. The study, which was conducted by Curtis and colleagues, utilised the ADHD Knowledge Scale (K-ADHD, Jerome et al., 1994), which is uni-dimensional, consists of 20 items, and has a dichotomous (*true/false*) response format. This instrument has been criticised for failing to provide detailed information about the knowledge of ADHD that teachers have (Soroa et al., 2012). Furthermore, it does not allow a distinction between lack of knowledge, and incorrect knowledge about ADHD to be made (Hepp, 2009).

Very limited information about primary school teachers' knowledge of ADHD in New Zealand is available. The objective of this research is to fill some of that gap and produce the first study in New Zealand that attempts to examine teachers' knowledge, and perceptions of ADHD in relation to symptoms/diagnosis of ADHD, the treatment of ADHD, and general information about the nature, causes, and outcome of ADHD, and to associate these factors with teacher characteristics. By directly quantifying teachers' knowledge of ADHD, identifying areas of strengths and weaknesses as well as inaccurate beliefs, and exploring possible links to teachers characteristics the experiences and needs of this population can be better understood. This knowledge could inform and improve future policies and interventions aimed at understanding, assisting and supporting children with ADHD and their teachers. Identifying areas of strength, commonly held inaccurate beliefs and areas of knowledge that are particularly weak is crucial for evaluating, designing and implementing effective educational interventions (Sciutto et al., 2000).

Definition of Terms

Attention-Deficit/Hyperactivity Disorder (ADHD)

Attention-deficit/hyperactivity disorder is a childhood mental disorder characterised by persistent and developmentally inappropriate symptoms of

inattention and (or) hyperactivity-impulsivity (APA, 2000). These symptoms have a detrimental impact on the individual's everyday functioning (Efron, Scibberas & Hassell, 2008).

Teacher Knowledge

Teacher knowledge will be defined as the "knowledge that a teacher has at a point in time which may originate from formal schooling, practical experiences, and/or day-to-day practice, that underlies his or her actions" (Carter, 1990; Calderhead, 1996; Verloop, Driel, & Meijer, 2001, as cited in Hepp, 2009, p.9).

Perceptions and Misperceptions

The term *perception* is defined differently by the disciplines of philosophy, sociology and psychology. Nevertheless, for purposes of this research, *perception* will be defined as "the way a person understands something" (Simpson & Weiner, 1989, as cited in Perold et al., 2010, p.460). Accordingly, the word *misperception* will be used in instances where teachers' knowledge and understandings pertaining to ADHD are incorrect and false (Lazarus, 2011).

Primary School Teachers

The term *primary school teachers* will refer to teachers who are involved in the education of students enrolled in Year 0 to Year 8 (New Zealand Ministry of Education [NZMOE], 2013a).

Full Primary, Contributing, and Intermediate Schools

Full primary schools are defined as schools in New Zealand that cater for students in Year 0 to Year 8. The majority of students at these schools are between five and 13 years of age. Contributing schools are defined as schools in New Zealand that educate children from year 0 to Year 6. The majority of students at these schools are between five and 10 years of age. Intermediate schools are defined

as New Zealand schools that cater for students in year 7 and Year 8. The majority of students at these schools are between 10 and 13 years of age (NZMOE, 2013b).

Research Questions

1. What knowledge and perceptions do primary school teachers in New Zealand have about ADHD in general?
2. What knowledge and perceptions do primary school teachers in New Zealand have about ADHD in relation to:
    a. symptoms/diagnosis?
    b. general information about the nature, causes and prognosis (associated features)?
    c. treatment?
3. What are New Zealand primary school teachers' specific areas of knowledge and perceptions about ADHD in terms of:
    a. symptoms/diagnosis?
    b. associated features?
    c. treatment?
4. Do New Zealand primary school teachers have greater knowledge about the symptoms/diagnosis, associated features, or treatment of the disorder? Are these differences significant?
5. Are New Zealand primary school teachers' perceptions about ADHD more or less likely to be related to the symptoms/diagnosis, associated features, or treatment of the disorder?
6. Are there statistically significant differences in the amount of misperceptions New Zealand teachers hold about the symptoms/diagnosis, associated features, and treatment of ADHD?

7. Which specific misperceptions are most widespread amongst New Zealand primary school teachers?
8. Do teachers have larger gaps in their knowledge of the symptoms/diagnosis, associated features, or treatment of ADHD? Are these differences significant?
9. What specific information about ADHD do New Zealand primary school teachers most commonly have, or lack?
10. Which, if any of the teacher characteristics examined correlate statistically with teachers' knowledge of ADHD in terms of:
    a. symptoms/diagnosis?
    b. associated features?
    c. treatment?

CHAPTER 2

LITERATURE REVIEW

Attention-deficit/hyperactivity disorder is one of the most common neurobiological/developmental childhood disorders (American Psychiatric Association [APA], 2000). The disorder is characterised by symptoms of distractibility/inattentiveness, hyperactivity, and impulsivity, which are more frequently exhibited and more severe than is typically observed in individuals at an equivalent level of development (APA**,** 2000; Sherman, Rasmussen, & Baydala, 2008**)**. These core characteristics are also associated with deficits in multiple domains including social functioning, rule-governed behaviour, and academic/work consistency (Barkley, 2006; Faraone et al., 1993; Fell & Pierce, 1995). The problems that typify ADHD can make an individual affected by the disorder a burden for parents, siblings, teachers, classroom peers, and co-workers (Kauffman & Landrum, 2009). Recent empirical evidence indicates that deficits in behavioural inhibition and sustained attention are underlying ADHD (Barkley et al., 2002). The majority of neurological studies have found that individuals with ADHD have less brain electrical activity and exhibit less reactivity to stimulation in at least one of the following regions of the brain: the frontal lobe, its connections to the basal ganglia, and their relationship to central aspects of the cerebellum (Faraone & Biederman, 1999).

Diagnosis of ADHD

Current Definition

In New Zealand, the current diagnostic system most commonly used by psychiatrists to classify individuals with mental disorders is the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition Text Revision (DSM-IV-TR)

(APA, 2000; Mellsop, Dutu, & Robinson, 2007). According to this classification system, ADHD is characterised by symptoms of inattention, and/or impulsivity and hyperactivity, that are more frequently displayed and more severe in nature than is typically observed in individuals at a comparable level of development (APA, 2000). The onset of the disorder must occur by age seven, and the main symptoms need to have been exhibited for at least six months. Furthermore, the symptoms need to be present and persistent in at least two environmental settings, for example, at school and at home (APA, 2000). This criterion is paramount as it reduces the likelihood that children will be diagnosed with ADHD merely because they do not work well with a teacher, or have a poor or conflicting relationship with a parent. Despite this requirement, several students are diagnosed exclusively based on information from a parent without receiving records and information from the school the student attends (Haber, 2003; Rowland, Lesesne, & Abramowitz, 2002).

According to the DSM IV, a specific number of the following symptoms need to be exhibited for the diagnosis of ADHD to be made:

Inattention:

(a) Often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities.

(b) Often has difficulty sustaining attention in tasks or play activities.

(c) Often does not seem to listen when spoken to directly.

(d) Often does not follow through on instructions and fails to finish school work, chores, or duties in the workplace.

(e) Often has difficulty organizing tasks and activities.

(f) Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (school work or homework).

(g) Often loses things necessary for tasks or activities (books, toys).

(h) Is often easily distracted by extraneous stimuli.

(i) Is often forgetful in daily activities.

Hyperactivity-impulsivity:

(a) Often fidgets with hands or feet or squirms in seat.

(b) Often leaves classroom or in other situation in which remaining seated is expected.

(c) Often runs about or climbs excessively in situations in which it is inappropriate.

(d) Often has difficulty playing or engaging in leisure activities quietly.

(e) Is often "on the go" or often acts as if "driven by a motor."

(f) Often talks excessively.

(g) Often blurts out answers before questions have been completed.

(h) Often has difficulty awaiting turn.

(i) Often interrupts or intrudes on others (APA, 2000, p.92-93).

Subtypes. Attention-deficit/hyperactivity disorder is a clinically heterogeneous mental disorder (Faraone & Biederman, 1999). According to the DSM-IV, three subtypes are associated with ADHD: predominantly inattentive, predominantly hyperactive-impulsive, and combined (APA, 2000). The diagnosis of a subtype is based on which symptoms are more predominantly exhibited. A minimum of six symptoms in each category (both hyperactivity-impulsivity and inattentive, and a total of at least 12 symptoms) must be present to warrant a diagnosis of the combined type of ADHD. Six or more inattentive symptoms but fewer hyperactive-impulsivity symptoms must be present to form a diagnosis of the predominantly inattentive type of ADHD. Finally, six or more of hyperactivity-

impulsivity symptoms but fewer inattention symptoms must be present to warrant a diagnosis of the hyperactive-impulsive type of ADHD (APA, 2000).

Differential Diagnosis

A diagnosis of ADHD should only be made once other mental disorders and medical conditions have been considered and ruled out, as the symptoms of ADHD are not unlike the symptoms of several other disorders (DuPaul & Stoner, 2003; MOH, 2001). For example, symptoms of mania that are exhibited by children who are affected by bipolar disorder mimic the extreme irritability and disruptiveness displayed by children with ADHD. This may lead to the misdiagnosis of both disorders (Cullinan, 2007). The ability to differentiate between these two conditions is particularly important as the stimulant psychotropic drugs often prescribed for individuals with ADHD can seriously exacerbate the manic symptoms of bipolar disorder (Hammen & Rudolph, 2003). In addition, individuals with hyperthyroidism may be misdiagnosed as ADHD, as hyperthyroidism is also associated with symptoms of inattention, decreased recent memory, and increased motor activity. Thus, thyroid function tests are occasionally used when assessing for ADHD, particularly with adults. Impaired attention and concentration may also stem from obstructive sleep apnoea. If an individual presents with other symptoms of sleep apnoea, such as loud snoring and brief breathing cessation, a sleep study should be conducted to ascertain whether symptoms of inattention are indicated of sleep apnoea or ADHD (Searight, 2008).

Prevalence

Attention-deficit/hyperactivity disorder is the most common cognitive, emotional and behavioural disorder treated in early life, affecting 3% - 5% of the school aged population worldwide (Barkley, 2001; Goldman et al., 1998). The

estimated prevalence of the disorder in the U.S. ranges from 4% - 12% in non-referred, school-aged community samples (American Academy of Pediatrics, 2000), with even higher rates in clinically referred children (Merrell, Ervin, & Gimpel, 2006). The exact prevalence of ADHD is difficult to compute due to differing diagnostic criteria, methods of assessment, and particular samples being examined (DuPaul & Weyant, 2009).

Over the past 50 years, the majority of research regarding ADHD has been conducted in the U.S. As a result, some experts assumed that ADHD is predominantly an American disorder, with rates of prevalence in other nations being considerably lower (Faraone, Sergeant, Gillberg, & Biederman, 2003). To examine the validity of this suggestion, Faraone and colleagues (2003) conducted an analysis of 50 studies and concluded that the prevalence of ADHD is equal or higher in many children in other countries (including New Zealand) as in American children. Studies of ADHD conducted within and outside the U.S. have also obtained remarkably similar findings concerning the external correlates of diagnosis, including the profiles of adaptive impairments and neuropsychological deficits; degree of familiarity; and estimation of the magnitude of genetic influence; association of specific candidate genes; structural, functional, and molecular imaging findings; and response to particular pharmacological treatments (Spencer, Biederman, Wilens, & Faraone, 2002). In light of these findings, it is reasonable to conclude that ADHD is truly a universal disorder.

Studies that have investigated the prevalence of ADHD in New Zealand have found comparable rates and variability in results: between 1 to 6.7% of New Zealand children are affected by the disorder (Anderson et al., 1987; Lee, 2003, as cited in Curtis et al., 2006; Goldman, et al., 1998). The large discrepancy between results of

studies examining the prevalence of ADHD in New Zealand may be attributed to methodological issues. For example, the Dunedin Health and Development Study (Anderson et al., 1987), which reported a rate of 6.7%, utilised a psychiatric interview by an experienced child psychiatrist, and utilised a sample in which children from large urban areas were absent, and those from Maori and Pasifika backgrounds underrepresented. Thus the generalisability of this study's findings may be limited. Despite the lack of research examining the prevalence rate of the disorder in New Zealand, ADHD is the most common diagnosis given to children in child and adolescent mental health services in New Zealand (Ministry of Health [MOH], 2001).

The majority of estimated prevalence rates for ADHD suggest that gender differences exist. The disorder is notably more prevalent in males than in females, particularly during their childhood years. Males are four times more likely to develop the disorder than females, although this gender ratio seems to differ significantly in various populations (Faraone et al., 2003). Boys have a higher chance of being referred for clinical assessment, and are three times more likely to meet the criteria for ADHD (Gershon & Gershon, 2002; Thompson, 1996).

Comorbidity

Most children with ADHD suffer from other problems, which are not associated with the fundamental symptoms of the disorder. This combined with the heterogeneity of the disorder, makes establishing the prognosis of the disorder a complex matter (Soroa et al., 2012). Estimates of comorbid psychiatric disorders in children and adolescents with ADHD reveal that approximately 44% of this population have one, 33% have two, and 10% have three additional disorders (Root & Resnick, 2003). The most common associated conditions include conduct

disorder (CD), oppositional defiant disorder (ODD), anxiety disorders, and depression (Mash & Wolfe, 2002). Between 35% - 70% of children with ADHD develop ODD and/or CD (Biederman, Newcorn, & Sprich, 1991; Johnston & Ohan, 1999). Thirty-four percent of children with ADHD have a coexisting anxiety disorder (MTA Cooperative Group, 1999), and up to a third of children affected by ADHD have comorbid depression (Pliszka, Carlson, & Swanson, 1999). A number of learning disorders also coexist with ADHD (Bear & Minke, 2006; Davies & Jennings, 2006; Pliszka et al., 1999; Wender, 2000). A study that analysed the data from the U.S. National Health Interview Survey (NHIS), revealed that 28% of children diagnosed with either ADHD or a learning disorder had been diagnosed with both conditions (Pastor & Reuben, 2008).

Coexisting disorders may exacerbate the difficulties children with ADHD and key people in their life face. The combination of ADHD and anti-social behaviour may cause children to experience impaired relationships with their peers (Kos et al., 2006; Selikowitz, 2004). "CD appears to worsen the course of ADHD: This comorbid condition is more persistent; more associated with severe family conflict; and more predictive of later school dropout, delinquency, and arrest than is ADHD without CD" (August, Stewart, & Holmes, 1983; Biederman et al., 1996; Fletcher, Fisher, Barkley, & Smallish, 1996; Satterfield & Schell, 1997, as cited in Pfiffner et al., 1999, p.881). Coexisting conditions may exacerbate the academic struggles faced by these children, and make teaching these students more challenging (Small, 2003). However, to support students with ADHD in their classroom in the most optimum manner, teachers need to be aware of these high rates of comorbidity and realise that symptoms associated with ADHD are often just one of their problems (Kellner, Houghton, & Douglas, 2003).

Aetiology

Experts have acknowledged four divisions of causal factors in the development of ADHD: genes, pregnancy and birth complications, exposure to toxins, and psychosocial adversity (Moir, 2010). The findings of empirical studies on the disorder have resulted in an increasing emphasis being placed on possible genetic influences, anatomic anomalies, biochemical impairments, and differences in both brain structure and function typical of ADHD (Chowdhury & Stein, 2006). Early research on the disorder revealed that a family history of ADHD is four times more common for children with ADHD than for a sample of typically developing controls (Cantwell, 1975). More recent research conducted by Frick et al. (1992) found that 80% of their sample of children with ADHD had at least one first-degree biological relative who had ADHD during their childhood. There is also strong evidence to suggest that low birth weight and maternal smoking during pregnancy are factors that considerably increase the risk of a child developing ADHD (Mick, Biederman, Prince, Fischer, & Faraone, 2002). While research has established that attention and learning difficulties can be caused by lead poisoning, lead does not account for the majority of cases of ADHD, and exposure to lead does not guarantee that the disorder will develop (Spencer, 2008).

There has been a large amount of public and media attention regarding the role of food additives and diet in the aetiology of ADHD (Moir, 2010). However, evidence lending support to such a relationship is lacking. For example, the Feingold (1975) diet for ADHD received much interest from the public and media alike, and was accepted and utilised as a treatment for the disorder by countless parents. However, empirical studies have indicated that the diet was ineffective (Faraone & Biederman, 1998; Pelham, Wheeler, & Chronis, 1998) and that food

additives cannot be considered a causal factor in the development of ADHD (Spencer, 2008). Recent studies have also show the potential role that psychosocial adversity plays in both the development and maintenance of ADHD. Studies which compared ADHD families to controls have identified several characteristics which are more common in ADHD families, namely family conflict, decreased family cohesion, and exposure to paternal psychopathology, particularly maternal (Spencer, 2008). Psychosocial adversity is regarded as a trigger of an underlying predisposition to ADHD or a factor that influences the prognosis of the illness (Moir, 2010).

Development, Course, and Prognosis of ADHD

A commonly held belief about ADHD is that children affected by the disorder naturally outgrow their symptoms by the time they reach adulthood (Jerome et al., 1994). However, evidence from longitudinal studies suggests that for two thirds of these children, primary and secondary symptoms of ADHD persist into late adolescence (Carr, 2006). These adolescents show an improvement in their ability to self-regulate with their maturation, but continue to exhibit significant difficulties with inattention and impulsivity, which have a detrimental impact on their functioning at school, their self esteem, and the developmental tasks of adolescence (Robin, 1998). Furthermore, an estimated 50% - 65% of children continue to experience symptoms of ADHD in their adult years (Weiss & Hechtman, 1993).

The rate at which the fundamental symptoms of ADHD decline from childhood into early adulthood differ (Biederman, Mick, & Faraone, 2000). While symptoms of inattention decline at a slow pace, symptoms of hyperactivity and impulsivity remit more suddenly (Spencer et al., 2007). Furthermore, evidence indicates that while inattention and other cognitive deficits linger, hyperactivity and

impulsivity become less pronounced at nine years of age (Searight, 2008). For example, a longitudinal study found that although the mean number of hyperactive/impulsive symptoms declined with age, the mean number of inattentive symptoms remained stable from age eight to 15 (Hart, Lahey, Loeber, Applegate, & Frick, 1995).

Spencer and colleagues (2007) analysed data from a four year longitudinal study conducted by Biederman, Mick, and Faraone (1998) to explore the long term course, outcomes, and prognosis of ADHD. They examined the adjustment of individuals with ADHD across three categories: emotional, educational, and social. Their results indicated that 20% of children with persistent ADHD functioned poorly at follow-up in all 3 categories, 20% did well in all 3 categories, and 60% had intermediate outcomes. They also found that exposure to maternal psychopathology, larger family size, psychiatric comorbidity, and impulsive symptoms could to some extent predict the adjustment outcomes they examined.

Differences between Subtypes

The likelihood of having comorbid ODD or CD is greater in children with ADHD who experience symptoms of hyperactivity than in their inattentive counterparts. Furthermore, evidence suggests children with ADHD who also exhibit significant conduct problems are at increased risk of having learning problems and poorer information-processing ability (Semrud-Clikeman, Hynd, Lorys, & Lahey, 1993). Children with impulsivity issues on the other hand, are generally disliked and rejected by their peers (Cullinan, 2007). As these children grow older, they tend to befriend other unpopular adolescents, and make irrational or rash decisions about peer groups, illegal undertakings, and other serious life situations, which have a detrimental impact on their welfare (Anastopoulos & Shelton, 2001; Barkley, 2003).

Research has found symptoms of hyperactivity and impulsivity associated with ADHD to be strongly related to Children's Global assessment scores (Lahey, Applegate, McBurnett, & Biederman, 1994).

Associated Characteristics and Outcomes

As children with ADHD gain an awareness of the deficits, difficulties, and outcomes associated with their condition many develop low self esteem and depression (Carr, 2006). Evidence suggests that these children's difficulties with low self-esteem persist into early adulthood (Reiff & Tippins, 2011; Selikowitz, 2004), and have a detrimental impact on their adjustment to (Shaw-Zirt, Populi-Lehane, Chaplan, & Bergman, 2005), and success at university (Wallace, Winsler, & NeSmith, 1999, as cited in Garcia, 2009). Children affected by ADHD who experience interpersonal problems in particular, are at increased risk of developing anxiety or depressive disorders as adolescents (Bagwell, Molina, Kashdan, Pelham, & Hoza, 2006). Depression frequently coexists with ADHD, affecting up to 33% of children with the disorder (Pliszka et al., 1999). According to Barkley (2006), at least one in three children with ADHD will consider attempting suicide by early adulthood, and 16% may engage in a suicide attempt in high school with 50% of these attempts leading to hospitalization. Thus the suicide rate for children with ADHD is four times greater than in children without ADHD.

Children affected by ADHD are also more likely to engage in harmful behaviours such as substance abuse or risky behaviours during their adolescent or adult years (Arias et al., 2008; Reiff & Tippins, 2011). Drug abuse becomes more likely, when ADHD is left untreated (Arias et al., 2008; Reiff & Tippins, 2011; Wilens, 2003). Adolescents affected by ADHD are more vulnerable to practicing unsafe sex, becoming pregnant during their teenage years, and experiencing

aggression. These tendencies are largely attributed their poor impulse control (Reiff & Tippins, 2004). Furthermore, several studies have indicated that both adolescents and adults affected by ADHD have a greater tendency towards reckless driving than their typical counterparts (Knouse, Bagwell, Barkley, & Murphy, 2005; Richards, Deffenbacher, Rosen, Barkley, & Rodricks, 2006).

Families of Children with ADHD

Raising a child affected by ADHD can be quite testing and stressful for parents (Shelton et al., 1998). Siblings also suffer, as living with a child who exhibits hyperactive, inattentive, and impulsive behaviour is difficult (Kauffman & Landrum, 2009). Children with ADHD often exhibit unpredictable, hostile, and argumentative behaviour, and do not seem to learn from their previous mistakes (Mash & Wolfe, 2002). Consequently, families of these children report experiencing many problems such as negative family interactions and sibling conflict. Children affected by ADHD are frequently engaged in conflict with their mothers from their preschool to adolescent years (Mash & Wolfe, 2012). However, conflict between these children and their fathers is less severe (Barkley, 2000).

The fundamental symptoms of ADHD make it difficult for youth with the disorder to comply with parental expectations (Carr, 2006). Results of a study conducted by DuPaul, McGoey, Eckert, and VanBrackle (2001) suggested that parent-child interactions were more problematic when the child was ADHD. When asked to complete activities and tasks by their parents, children with ADHD displayed over twice the level of noncompliance and greater than five times the level of inappropriate behaviour displayed by their typically developing peers. In addition, the frequency in which parents of children with the disorder engaged in negative behaviours toward their children was three times that of parents of typically

developing children, especially when asking their children to complete activities and tasks. These findings may support the notion that interactions and relationships between a child affected by ADHD and their parents are of a reciprocal nature (Kauffman & Landrum, 2009).

Parents of children with ADHD reported greater amounts of stress related to child behaviour and dysfunctional interactions than did parents in the control group. Based on these reports, parents of children with ADHD average stress levels were higher than 83% of the Parenting Stress Index normative group. In addition, parents of children with ADHD scored more than two standard deviations higher than control parents on these measures. Families of children with ADHD also reported using less adaptive coping styles in response to stressful situations. When compared to parents of typically developing children, parents of children affected by ADHD were less likely to seek social support, and less capable of reframing stressful events to make them more manageable (DuPaul et al., 2001).

Assessment

Diagnosing ADHD is not straight forward. There is presently no established group of laboratory tests that can be utilised when making a diagnosis of ADHD (Searight, 2008). However, the U.S. Food and Drug Administration (FDA) has recently consented to the marketing of a medical device, which through examining brain waves helps assess ADHD in individuals who are between six and 17 years of age (FDA, 2013). If treated as just one aspect of a comprehensive physical and psychological assessment, the device can assist in verifying a diagnosis of ADHD or a medical practitioner's resolution that additional diagnostic examination should focus on ADHD or other health or behavioural conditions whose symptoms mimic those of ADHD.

A multimodal approach to diagnosing ADHD is recommended (Small, 2003). In the *New Zealand Guidelines for the Assessment and Treatment of Attention-Deficit/Hyperactivity Disorder*, the New Zealand Ministry of Health (2001) advises that diagnoses of the disorder be made in light of supporting evidence and information from teachers and other educational professionals such as specialist education service (SES) staff, and resource teachers: learning and behaviour (RTLBs). They also recommend that assessment procedures include behavioural observations and rating scales designed specifically for diagnosing ADHD, both at home and at school if possible, as this approach is likely to achieve optimal outcomes. Although no other psychological tests have demonstrated merit when diagnosing ADHD, they may be of use when engaging in the differential diagnostic process, conducting an educational evaluation, as well as reviewing the individual's symptoms, progress, or response to medication (MOH, 2001). The ultimate objective of the diagnostic processes is not to simply determine whether a diagnosis of ADHD is warranted, but to plan effective based on the information collected (DuPaul & Stoner, 2003). Thus, conducting a thorough assessment is important, as interventions driven by assessment findings are considered more time and cost effective than those selected on a trial and error basis (Ervin, Ehrhardt, & Poling, 2001).

Treatment

While ADHD cannot be cured, it can be managed effectively with treatment (Rief, 2005). Several caregivers and various professionals are usually involved in the management of the behaviour of a child with ADHD, as the difficulties associated with the condition take place in multiple settings (MOH, 2001). Therefore, a multidisciplinary approach based on collaboration among professionals,

parents, and teachers has been recommended for the optimal treatment of children with ADHD (Holowenko, 1999). Given the heterogeneity (Faraone & Biederman, 1999) and various diagnostic and epidemiological issues associated with ADHD, the disorder cannot simply be treated with one approach (Castenova, 2008). Thus a wide variety of evidence-based interventions has been used to treat children and adolescents with ADHD. These can be grouped into two major categories: biological and psychological approaches.

Biological Approaches

Biological approaches are the most frequently employed type of treatment for ADHD (Pelham et al., 1998). Many empirical studies have documented the successful use of pharmacological treatment to manage ADHD (e.g., Barkley & DuPaul, 1991; DuPaul & White, 2006; Pelham et al., 1993). Specifically, the most effective and commonly used method for managing ADHD is through stimulant medication (Evans, Schultz, & Sadler, 2008; Gilmore & Milne, 2001; Jadad, Boyle, Cunningham, & Schachar, 1999). Stimulants decrease restlessness and improve the ability to focus by increasing neurotransmitter levels, thereby blocking dopamine transporters in the brain (Selikowitz, 2004). To this end, the *New Zealand Guidelines for the Assessment and Treatment of Attention-Deficit/Hyperactivity Disorder* identifies the exclusive use of stimulant medication as the first line of treatment (MOH, 2001). Despite this, an estimated 1 to 1.5% of school-aged children in New Zealand have been prescribed medication for ADHD (Lee, 2003; Pharmaceutical Management Agency, 2003, as cited in Curtis et al., 2006). This is significantly lower than the estimated 4.2% in the U.S., which is thought to have a comparable prevalence rate of ADHD (Cox, Motheral, Henderson, & Mager, 2003).

Stimulant therapy. Methylphenidate and dextroamphetamine are the most commonly prescribed stimulants (DeGrandpre; 2000; Safer & Malever, 2000) and the only medications of this kind registered for use in New Zealand (MOH, 2001). Research has consistently demonstrated that stimulant medications have the ability to improve the behavioural symptoms of ADHD (Davies & Jennings, 2006). The effects of this type of medication seem to be substantial; as teachers frequently notice changes in the classroom behaviour of students affected by ADHD once they commence stimulant therapy (DuPaul & White, 2006; Vereb & DiPerna, 2004). The use of stimulant medications such as methylphenidate (more commonly known as Ritalin), is associated with many desirable outcomes including:

- greater ability to self-regulate;
- improved concentration;
- increased effort when performing tasks;
- increased attention span;
- decreased severity or frequency of verbal and physical hostility towards others;
- reductions in impulsive behaviour;
- enhanced classroom productivity;
- superior accuracy of work;
- increased compliance with instructions;
- and reductions in fidgetiness as well as interruptions (Davies & Jennings, 2006; DuPaul & White, 2006; Pelham et al., 1993; Shelton & Barkley, 1995).

It is important to note however, that these effects are only temporary, and that medication usually improves the application and performance of previously learned skills, rather than skill acquisition (MOH, 2001; Shelton & Barkley, 1995).

Limitations of stimulant therapy. Despite the positive outcomes achieved by managing ADHD with stimulant therapy, this treatment option also has its limitations. Stimulant medications do not cure ADHD (Brown, 2005). Critics of this form of treatment argue that "they act as a band-aid, often covering the underlying difficulties that may help understand or explain a child's behavioural problems" (Anonymous, 2000; DeGrandpre, 2000; Pelham et al., 1998, as cited in Kos et al., 2004, p.38). Furthermore, once stimulant therapy is discontinued, the child's psychological problems will persist (Conners & Jett, 1999). In addition, there is no empirical evidence to suggest that stimulant medication leads to improvements in any impairments or outcomes (e.g., academic attainment, cognitive capacities, or anti-social behaviour) in the long term (Pelham & Fabiano, 2000; Tannock & Martinussen, 2001). Finally, pharmacological treatment is of no assistance to children with ADHD with respect to two core areas of difficulties they face; it does not teach children how to sit still in class, attend to classroom instruction, or follow their parents' directions, nor does it help in the development and preservation of friendships with peers (Garber, Garber, & Spizman, 1996).

Second, stimulant medication cannot be used to treat all cases of ADHD. Although a definitive diagnosis of ADHD can be made in children as young as three (Barkley, 2006), this type of medication should not be prescribed to children under the age of four (Davies & Jennings, 2006). In addition, research findings indicate that stimulant medications fail to produce desirable outcomes in up to 30% of children with ADHD (Pelham & Fabiano, 2000; Spencer et al., 1996). Finally, research attempting to determine whether stimulant medications are capable of reducing the primary symptoms of ADHD in individuals with comorbid conditions

has been inconclusive (Davies & Jennings, 2006; Tannock, Ickowitz, & Schachar, 1995).

Third, children undergoing stimulant therapy frequently experience side effects. Evidence suggests that 25% - 51% of children treated with stimulants will experience side effects (Alberici, 2001, as cited in Kos et al., 2004). Side effects of stimulant medication include changes in mood, insomnia, loss of appetite, stomach-aches, and headaches (Barkley, McMurray, Edelbrock, & Robbins, 1990; DuPaul, Barkley, & Connor, 1998; Fox & Reider, 1993; Garber et al., 1996). About 10% of children experience severe side effects, becoming withdrawn, tearful, and irritable (Allen, 1995; Brown & Cooke, 1995). For some individuals with ADHD, the side effects of the medication lead to more negative experiences than the actual symptoms of the disorder. For example, stimulants may trigger tics in individuals who have an underlying predisposition to a tic disorder (Pelham & Fabiano, 2000).

In light of these findings, it is not surprising that the use of stimulant medication is not considered acceptable by all individuals. Children with ADHD may either intentionally, or unintentionally forget to take their medication, especially in adolescence (Pelham & Fabiano, 2000). Furthermore, a sizeable proportion of individuals with ADHD and caregivers reject or discontinue stimulant therapy (Evans et al., 2008). In addition, many parents express their reservations over managing their child's symptoms of ADHD with stimulants due the dearth of research examining the long term effects of stimulant medications (MOH, 2001). In recent years, ADHD has attracted a lot of attention and there has been a considerable amount of media coverage and public controversy concerning the use of stimulant medications to treat children affected by the disorder. The existence and availability of a great quantity of incorrect information about ADHD further exacerbates the

situation, making it harder for parents of children affected by the disorder to make informed decisions about treatment options for their child (Rief, 2005).

Anti-depressants. In cases where children affected by ADHD are unresponsive to stimulant therapy, or experience severe side effects as a result of this treatment, the use of anti-depressants is recommended (Brown & Cooke, 1995; Fox & Reider, 1993; Zoler, 2001). There is evidence to suggest that between 68% and 83% of children affected by ADHD are responsive to tricylic anti-depressants (Brown & Cooke 1995). However, a study that compared the effects of anti-depressants to stimulant medication in 12 children with severe ADHD found mixed results. Although anti-depressants led to greater reductions in depressive symptoms and low self esteem, stimulants were superior in terms of managing inattention and hyperactivity (Garfinkel, Wender, Sloman, & O'Neill, 1983). Like stimulants, the use of anti-depressants is linked to several side effects such as fatigue, drowsiness, irritability, and increases in weight, blood pressure, and heart rate (Brown & Cooke, 1995; Fox & Reider, 1993). There have also been instances in which the prescription of anti-depressants to children has resulted in fatalities. This has led some experts to advise against the use of anti-depressants in children (Brown & Cooke, 1995).

Psychological Approaches

Psychological approaches have been utilised to treat ADHD for around half a century (O'Leary, Pelham, Rosenbaum, & Price, 1976). The majority of evidence indicates that they are efficacious in the treatment of ADHD (e.g. Chambless & Ollendick, 2001; Hazell et al., 2000; Pelham et al., 1998). Children with ADHD seem to respond best to clear and consistent behavioural expectations that are monitored by adults in both home and school settings. Psychological interventions

that focus on insight-driven change, such as cognitive behavioural therapy (CBT), and individual forms of therapy are generally less effective for this population. Instead, virtually all evidence-based psychological interventions for children with ADHD rely on behavioural strategies (Evans et al., 2008)

In the *New Zealand Guidelines for the Assessment and Treatment of Attention-Deficit/Hyperactivity Disorder*, the Ministry of Health (2001) recommends the use of behavioural interventions in cases where the parents of the child or individual affected by ADHD have rejected stimulant therapy as a treatment option (2001). Teachers need to be trained in how to use these interventions to maximise the chances of successful outcomes (Kauffman & Landrum, 2009). The successful use of parent training and classroom behaviour modification to manage the behaviour of children affected by ADHD has been well documented in the literature (Chambless & Ollendick, 2001). In addition, there is evidence to suggest that parent training, among other behavioural interventions reduces the greater levels of stress experienced by parents of children with the disorder (Barkley, 1998). Therefore, treatment plans for students with ADHD commonly include systematic training of parents and teachers in behaviour management skills (Alberto & Troutman, 2009). This training is based on behavioural principles and involves teaching parents and/or teachers how to interact with their children in a more positive manner during routine tasks, and avoid the coercive interactions that are typical of children and adolescents with ADHD (Kauffman & Landrum, 2009).

Behaviour modification strategies are the most commonly used non-pharmacological treatment for managing ADHD in children (DuPaul & Eckert, 1998). Evidence suggests that the vast majority of teachers employ elements of behaviour modification in their classrooms (Fabiano & Pelham, 2003). For example,

in a survey conducted by Reid, Maag, Vasa, and Wright (1994), 72% of teachers reported using behaviour modification with students diagnosed with ADHD. Token economies for example, have been found to effectively improve academic productivity and accuracy in most children and adolescents affected by ADHD (Barkley, 1990). Their ability to reduce symptoms of hyperactivity in children with ADHD has also been demonstrated. For example, in one study, a token reinforcement was used to address the math and reading performance of three hyperactive children, and decreased hyperactivity as much as the use of Ritalin (a stimulant medication prescribed for ADHD) (Ayllon, Layman, & Kandel, 1975). Furthermore, the use of token reinforcement in this study increased academic performance, while Ritalin did not.

Another type of behaviour modification intervention for children affected by ADHD is home-based contingency management. This strategy involves the school and parents using a collaborative approach in an attempt to improve the classroom behaviour of a child with ADHD (Barkley, 2006). This process typically involves teachers documenting whether the child achieved the specified objectives for that day (e.g., paying attention to classroom activities, completion of assigned tasks, accuracy of work, and following the rules), using a daily report card or checklist (DuPaul & Stoner, 2003). This document is typically given to the child to take home for the parents to read, sign, and return to the teacher (Fiore, Becker, & Nero, 1993). Based on this information, parents then reward the child for appropriate behaviour at school in the home setting (e.g., household privileges, television time, or an overnight visit at a friend's house) (DuPaul & Weyandt, 2006; Rief, 2005). This procedure has been demonstrated to be effective in increasing the attention, classroom productivity, accuracy of work, and academic performance of primary

school-aged children, as well as reducing their disruptiveness (Kelley & McCain, 1995; Witt, Hannafin, & Martens, 1983). This intervention is also particularly appealing to teachers because it is cost-effective, efficient, and allows them to establish daily communication between the home and school, without requiring the teacher to adjust his or her approach to instruction (Barkley, 2006; DuPaul & Stoner, 2003).

Limitations of psychological approaches. Like pharmacological approaches, psychological approaches to treating children with ADHD have their limitations. First, they are not successful in treating all cases of ADHD (Frazier & Merrell, 1997). Second, there is evidence to suggest that children who have a parent who also has the disorder may be less likely to benefit from psychological treatments that require parental involvement. Specifically, a study examining the efficacy of parent training for mothers who like their children were affected by ADHD revealed that children with the disorder whose mothers exhibited high levels of symptoms showed less improvement after the intervention than those whose mothers had lower or moderate level of ADHD symptoms (Sonuga-Barke, Daley, & Thompson, 2002). Third, research examining the long term effects of behaviour therapy is lacking (Pelham et al., 1998). As a result, one cannot currently ascertain whether psychological interventions are effective in the long-run. Finally, psychological interventions are more time consuming and costly on a short term basis, than pharmacological treatments (Atkinson, Robinson, & Shute, 1997; Pelham et al., 1998).

Multimodal Approach

In light of the limitations of both pharmacological and psychological treatments of ADHD, some experts recommend using a multimodal approach involving a mixture of pharmacological, behavioural and educational interventions to achieve optimum outcomes (Cooper, 1997; Dulcan et al., 1997; Jensen, 2001; Kidd, 2000; Taylor, 1997). According to Fabiano and Pelham (2003), a combination of both stimulant medication and behaviour modification techniques is usually required to 'normalise' functioning. Indeed there is evidence to suggest that combining these treatment leads to improved outcomes for individuals with ADHD.

Many studies have established that a combination of stimulant therapy and school based behaviour modification strategies (including those tackling academic difficulties) successfully reduces the occurrence of ADHD-related behaviour (DuPaul & Eckert, 1997). However, the findings of the Multimodal Treatment Study of Children with Attention-Deficit/Hyperactivity Disorder (MTA study), which compared a combined treatment approach with stimulant therapy or non-pharmacological treatment, and included a 14 month follow up, provide different results (MTA Cooperative Group, 1999). Results of this large trial indicated that a combination of behavioural interventions and medication was no more effective than medication alone for addressing the core symptoms of ADHD. However, a combined approach was superior at reducing associated features of ADHD (e.g., defiance, aggression, opposition, internalizing symptoms, parent-child relationships, and reading achievement).

ADHD in Schools

Children spend the majority of their time in classrooms and other school contexts in which they are expected to: comply with rules, behave in a socially

desirable manner, partake in educational activities, and refrain from disrupting the learning or activities of other students who they share their educational environment with (Kleynhans, 2005). Concerns about ADHD usually first appear during early childhood or first year of primary schooling, as the deficits linked to the disorder have a detrimental impact on academic performance and result in disruptive behaviour in the classroom (Searight, 2008). As they start school for the very first time, children with ADHD tend to lag behind their typically developing peers with respect to basic mathematical concepts, pre-reading skills, and fine motor skills (Lahey et al., 1998; Mariani & Barkley, 1997; Shelton et al., 1998).

Estimates based on the disorder's prevalence rate revealed by epidemiological studies suggest that for class sizes that exceed 20 students, on average a minimum of one child with ADHD exists in every primary classroom (Kleynhans, 2005; Ohan et al., 2008). With these estimates in mind, Fabiano and Pelham (2003) assert that interventions directed at minimising classroom impairments of children with ADHD are an area of concern for all educational staff.

Symptoms of ADHD are more prominent in the school environment, because the classroom demands that students behave in ways that are contrary to the core symptoms of the disorder; namely inattention, hyperactivity, and impulsivity (Salmelainen, 2002). Kos and colleagues (2006) claim that the classroom is the most challenging setting for students who are affected by the condition. It is therefore not surprising that the majority of research on ADHD has concentrated on the academic and social struggles students with the disorder encounter within educational contexts (e.g., Barkley, Fischer, Edelbrock, & Smallish, 1990; DuPaul & Eckert, 1997a, 1997b, 1998). Behaviours associated with the defining symptoms of the disorder commonly exhibited by students with ADHD, disrupt classroom and social activities

(Barkley et al., 2010; DuPaul & Stoner, 2003; Koch, 1999). For example, their off-task behaviour, motoric restlessness, intrusive verbalizations, and inability to maintain attention during continual tasks or discussion, are disruptive to the teaching process and hinder learning (Abikoff, Gittelman-Klein, & Klein, 1977; Whalen, Henker, Collins, Finck, & Dotemoto, 1979; Zentall, 1993). Thus, teachers may face several challenges as a result of having a student with ADHD in the classroom (Ohan et al., 2008).

The challenges that students with ADHD experience in the classroom may vary according to the subtype of ADHD they are diagnosed with, or their gender. For example, a short attention span makes it difficult for students with in-attentive symptoms of ADHD to complete tasks assigned to them, engage in class discussions, stay on task, work independently in the classroom, and follow teacher directions (Barkley, 2006; Murray, 2010). Students with symptoms of impulsivity may blurt out answers in class without gaining their teacher's permission to speak, or disrupt the learning of other students by excessively chatting to them at unsuitable times (DuPaul & Stoner, 2003). Finally, symptoms of hyperactivity cause students with ADHD to fiddle with objects that are unrelated to the assigned activity, rock in their chairs, repeatedly drum their hands, and struggle to remain in their seat during class (DuPaul & Stoner, 2003). It is important to note however that most students with ADHD experience behavioural difficulties associated with at least two of the three fundamental symptom types (APA, 2000).

There is evidence to suggest that the severity of difficulties experienced by students with ADHD in the classroom may also vary according to gender (Kos et al., 2006). For example, a study conducted by Abikoff and colleagues (2002) indicated that although males with ADHD exhibit considerable behavioural problems in

classroom settings, female students affected by the condition are no more disruptive than their typically developing peers, yet prone to experiencing predominantly inattentive symptoms.

Students with ADHD struggle with organisation and often misplace assignments, books, and materials required to complete tasks (APA, 2000; DuPaul & Stoner, 2003). In a classroom setting, students with ADHD may misunderstand what is required of them, and consequently fail to complete tasks in a satisfactory manner due to inattention caused by their hyperactive and impulsive nature (Kos et al., 2006). Consequently, students with ADHD are at a high risk of academic underachievement, despite the fact that the majority of these students are of average or above-average intelligence (Barkley et al., 2010; Mash & Wolfe, 2005; Spencer et al., 2007; Zentall, 2006). Academic underachievement becomes more likely when the student's ADHD is unrecognised and not managed in a suitable manner (Barkley, 2006; Green & Chee, 1997).

Children with ADHD experience frequent interpersonal difficulties with peers, and teachers. Evidence suggests that these children may have deficits in their ability to recognise and respond to social situations (Gumpel, 2007; Kos et al., 2006; Osman, 1997; Selikowitz, 2004). Thus, children with ADHD generally struggle to socialise appropriately with peers (Kos et al., 2006). In a study conducted by DuPaul et al. (2001), involving classroom observations, children with ADHD exhibited a significantly higher frequency of negative social behaviour than their typically developing peers (a difference of more than three standard deviations), particularly during unstructured, free-play activities. Not surprisingly, children affected by ADHD are disliked and rejected by the majority of their peers (Cullinan, 2007). According to Pelham and Bender (1982), interactions with a child with

ADHD can be perceived to be so unpleasant that peers tend to dislike them within minutes of their first encounter. Sociometric data indicate that children nominated by their classmates as symptomatic of ADHD may actually be more disliked than those nominated as aggressive and instigators of fighting (Milich & Landau, 1989). As a result children with the disorder have trouble initiating and maintaining friendships (DuPaul& Stoner, 2003). Some experts assert that impaired peer relations should be regarded as one of the distinguishing characteristics of ADHD (Landau & Moore, 1991; Whalen & Henker, 1991). The school difficulties, academic underachievement, and problems with peers that children with ADHD experience reduce their own (Danckaerts et al., 2010), and possibly their teachers' self esteem (Glass, 2001; Glass & Wegar, 2000).

The Roles of Teachers

Referral

According to Barkley (1995), the success of ADHD students at school is most influenced by the classroom teacher. Children exhibiting ADHD symptoms are frequently referred for assessment during their primary school years (Guerra & Brown, 2012). Teachers are often the first people to suspect that a child has ADHD (Tannock & Martinuseen, 2001). Indeed, research indicates that they are the most common initial referral source, advising the parents to obtain an assessment for their child (Snider et al., 2003; Stroh et al., 2008; Vereb & DiPerna, 2004). Furthermore, teachers' referrals for assessment of suspected ADHD have frequently been employed as a predictor of a student's symptoms (Pelham, Evans, Gnagy, & Greenslade, 1992). However, evidence suggests that a considerable number of children referred for ADHD assessments are more appropriately diagnosed with some other mental disorder or none at all (Cotugno, 1993; Desgranges, Desgranges,

& Karsky, 1995; Sabatino & Vance, 1994). In a study conducted by Cotugno (1993) a mere 22% of children referred to a clinic which specialised in the disorder received a primary diagnosis of ADHD, and just 37% of those referred received a secondary diagnosis of ADHD. Further research conducted by Desgranges and colleagues (1995) established that only 38% of clinic referrals for suspected ADHD were subsequently verified as cases of ADHD.

While many children who have mistakenly been referred for an assessment of ADHD have other genuine needs which necessitate treatment, which are acknowledged and attended to subsequent to a thorough evaluation, inaccurate referrals can lead to detrimental outcomes (Cotugno, 1993; Desgranges et al., 1995). For example, in some situations, referrals for ADHD assessment might result in a "preconceived diagnosis" which is resistant to change, despite the availability of information at odds with it, as well as neglect of other legitimate treatment needs. There is also evidence to suggest that identified cases of ADHD, which are genuine, are associated with enhanced treatment compliance and outcomes. Misdiagnosed cases on the other hand, have a tendency to terminate treatment prematurely (Desgranges et al. 1995). In addition, treatment for misdiagnosed ADHD has the potential to make symptoms of the actual disorder worse. For example, stimulants can seriously worsen the manic symptoms of bipolar disorder (Hammen & Rudolph, 2003). Teachers need to understand how to distinguish between ADHD and typical childhood behaviour (Kauffman & Landrum, 2009; Sciutto et al., 2000). The ability to make this distinction is crucial because misdiagnosis and subsequent overdiagnosis of ADHD subjects children whose difficulties are severe and cause detrimental outcomes to more criticism, and also scepticism regarding the legitimacy of their problems (Glass & Wegar, 2000).

Diagnosis

Teachers are expected to provide information to assist practitioners in making a diagnosis of ADHD (Wolraich et al., 2003), because they interact with students in a variety of ways on a daily basis (Pelham et al., 1992). Practitioners often rely on to teachers to provide in depth information about the referred child's academic history and performance, social relations and general every day functioning (Barkley, 2006; Kleynhans, 2005). Data are usually collected through the use of rating scales or questionnaires relating to the student's symptoms (Liesveld, 2007). Research has demonstrated the reliability of behaviour rating scales in determining the severity of behaviours associated with ADHD relative to normative samples (DuPaul & Stoner, 2003). According to the DSM-IV, diagnoses cannot be made based on data collected from a single informant (APA, 2000). However, a study conducted by Carey (1999) involving 401 primary care paediatricians revealed that more than half of these practitioners relied solely on school reports when determining whether a diagnosis of ADHD is warranted. Thus, as informants, teachers need to be provided with accurate information about the disorder (Sciutto et al., 2000).

Treatment

Teachers of students with ADHD are also frequently held responsible for the implementation of recommended treatment plans and monitoring of progress made by the student as a result of treatment (Ohan et al., 2008; Tannock & Martinussen, 2001). Teachers' observations regarding the student's functioning during school activities and social situations are drawn on when making treatment decisions (Vereb & DiPerna, 2004). Thus, once interventions have been put in place, teachers are expected to gather data on a regular basis to assist appraisals of the benefits and shortcomings of the intervention/treatment programme (DuPaul &Stoner, 2003). For

example, the use of teacher observations and reports is recommended for careful monitoring of symptoms and side effects, which is vital when utilising stimulant therapy (Kauffman & Landrum, 2009; MOH, 2001).

Informing Parents

According to research conducted by Snider and colleagues (2003), communication with parents of students with ADHD is one of the main strategies used by teachers to deal with the disorder. Furthermore, evidence suggests that parents of children affect by the disorder frequently turn to schools for information about ADHD (Bussing et al., 1998). Research has linked parental knowledge about ADHD and available treatment options to a range of variables associated with referral, such as frustration with their child's behaviour (Odom, 1996), unrealistic or inaccurate beliefs or expectations about the disorder (McNeal, Roberts, & Barone, 2000), and an inclination to label their child as "bad" (Bussing et al., 1998). Unfortunately, there is evidence to suggest that teachers provide incorrect and unsuitable advice to parents of children with ADHD, which many parents follow (DiBattista & Shepherd, 1993). The possible transfer of inaccurate knowledge about ADHD from teachers' to parents, and variables associated with parental knowledge of ADHD, highlights the importance and influence of teachers' knowledge about ADHD.

Teachers' Knowledge of ADHD

Despite the existence and availability of many empirical studies examining the causes, assessment, associated issues, and treatment of ADHD, relatively few studies have examined teachers' knowledge of and attitudes towards the disorder (Kos et al., 2006). In 1994, the year the DSM IV was published, Jerome and colleagues (1994) voiced their concerns about the absence of available literature

addressing teacher's knowledge of ADHD. Despite this, only 17 additional studies (worldwide) which assessed teachers' knowledge of ADHD had been reported by 2011; an average of one additional study per year (Funk, 2011). Furthermore, only one New Zealand study appears to have been reported (Curtis et al., 2006). The scarcity of research addressing teachers' knowledge of ADHD is rather surprising considering a lack of teacher knowledge about ADHD has been pinpointed as being among the biggest obstacles encountered when addressing to the needs of children affected by ADHD (Shapiro & DuPaul, 1993). Without this knowledge, teachers may create a classroom environment which does not meet the needs of their students (Ghanizadeh et al., 2006).

The vast majority of studies examining teachers' knowledge of ADHD utilise questionnaires based on either Jerome and colleagues' (1994) Knowledge Of ADHD Scale (K-ADHD) or Sciutto and colleagues (2000) Knowledge Of Attention Deficit Disorders Scale (KADDS) (Anderson et al., 2012). Average knowledge scores with regards to ADHD, as measured by the proportion of questions answered correctly, have varied across studies involving qualified practicing classroom teachers. Studies based on the K-ADHD (Jerome et al., 1994) have indicated that on average, the proportion of questions which teachers' answered correctly ranged from 76% (Ohan et al., 2008) to 82% (Bekle, 2004). On the other hand, studies based on one of several versions of the KADDS (Sciutto et al., 2000), indicated that the average proportion of questions which teachers answered correctly ranged from 35% (Lazarus, 2011) to 59% (Liesveld, 2007). The discrepancy in findings obtained in these studies cannot be interpreted as simply due to cross-national differences, because the correct response rate of 77% for American teachers in the Jerome et al.

(1994) study is significantly higher than that of the Sciutto et al. (2000) study, where teachers answered an average of 48% of questions correctly.

The apparent discrepancy in results between these two scales may be attributed to two main methodological differences. First, the K-ADHD (Jerome et al., 1994) is comprised of 20 items, while Sciutto et al. (2000) included 36 items in the KADDS. Scales consisting of a larger number of items, which may also draw on a wider range of issues, may inflate gaps in teachers' knowledge of ADHD (Kos et al., 2006). In addition, the K-ADHD (Jerome et al., 1994) utilises a dichotomous *true/false* response format while the KADDS (Sciutto et al., 2000) provides three response options, *true/false/don't know*. Thus, when utilizing the K-ADHD (Jerome et al., 1994), teachers have no option but to guess the answers to items they do not know the answers to and have a 50% chance of answering a question correctly by guessing. As a result, teachers' knowledge of ADHD may be magnified. The KADDS (Sciutto et al., 2000) on the other hand reduces this probability to 33% and instructs respondents to select the *don't know* option when they lack knowledge related to an item. Therefore, the KADDS allows for a distinction between lack of knowledge and misperceptions to be made. This distinction is advantageous as evidence suggests that misperceptions about ADHD are difficult to change even in light of research that contradicts them (Kos et al., 2004; Sciutto et al., 2000). Furthermore, while teachers who lack knowledge about ADHD may be driven to search for information about the disorder, those who hold misperceptions and thus believe themselves to be knowledgeable are less likely to do so (Kos et al., 2006).

The KADDS (Sciutto et al., 2000) has been utilised in research conducted in almost 20 countries (Sciutto, n.d.), and has sound psychometric properties (Soroa et al., 2012). It measures teachers' knowledge of ADHD in relation to three areas,

which were chosen due to their relevance to diagnostic decisions and educational interventions: symptoms/diagnosis, treatment, and associated features (Sciutto & Feldhamer, 2005). The majority of research which has utilised this scale has found teachers' knowledge of the symptoms/diagnosis of ADHD to be superior to the other two areas (e.g., Castenova, 2008; Herbert, Crittenden, & Dalrymple, 2004; Kleynhans, 2005; Lazarus, 2011; Sciutto, Nolfi, & Bluhm, 2004; Sciutto et al.; 2000; Small, 2003). However, the mean proportion of items pertaining to this subscale answered correctly by teachers in these studies ranged from 50% (Lazarus, 2011) to 72% (Castenova, 2008). Nevertheless, these findings imply that "knowledge of ADHD is a heterogeneous construct and support the use of subscales when measuring knowledge of ADHD. Subscales allow researchers to detect gaps and strengths in teachers' knowledge" (Anderson et al., 2012, p.513). This information is critical when developing educational interventions for teachers, as these should be aimed at teachers' existing level of understanding of ADHD, to be beneficial (Kos et al., 2004). Mounting evidence from research conducted in several countries suggests that although teachers have a substantial amount of knowledge about some aspects of ADHD, their knowledge is also limited in other areas (Ohan et al., 2008). Furthermore, many educators hold several specific misperceptions about the disorder (Jerome et al., 1994).

Symptoms/Diagnosis

There is a consensus within the literature that teachers are well informed about the core symptoms of ADHD (e.g., Kleynhans, 2005; Durbach, 2001; Economou, 2002; Kern, 2008, as cited in Lazarus, 2011; Perold et al., 2010; Sciutto et al. 2000). Teachers' familiarity with the fundamental symptoms of ADHD has been attributed to the fact that teachers interact with these symptoms within

classroom settings on a regular basis (Lazarus, 2011; Small, 2003). Unfortunately, although these symptoms predict the absence of ADHD, their ability to predict the presence of the disorder is poor (Pelham et al., 1992).

Evidence suggests that a substantial proportion of teachers lack knowledge or hold misperceptions about the diagnosis of ADHD. Research conducted by Kleynhans found that less than half (47%) of teachers in her South African sample were aware that the child's symptoms must have been present before age seven, and 19% held a misperception about this diagnostic criteria. In an American study conducted by Small (2003), only a tenth of the sample held a misperception about the item relating to this criteria, yet this KADDS item was among the five which received the largest number of incorrect responses from teachers.

There is also evidence to suggest that teachers lack an understanding of the nature of ADHD, and are thus incapable of distinguishing between ADHD and other related conditions, such as ODD and CD. In an American study, a sample of primary school teachers watched a video of a student exhibiting behaviours characteristic of ADHD in addition to those that are typical and distinctive of ODD. Teachers were then asked to evaluate the symptoms exhibited by the students. Consistent with the mounting evidence that indicates that teachers are familiar with the fundamental symptoms of ADHD, teachers' evaluations of symptoms such as inattention and hyperactivity were accurate. However, when evaluating students' who only exhibited behaviours that are distinctive of ODD, such as opposition and non-compliance, participants automatically assumed that these behaviours were indicative of ADHD. Therefore, teachers misguidedly assumed that students who exhibited only ODD-like behaviours, displayed ADHD-like behaviours as well (Reid & Johnson, 2011). A study conducted by Lazarus (2011) confirmed these findings,

revealing that many teachers in their sample attributed symptoms of CD and ODD, such as a history of stealing or destroying other peoples things, or physical cruelty towards other people, to ADHD.

Associated Features of ADHD

Evidence suggests that teachers' knowledge of the nature, causes, and outcomes of ADHD (associated features) is an area of weakness. Research conducted by Kleynhans (2005) and Castenova (2008) utilising the KADDS found the proportion of both incorrect and *don't know* responses to be largest for this subscale. Thus teachers have both large gaps in knowledge and misperceptions of this area. According to several U.S. studies, the most common correct response on this subscale was that it was possible for an adult to be diagnosed with ADHD, with the proportion ranging from 81% - 97% of the sample (Castenova, 2008; Sciutto et al., 2000; Small, 2000). However, the findings of a study conducted by Lazarus (2011) revealed that teachers are much less knowledgeable about how a diagnosis of ADHD is made. Specifically, the majority of teachers in this South African study were unaware of the absence of particular physical characteristics that can be identified by medical doctors to establish a definitive diagnosis of ADHD, and 27% held a misperception about this item.

Teachers' knowledge about the situational variations of ADHD varies greatly and thus requires a more in depth examination. For example, research examining teachers' knowledge of ADHD conducted in both South Africa and the U.S. indicates that the majority of teachers are aware that it is easier to distinguish between a student with ADHD and a student without the disorder in a classroom environment as opposed to a free play setting (Lazarus, 2011; Perold et al., 2010; Sciutto et al., 2000). However, misperceptions relating to situational variations of

ADHD were among the most common misperceptions that teachers held about the disorder. For example, in a U.S. study conducted by Castenova (2008), the belief that children with ADHD generally experience more struggles in novel situations than in familiar situations was the most commonly held misperception about ADHD held by middle school teachers, with 60% percent of the sample in this study believing this to be true. The belief that children with ADHD generally experience more struggles in novel situations than in familiar situations was also the second most common misperception held by teachers about ADHD in a study conducted by Sciutto and colleagues (2000), where 57% of the sample believed this to be true. Furthermore, evidence suggests that teachers are largely unaware that children with ADHD are usually more compliant with their fathers than with their mothers. The item relating to this matter was among the five KADDS items that received the highest number of *don't know* responses in studies conducted by Castenova (2008), Kleynhans (2005), and Sciutto (2000), where 62%, 53%, and 58% of teachers in the sample selected this response option respectively.

Literature that examines teachers' knowledge of ADHD highlights the existence of substantial gaps in their knowledge and to a lesser extent, misperceptions about the epidemiology and aetiology of ADHD (e.g., Castenova, 2008; Glass & Wegar, 2000; Kleynhans, 2005; Ohan et al., 2008; Small, 2003). There is evidence to suggest that teachers are lacking knowledge of disorders that frequently coexist with ADHD, the genetic nature of the disorder, and factors that influence prognosis. For example, Castenova (2008) and Small (2003) revealed that the majority of teachers in their samples were unsure whether symptoms of depression are found more frequently in children with ADHD than in children without ADHD, or ADHD is more common in the 1st degree biological relatives

(i.e., mother, father) of children with ADHD than in the general population. Furthermore, these items were among the five that received the highest amount of *don't know* responses. There is also mounting evidence that suggests that many teachers lack knowledge or hold misperceptions regarding the prognosis of the disorder (Sciutto et al., 2000; Small, 2003). For example in studies involving American, Australian, or Canadian teachers, which utilised the K-ADHD (Jerome et al., 1994), between 43% - 59% of teachers recognised that the majority of children affected by ADHD do not outgrow the disorder when they reach adulthood (Jerome et al., 1994; Ohan et al. 2008).

Treatment

Several studies have indicated that teachers' knowledge of treatment of ADHD is relatively weak (e.g., Jerome et al., 1994; Lazarus, 2011; Sciutto et al., 2000; West et al., 2005). For example, in a study conducted by Lazarus (2011), which utilised the KADDS scale, teachers answered less than a third of questions on the Treatment subscale correctly. However, evidence on whether teachers have less knowledge about the treatment of ADHD compared to both the symptoms/diagnosis and associated features of the disorder is inconsistent and has involved diverse sample of teachers. An Australian study conducted by West and colleagues (2005), as well as a South African study conducted by Lazarus (2011), found teachers to be least knowledgeable about the treatment of ADHD. This was not the case in a more recent study conducted by Guerra and colleagues, where teachers obtained lower scores on the Associated Features subscale (47%) than the Treatment subscale (57%). The discrepancy between these findings may be attributed to the fact that the latter study included a sample consisting of only middle school teachers, while participants in the former studies were elementary school teachers.

Research examining teachers' knowledge of treatment of ADHD has been inconsistent. There is mounting evidence which demonstrates that the majority of teachers are aware that treatment for students with ADHD that combines medication with parent and teacher training focused on managing a child with ADHD is usually effective (Castenova, 2008; Garcia, 2009; Kleynhans ,2005; Krowski, 2009; Lazarus, 2011). However, the proportion of teachers who have demonstrated this knowledge has varied across studies. For example, in studies conducted by Lazarus (2011) and Kleynhans (2005), which both involved a sample of South African teachers, 65% and 76% of teachers respectively, correctly knew that parent and teacher training are effective, when combined with medication, in managing ADHD. Results of a study by Garcia (2009), obtained results that are comparable to those obtained by Kleynhans (2005), with 75% of teachers in the American sample responded correctly to an item related to this information. However, this percentage was significantly lower than those reported in other U.S. studies conducted by Krowski (2009) and Castenova (2008), where 91% and 93%of respondents, respectively, knew that parent and teacher training are effective, when combined with medication, in managing ADHD. The discrepancy between the results obtained by Garcia and the other two studies that involved a U.S. sample of teachers may be due to differences in sample size. The study conducted by Garcia (2009) involved 32 participants, while Castenova's (2008) had 58 participants, and Krowski's (2009) included 140 teachers.

There is evidence to suggest that some of the inconsistent findings obtained in research examining teachers' knowledge of treatment of ADHD may be partially attributed to cross-national differences. A study conducted by Sciutto and colleagues (2000) revealed that 80% of American teachers were aware that ADHD did not

result from poor parenting practices. In a more recent Australian study conducted by Kos (2004), 91% of teachers responded correctly to an item relating to this information. However, in studies conducted by Lazarus (2011) and Kleynhans (2005), only 37% and 48% of South African teachers in their sample displayed this knowledge. Similarly, U.S. studies conducted by Garcia (2009) and Krowski (2009) found that 75% and 83% of teachers, respectively, were aware that treatments for ADHD that focus primarily on punishment, have not been found to be the most effective in reducing the symptoms of the disorder. However, in studies conducted by Lazarus (2011) and Kleynhans (2005), only 47% and 59% of participants, respectively, gave the correct response to an item relating to this knowledge. Finally, studies conducted in the U.S. indicate that the majority of teachers are aware of the side effects of stimulants, with the proportion of teachers ranging from 72% - 93% (Castenova, 2008; Garcia, 2009; Krowski, 2009). However, in South African studies conducted by Lazarus (2011) and Kleynhans (2005), only 43% and 54% of respondents, respectively, appeared to be knowledgeable about the side effects of stimulants.

Misperceptions and gaps in knowledge about treatment. Research using both the K-ADHD (Jerome et al., 1994) and the KADDS (Sciutto et al., 2000) has consistently found misperceptions about the role of dietary management in the treatment of ADHD to be common amongst teachers. However, the proportion of teachers who believed this myth has varied across studies. For example, in Jerome et al.'s initial study (1994), which involved a sample of both American and Canadian teachers, approximately 77% of the Canadian sample and 81% of the American sample indicated that dietary modifications are useful in treating children with ADHD. A further study, which utilised their scale, found that 74% of elementary

school teachers believed that diets were effective in treating children with ADHD (Piccolo-Torsky & Waishwell, 1998). In a study conducted by the developers of the KADDS, 42% of teachers held a misperception about the effects of sugar and food additives in regards to treatment of ADHD (Sciutto et al., 2000). Finally, in a more recent South African study, which utilised the KADDS, 65% of respondents incorrectly believed that reducing dietary intake of sugar or food additives effectively reduces the symptoms of ADHD (Perold et al., 2010).

Research has consistently indicated that the majority of teachers are unaware that behavioural/psychological interventions for children with ADHD focus on the management of inattentive, impulsive, and hyperactive behaviour at home, or in a classroom setting. Furthermore, there is evidence to suggest that the misperception that behavioural/psychological interventions for children focus primarily on the child's problem with inattention, is common among teachers. In recent American studies conducted by Garcia (2009) and Krowski (2009), a mere 16% and 22% of teachers, respectively, correctly disagreed with a KADDS item which stated that behavioural/psychological interventions for children with ADHD focus primarily on the child's problems with inattention. In another study, only 10% of a South African study of teachers responded to this item correctly, with 49% of teachers providing an incorrect response, and 41% selecting the *don't know* response option (Kleynhans, 2005). Furthermore, this item was found to be one of the five which obtained the highest proportion of incorrect responses on the KADDS in studies conducted by Castenova (2008), Sciutto (2000), and Small (2003). An American study by Sciutto et al. (2000) found that 61% of elementary school teachers believed that behavioural/psychological interventions for children focus primarily on the child's problem with inattention. More recently, a study conducted by Lazarus (2011)

revealed that 47% of South African elementary school teachers held this misperception.

Studies examining teachers' knowledge of treatment of ADHD have consistently found that the majority of teachers are uncertain about whether electroconvulsive therapy (i.e. shock treatment) has been found to be an effective treatment for severe cases of ADHD. Indeed, the KADDS item which pertains to this knowledge has received the largest proportion of *don't know* responses in studies conducted in South Africa by Kleynhans (2005) and Lazarus (2011), as well as the U.S. by Sciutto et al.(2000) and Small (2003). Furthermore, the proportion of teachers who selected the *don't know* response options in these studies is remarkably similar, ranging from 72% (Small, 2003) to 82% (Kleynhans, 2005).

Teacher Characteristics that are Related to their Knowledge of ADHD

While research is increasingly targeting teachers' knowledge and perceptions of ADHD, few studies have actually linked this to their characteristics. Furthermore, results of the few international studies that have examined these relationships have been inconsistent. These mixed results have been attributed to methodological differences between the studies (Kos et al., 2006).

Demographic Variables

Age and educational level are two of the demographic variables which research has tried to link to teachers' knowledge of ADHD. Several international studies that have been undertaken in Australia, South Africa and the U.S A have failed to find an association between teachers' knowledge of ADHD and their age (Kos, 2008; Lazarus, 2011; Perold et al., 2010; Piccolo-Torsky & Lynn Waishwell, 1999; Sciutto et al., 2000). Evidence on whether teachers' knowledge of ADHD is related to their level of education on the other hand, is inconsistent. For example,

studies conducted by Guerra and Brown (2012), Perold et al. (2010), Sciutto et al. (2000), and Small (2003) involving middle school and primary school teachers found no association. However a study conducted by Kleynhans (2005) and a study conducted by Ghanizadeh et al. (2006) found a small but statistically significant positive relationship between teachers' overall knowledge of ADHD and their education level. These mixed results may be due to variation in the amount of coursework relating to ADHD provided in degrees obtained by teachers in these studies.

The Influence of Teaching Experience

One might expect that increases in teaching experience would translate to increases in teachers' knowledge across all areas of education (Guerra & Brown, 2012). The majority of research investigating the extent of teachers' knowledge about ADHD however, has found it to be unrelated to their amount of teaching experience (e.g., Guerra & Brown, 2012; Kos et al. 2004; Lazarus, 2011; Perold et al., 2010; Small, 2003). A study by Small (2003) involving 72 American general education elementary school teachers found no relationship between their years of teaching experience and knowledge of the symptoms/diagnosis, associated features, and treatment of ADHD. Similarly, no relationships between years of teaching experience and these areas of ADHD knowledge were found in a more recent U.S study, involving 58 general education middle school teachers (Castenova, 2008). This was not the case in Sciutto and colleagues (2000) study, where a positive association between years of teaching experience and teachers overall knowledge of ADHD was found. It is important to note however, that although this relationship was statistically significant it was small. Furthermore, the inconsistencies in these results may be due to methodological issues. For example, the study conducted by

Sciutto et al. (2000) failed to mention the sampling technique used. Thus it is impossible to determine how representative or biased the sample was, which ultimately restricts the generalisability of the results (Johnson & Christensen, 2012).

Teacher Pre-Service and In-Service Training

A lack of attention to ADHD in teacher training exists despite the availability of research that has consistently indicated that teachers desire more education and training in relation to the disorder (Bekle, 2004; Holowenko & Pashute, 2000; Jerome et al., 1994). Specifically, an American study conducted by Piccolo-Torsky and Waishwell (1998) involving 154 elementary school teachers found that 83% of their sample underwent no official training concerning ADHD as undergraduates, even though 90% reported a desire for additional regular training. Similarly, in another study of elementary school teachers, 77% of teachers reported being given no instruction about ADHD during their undergraduate education; however 98% of the sample revealed they might gain from more training in relation to ADHD (Barbaresi & Olsen, 1998). More recently, Bussing, Gary, Leon, Garvan, and Reid, (2002) surveyed 365 general education elementary school classroom teachers, to investigate their formal teacher training and sources of ADHD knowledge. Approximately 50% of the teachers in their sample reported being educated about ADHD during their degree, and 65% received brief in-service training about the disorder following graduation. Ninety-seven percent of participants indicated that they had read at least one article about ADHD, with 61 % indicating that they had read a book about the disorder. Furthermore, consistent with the findings of previous studies (e.g., Barbaresi & Olsen, 1998; Piccolo-Torsky & Waishwell, 1998), 94% of teachers in the sample expressed a desire for more training on the subject of ADHD.

According to the findings of a study conducted by Christopher and David (2004), the more education about ADHD an individual receives, the more knowledge he/she will have on the condition. Research investigating the impact of instruction about ADHD given to teachers during their pre-service training and in-service workshops has lead to mixed results. One Australian study conducted by Bekle (2004) found no relationship between teachers' knowledge of ADHD and either teacher training or in-service workshops. Similarly, results of a more recent study conducted in the United States indicated that the number of courses teachers attended during their teacher training which included coursework concerning ADHD was unrelated to their knowledge of the disorder. However, an earlier American study conducted by Small (2003) found a significant positive association between teacher training on the subject of ADHD and total KADDS and Treatment scores, yet no statistically significant relationship between workshop attendance and teachers' knowledge of ADHD. These discrepant findings may be attributed to cultural differences or the diversity of training programmes and workshops. Alternatively these inconsistent results may result from methodological differences such as dissimilar sample sizes. It is also feasible that teachers who had been educated about ADHD during their teacher training had graduated many years ago, and consequently, the knowledge they had acquired about ADHD through training had since become outdated (Garcia, 2009). The lack of association between workshop attendance and teachers' knowledge of treatment for ADHD observed in Bekle (2004) and Small's (2004) studies lend support to the view that workshops on ADHD may not adequately cover information relating to the treatment of the disorder in light of the view that teachers do not technically treat ADHD (Anderson et al., 2012).

Self-directed Study

Given the lack of training given to teachers in regards to ADHD, it is not surprising that most of teachers engage in some form of self study, obtaining information about the disorder from articles, books, or magazines (Sciutto et al., 2000; Small, 2003; Snider et al., 2003; Stormont & Stebbins, 2005). The impact of self-directed study on teachers' knowledge of ADHD has therefore been a topic of interest, with research leading to mixed findings. For example, one study found that teachers' self-directed study was positively yet weakly related to their total KADDS scores, moderately related to Treatment scores, but not significantly related to either Associated Features or Symptoms/Diagnosis subscale scores (Small, 2003). However, in a more recent study, Lazarus (2011) found a positive relationship between reading an article about ADHD and teachers' scores on all three subscales of the KADDS. Finally, an earlier study conducted by Piccolo-Torsky and Waishwell (1996), indicated that teachers who had read more than 10 books or articles on ADHD received higher scores on a test of knowledge on ADHD than teachers who had not. These discrepant results may be attributed to methodological differences. Specifically, while Small (2003) combined all sources utilised for self-directed study and then used a *yes*/*no* format, Lazarus (2011) correlated the number of articles about ADHD that teachers reported reading with their knowledge of the disorder. Furthermore, the study conducted by Piccolo-Torsky and Waishwell (1996) utilised the K-ADHD (Jerome et al., 1994) to measure teachers' knowledge of ADHD. Thus comparisons between the results of this study and the other two studies, which utilise the KADDS (Sciutto et al., 2000), cannot be made.

Prior Exposure to and Experience of Students with ADHD

Evidence on whether knowledge of ADHD is higher in teachers who have taught a student with ADHD compared to teachers who have not, is inconsistent. Similarly, studies investigating whether teachers who have taught a larger number of students with ADHD had superior knowledge of ADHD relative to those who had taught a smaller number of students have led to mixed results. Research conducted by Kleynhans (2005), Kos et al. (2004), and Sciutto et al. (2000) found that teachers' knowledge of ADHD was positively related to having previously taught a student with ADHD. In addition, the number of students affected by ADHD that teachers' had taught was positively associated with their knowledge of ADHD. These studies were conducted in the U.S, South Africa, and Australia respectively, and utilised the KADDS. However, other studies found no association between experience teaching a student with ADHD and teachers knowledge of ADHD (Lazarus, 2011; Small, 2003).

The discrepancy in these findings may be attributed to several reasons. For example, Lazarus (2011) utilised a convenience sampling method, which restricts the generalisability of the results, Kleynhans used a purposive sampling method, and Sciutto and colleagues (2000) did not disclose their method when documenting their study. Finally, the ability to compare the results of these studies may be compromised by the fact that researchers were unaware of the nature and severity of the symptoms exhibited by the students with ADHD that the participants had been exposed. The symptoms of ADHD displayed by these students are likely to influence the knowledge of ADHD that teachers develop (Small, 2003). For example, if teachers had only been exposed to students with milder symptoms of

ADHD, they might not have had to implement or monitor treatments for more severe symptoms and thus lack knowledge about these treatments.

Teachers are frequently given the responsibility of implementing educational and behavioural interventions for students with ADHD in the classroom (DuPaul & Stoner, 2003; Snider et al., 2003). Despite this, studies examining the impact of teacher participation in the development of treatment plans for students with ADHD on teachers' knowledge of the disorder are notably absent from the literature. However, Curtis and colleagues (2006) conducted a study, which compared United States and New Zealand teachers' perceptions of classroom interventions for ADHD. Their findings indicated that teachers in the U.S. sample were more likely to have participated in implementing an individual behaviour plan (IBP) for a student with ADHD in the two years preceding the study and had superior knowledge of ADHD. The authors concluded that differences in the frequency of participation in developing these treatment plans could have contributed to differences in teachers knowledge of ADHD observed across cultures. It is important to note that this is the only reported study involving a sample of teachers from New Zealand.

Teacher Self-efficacy

Research suggests that teachers' knowledge of ADHD is related to their self-efficacy concerning teaching a child with the disorder effectively. Evidence from studies conducted by Sciutto et al. (2000), Perold et al. (2010), Lazarus (2011), and Kleynhans (2005), indicates that teachers who have more overall knowledge about ADHD feel more confident about teaching a student affected by the condition. Lazarus (2011) who asked participant to rate their confidence in working with students with ADHD on a four point Likert scale, also found a significant positive relationship between these ratings and teachers' knowledge of treatment. This was

not the case in Ohan and colleagues' (2008) study, where teachers' with superior knowledge of ADHD reported less confidence in their ability to manage a child with ADHD in their classroom. This discrepancy may be attributed to methodological differences. Specifically, Ohan and colleagues (2008) divided their sample of teachers in into three groups based on their knowledge of ADHD (low, average and high knowledge) and took a mean group-difference approach to analysis. Furthermore, teachers in their low knowledge group had scores of 69% correct or less, which is higher than the mean scores for the other four studies (Range = 35% - 47%). In addition, Ohan et al. (2008) utilised the K-ADHD (Jerome et al., 1994) to measure teachers' knowledge of ADHD, which introduces several sources of variability in results, as outlined previously in this section.

Summary

Children and adolescents with ADHD experience educational and social difficulties (Barkley, 2006; Faraone et al., 1993; Fell & Pierce, 1995) that are associated with increased risk of poor academic outcomes (Barkley et al., 2010; Mash & Wolfe, 2005; Spencer et al., 2007; Zentall, 2006), and psychological problems (Bagwell et al., 2006; Barkley, 2006; Carr, 2006; Pliszka et al., 1999). The amount of time that children spend in school settings places teachers in a position where they can influence the lives of children with ADHD and reduce or prevent many of these difficulties (Barkley, 2006; Miranda et al., 2002). Teachers play a large role in the referral, diagnosis, treatment, and monitoring of students with ADHD (Kleynhans, 2005). They also collaborate with and advise parents about their child with ADHD on a frequent basis (Bussing et al., 2002; DiBattista & Shepherd, 1993).

This review of the literature indicates that teachers may not have the necessary knowledge to carry out these responsibilities effectively. Evidence suggests that teachers have a weak understanding of the nature, aetiology, development, course, and prognosis of ADHD, and hold considerable misperceptions about suitable interventions for children affected by the disorder (e.g., Castenova, 2008; Kleynhans, 2005). Furthermore, prior research exploring teachers' knowledge of the disorder revealed that the majority of teachers received no training in ADHD or related matters (Barbaresi & Olsen, 1998; Bekle, 2004; Holowenko & Pashute, 2000; Jerome et al., 1994; Piccolo-Torsky & Waishwell, 1998). Inadequate teacher knowledge or training about the disorder may lead to underdiagnosis (Barkley et al., 2002), or overdiagnosis (Sciutto et al., 2000) of ADHD, and to ineffective management of the disorder (DuPaul & Eckert, 1997b). Teachers' inaccurate knowledge may also be passed on to parents (DiBattista & Shepherd, 1993), which may cause parents to become frustrated with their child (Odom, 1996), and/or have unrealistic expectations of the disorder (McNeal et al., 2000).

Rationale

Given the prevalence of ADHD in school aged children, most teachers will teach several students with ADHD during their career (Legato, 2011). Teachers' knowledge or misperceptions about ADHD can influence every step of the process through which a student affected by ADHD is identified, diagnosed and treated (Sciutto & Feldhamer, 2005). In light of the unremitting nature of this childhood disorder (Accardo et al., 2000), and the amount of time that children with ADHD spend at school, the importance of examining New Zealand primary school teachers' knowledge and perceptions of ADHD cannot be overstated.

CHAPTER 3

METHOD

The current study is non-experimental, descriptive, and based on a post-positivist paradigm. This paradigm was considered to be the most appropriate as it supports the notion that there is a 'truth' to be found, yet acknowledges the fact that due to the researcher's limitations (Maxwell, 2004), "researchers can [only] discover 'reality' within a certain realm of probability. They cannot 'prove' a theory, but they can make a stronger case by eliminating alternative explanations" (Mertens, 2010, p.14).

The main goals of this study were to: 1) examine and quantify teachers' knowledge and perceptions of Attention-deficit/hyperactivity disorder (ADHD); and, 2) identify teacher characteristics that are related to their knowledge of ADHD. To best answer the research questions, a quantitative, survey approach was selected. This method of investigation is appropriate because the target population was "too large to observe directly or to make descriptive assertions about" (Babbi & Mouton, 2002, as cited in Kleynhans, 2005, p.35), and the researcher was more interested in a broad overview of responses for a representative sample of a large population rather than the multiple perspectives that exist within the group (Johnson & Christensen, 2012). The collection of data through surveys, which featured close-ended questions and a set response format, facilitated the statistical analysis of teachers' responses to items (Babbi & Mouton, 2002, as cited in Kleynhans, 2005).

Selection of Participants

The participants comprised of general education and special education primary school teachers currently employed by full primary, contributing, or

intermediate schools, in New Zealand. Primary school teachers were selected as participants in this study for four main reasons:

1. Children who display symptoms that are characteristic of ADHD are often referred for assessment during their primary school years (Guerra & Brown, 2012).
2. Estimates suggest that for class sizes that exceed 20 students, on average a minimum of one child with ADHD exists in every primary classroom (Kleynhans, 2005; Ohan et al., 2008).
3. Children spend the majority of their time in classrooms and other school contexts (Kleynhans, 2005), and the success of ADHD students at school is most influenced by the classroom teacher (Barkley, 1995).
4. Teachers often provide advice to parents of children with ADHD (Bussing et al., 1998; Kos et al., 2004) and information to assist practitioners in making a diagnosis of ADHD (Wolraich et al., 2003).

The sample of schools from which teachers were recruited from was obtained using a simple random, probability sampling technique. According to Johnson and Christensen (2008), a simple random sample is "a sample drawn by a procedure in which every member of the population has an equal chance of being selected for the study" (p.225). This sampling method was selected to reduce the possible occurrence of human bias when selecting cases to be included in the sample (Sharma, 2005a), which enables a sample that is greatly representative of the population being studied to be obtained(Sharma, 2005b), and generalisations from the sample to the population to be made (Jackson, 2009).

To draw a random sample of schools, a table of computer generated numbers obtained online was used and matched to the numbers attached to the primary

schools listed in the most recent directory of 1982 primary schools compiled by the Ministry of Education (Education Counts, 2013). Five hundred and ninety-three schools were contacted, of which 44 indicated they were interested in participating in the study (7.4%). Two hundred and seventy-seven questionnaires were posted to principals for distribution to teachers, of which 84 were completed and returned (30% return rate).

Instrumentation

The data for this study were collected by means of a self-report questionnaire. The 54-item questionnaire consisted of two sections. The first section of the questionnaire was developed for this study and collected demographic details of the participants, and information regarding their experiences and perceptions of ADHD (See Appendix A). Questions in the first section included those related to teachers' age, gender, years of teaching experience, training and their teaching roles. For example, respondents were asked to indicate if they had ever participated in developing an individual education plan (IEP) for a student with ADHD, or if they ever taught a child who they knew was diagnosed with ADHD. The remaining section assessed teachers' knowledge of and misperceptions about ADHD using the Knowledge Of Attention Deficit Disorders Scale (KADDS) (Sciutto et al., 2000). The questionnaire was obtained from Professor Mark Sciutto, who granted permission for the questionnaire to be used in this study (see Appendix B). A few questions in the KADDS that were specific to an American school setting (viz., items 18 and 32) were reworded to suit the New Zealand context. For example, "elementary school" was changed to "primary school" in item 32.

The Knowledge Of Attention Deficit Disorders Scale

The Knowledge of Attention Deficit Disorders Scale (KADDS) is a 36-item questionnaire designed by Sciutto and colleagues (2000) to assess knowledge and perceptions of ADHD. The KADDS consists of three subscales: 1) Associated Features (15 questions); (2) Symptoms/Diagnosis (nine questions); (3) Treatment (12 questions).

The focus of two subscales (Symptoms/Diagnosis and Treatment) are self-evident. The Associated Features subscale examines knowledge of general information about the nature, causes and prognosis of ADHD. These three subscales were selected because they address subject matter related to diagnostic decisions and educational interventions.

Participants were asked to rate items as *true* (*T*), *false* (*F*) or *don't know* (*DK*). This response format is considered superior to a, dual, *true-false* format, as it allows for a distinction between teachers lack of knowledge and misperceptions of ADHD to be made. This distinction is desirable and meaningful, as evidence suggests that perceptions about ADHD are especially resistant to change (Kos et al., 2004; Sciutto et al., 2000). Total scores range from 0 to 36, with higher scores indicating greater accurate knowledge of ADHD. The Associated Features subscale score has a range of 0-15. The Symptoms/Diagnosis subscale score has a range of 0-9. The Treatment subscale score has a range of 0-12.

Scale development. In developing individual KADDS items, only items that were evidence-based and widely acknowledged (Sciutto et al., 2000) were used in the scale. The KADDS includes two types of items: those that refer to positive signs of ADHD and those that refer to negative signs of ADHD. Thus, the KADDS is intended to measure not only what respondents think ADHD is, but also what they

think it is not. To achieve this goal, items relating to negative behaviours more distinctive of other mental disorders were also included (for example, physical cruelty to other people, destroying other people's things) (Sciutto & Feldhamer, 2005). Items were assigned to a subscale by Sciutto and colleagues (2000), based on the consensus view of 40 upper level doctoral level students specialising in clinical and educational psychology. With a description of the KADDS subscales in mind, each participant categorised each item in the scale into one of the three KADDS subscales. To be considered part of a subscale, at least 75% of the sample had to agree (Sciutto & Feldhamer, 2005).

Scoring procedure. Data related to KADDS items were prepared by recoding variables and generating composite variables according to Sciutto and Feldhamer's (2005) scoring procedure. At first, participant's responses to each KADDS item were assigned with the following values: *true*=1, *false*=2, *don't know*=3. Responses were then recoded as correct/incorrect. Different variables were created for recoded responses to allow for the tabulation of misperceptions. A misperception was defined as an incorrect response (i.e., answering *false* to a question for which *true* is the correct answer); *don't know* responses were not considered to be misperceptions. To obtain subscale and total scale scores, responses to all KADDS items were recoded so that correct answers received a score of 1 and incorrect and *don't know* answers received a score of 0. The recode statements and composition of subscales are detailed in Appendix C.

Reliability. Previous studies which examined the internal consistency of the KADDS revealed that the 36 items of the scale had high internal consistency ($.80 < \alpha_c < .90$), and the three subscales, within the measure (Associated Features, Symptoms/Diagnosis, and Treatment) had moderate levels of internal consistency

(.52 < α_c < .75) (Bender, 1996; Herbert et al., 2004; Sciutto et al., 2004; Sciutto & Terjesen, 2004; Sciutto et al., 2000). In addition, Sciutto and Terjesen (2004) administered the KADDS scale to a sample of 185 college students two weeks apart to determine the scale's test-retest reliability. Test-retest correlations for the KADDS scores were moderate to high (.59 < r < .76), indicating that the scale has adequate stability.

Validity. The validity of the KADDS scale as a measure of ADHD knowledge has been verified through examination of the correlations between the scale scores and a series of variables, which according to the literature, are related to teachers' knowledge of ADHD (Soroa et al., 2012). For example, teachers who had taught a child with ADHD obtained significantly higher scores on the KADDS scales than teachers who had never taught a child with ADHD (Sciutto et al., 2000), and the number of children with ADHD previously taught by elementary school teachers was positively associated with their KADDS scores (Sciutto et al, 2000; Sciutto et al, 2004). The validity of the KADDS has also been assessed by examining whether educational interventions lead to changes in scores on the scale. For example, Sciutto and Terjesen (2004) administered the KADDS prior to and after a one-hour educational lecture on ADHD. They found a significant increase in KADDS scores for participants in the intervention groups, and no change in scores of participants in the control group, which did not receive any information relating to ADHD.

Procedure

Ethical approval from Massey University's Human Ethics Committee was sought and granted (see Appendix D). The researcher then sent principals of the identified schools information about the study and a request for the teachers in their

schools to voluntarily participate in the study. This information package included a letter in which the researcher introduced herself and provided a brief description of the study (Appendix E), a copy of the survey (Appendix A), a consent form which instructed principals to specify the number of teachers employed by their school if they agreed to participate (Appendix F), and a postage paid self-addressed envelope for returning the consent form.. Principals were assured that the schools' responses would be kept anonymous. A deadline for returning consent forms was set and specified in the letter to principals.

The researcher then sent principals of consenting schools a letter thanking them for their cooperation and asking them to distribute packages among their teaching staff as soon as possible, during a staff meeting or via teachers' mail boxes. These packages were enclosed, and contained the questionnaire, a self-addressed postage paid envelope, and a participant information sheet. Information sheets were addressed to teachers, invited them to participate, explained the motivation for and importance of the study, and thanked them for their cooperation (Appendix G). Teachers were assured that their responses would be kept anonymous and that their individual responses could not be identified.

Ethical Considerations

Selected schools were not contacted until permission for the study was granted by the Massey University's Human Ethics Committee. Information sheets that outlined the details of the study were distributed to potential participants (both schools and teachers). Principals and teachers were informed about anonymity and confidentiality of all information collected for the study. Information that could be used to identify teachers or their schools was not collected, to encourage honest responses. The voluntary nature of participation in the study was emphasised.

Teachers were made aware of the fact that by completing the survey, their consent was implied.

Questionnaires were completed by the participants privately and took approximately 10 minutes. Clear instructions on how to complete the questionnaires were given, with teachers encouraged to respond honestly to the KADDS items and to select the *don't know* option rather than guessing the answer questions to which they did not know the answers.

The researcher and her supervisors' contact details were provided to the research participants in the event that they had any additional queries or concerns regarding the questionnaire, research process, ethical conduct of the study, or research findings. The contact details of the director of Research Ethics were also made available in case the participants had concerns about the ethical conduct of this research that they wanted to raise with someone other than the researchers.

Recruitment of teachers for this study commenced only after consent was obtained from the principals of their schools. All participating schools were notified that they would be provided with a copy of the results following completion of the study. Dissemination of these findings to participating schools may enhance teacher awareness and understandings of ADHD by drawing their attention to commonly held misperceptions about the disorder and existing gaps in New Zealand primary school teachers' knowledge of ADHD.

Data Analysis

Each participant's data were entered into the Statistical Package for the Social Sciences (SPSS v.21) where all analyses were performed. Descriptive statistics were used to provide information about the participants in the sample,

while the inferential statistics were used to analyse the differences between demographic groups and KADDS scales.

The responses to each KADDS item were categorised as *don't know*, incorrect responses or misperceptions, and correct responses, and tabulated to facilitate the examination of ADHD content about which the majority of teachers hold misperceptions, or have/lack knowledge of at the item level of each of the subscales. These analyses were presented graphically in the form of a stacked bar graph for the items of each subscale of the KADDS. Separate Friedman's tests were used to compare the mean correct, incorrect, and *don't know* scores of participants across the three KADDS subscales. Post hoc analyses for these tests were conducted using the Wilcoxon signed-rank test. As three pairwise comparisons were completed/three hypotheses tested, the significance level was adjusted using the Bonferroni correction (.05/3=.017) to maintain the familywise error rate.

Spearman's rank-order correlations were used to explore the relationships between teachers' knowledge of ADHD, and their experiences and perceptions of ADHD as well as various demographic characteristics. Mann-Whitney U tests and Kruskal-Wallis tests (with Tukey-Kramer's post hoc test) were used when the independent variables in question were of a nominal nature.

The psychometric properties of the various KADDS scales were determined prior to addressing the research questions. Cronbach's alphas were used to assess the internal reliability of the KADDS full scale and Associated Features, Symptoms/Diagnosis, and Treatment subscales (Sciutto et al., 2000).

Data Screening

The first step of the analysis was to screen the data. Descriptive statistics and graphic representations were used to analyse the accuracy in which the data had been

entered (Tabachnick & Fiddell, 2007). This included an examination of the frequency distribution for categorical items, and the mean and standard deviation for the numeric variables. In the case of suspicious data, implausible or extreme values, the data were double-checked from the original data against the data file to ensure its accuracy (Tabachnick & Fidell, 2007). The majority of participants responded to items on the KADDS, with a maximum of two missing cases on an individual item. Given the modest size of the sample in this study, casewise deletion was not considered to be the optimal way of addressing the issue of missing data, as this approach would cause a very significant amount of data and therefore statistical power to be lost.

The next step involved an examination of the relationships between skewness, kurtosis, and variance using the Kolmogorov-Smirnov (K-S) Test for all groups undergoing inferential testing. Non parametric tests were used for distributions that violated assumptions of normality. The Levene's test of homogeneity of variance was utilised to determine whether the assumptions of potential tests utilised for post-hoc analysis were met.

CHAPER 4

RESULTS

Data for each participant were entered onto an SPSS (Statistical Package for the Social Sciences, v.21) spreadsheet. Analyses were performed using the SPSS package. Analyses consisted of data screening, the generation of composite variables, and the calculation of inferential statistics. Inferential testing included correlational analysis, goodness of fit, and difference testing. All items on the Knowledge Of Attention Deficit Disorders Scale (KADDS) were recoded preceding analysis in line with the recommendations of Sciutto and Feldhamer (2005). The distributions of the total scores of the KADDS and its subscale scores were examined for normality and internal consistency reliability, as these measures influence the selection and interpretation of the statistics necessary to answer the research questions. Given that the parametric tests used for answering the research questions of the study assume that the responses are normally distributed, the relationships between skewness, kurtosis and variance of the distributions of scores on the KADDS and subscales were examined, with all distributions reflecting the percentage of correctly answered items. The scoring method used scored *don't know* responses as incorrect answers.

Psychometric Properties of the KADDS

Scale and Subscale Distributions

The distributions of the total KADDS scores and the scores on the three subscales were found to deviate significantly from normality when tested using the Kolmogorov-Smirnov (K-S) with Lilliefors correction (Table 1). As a result, non-parametric equivalent tests, which do not assume normality, were used to test the hypotheses linked to research questions of this study.

Table 1

Results of Kolmogorov-Smirnov Test for Normality for Teachers' Scores on KADDS Scales.

Scale	*D*	*df*	Significance[a]
KADDS (full-scale)	.105	75	.039*
Associated Features	.126	82	.003**
Symptoms/Diagnosis	.168	83	.000**
Treatment	.163	77	.000**

Note. a. Lilliefors Significance Correction.

*$p < .05$, **$p < .01$

Reliability

Cronbach's alpha coefficients were calculated to examine whether the items contributing to each of the four measures of the KADDS formed an internally consistent scale. Mean scores (*M*) and standard deviations (*SD*) are presented along with α_c statistics, in Table 2, for the KADDS and its three subscales. Cronbach's alpha statistics from the scale analysis indicate that the KADDS total scale (36 items) has high internal consistency (α_c=0.81). The three subscales (Associated Features, Symptoms/Diagnosis, and Treatment) all had moderate levels of internal consistency ($.52 \leq \alpha_c < .66$).

Table 2

Cronbach's Alpha and Descriptive Statistics for the Knowledge Of Attention Deficit Disorders Scale (KADDS)

Scale	*n*	No. items	*M*	*SD*	Alpha
KADDS (full-scale)	75	36	12.56	4.93	.81
Associated Features	82	15	4.59	2.37	.64
Symptoms/Diagnosis	83	9	4.51	1.73	.66
Treatment	77	12	3.35	1.76	.52

Note. *n*=84

Demographic Characteristics of the Sample

Demographic characteristics of the sample are displayed in Table 3. There were 12 male and 72 female teachers in the sample. The majority of participants (67%) were aged 40 years or older, with two participants declining to disclose their age. The current educational level of the participants was as follows: 66% had a bachelor's degree, 16% had a graduate diploma, and 18% had a postgraduate degree, with one teacher in this sample declining to specify the highest level of education they had completed. Almost all respondents (96%) were regular education teachers, with one participant declining to disclose the type of teacher they were. Approximately 64% of teachers in this sample were employed at a full primary school, 29% at a contributing school, and 7% at an intermediate school. Participants reported an average of 16.07 (*SD* = 9.97) years of teaching experience, with two teachers declining to disclose the amount of teaching experience they had.

A Chi-square goodness-of-fit test was used to determine if the sample was representative of the total population of primary school teachers in New Zealand in terms of gender (83% female; 17% male). Results suggested no sample gender bias,

but a trend in the direction of females more likely to complete the survey than males, $\chi 2$ (2, n = 75) = .469, p > .05.

Table 3

Demographic Characteristics of the Sample

Category	Frequency	Percent (Valid)
Gender		
Male	12	14.3
Female	72	85.7
Age		
< 30	9	11.0
30- 39	18	22.0
40 – 49	18	22.0
50 – 59	29	35.4
≥ 60	8	9.8
Undisclosed	2	
Highest Level of Education Completed		
Bachelor's degree	55	66.3
Graduate diploma	13	15.7
Postgraduate degree	15	18.1
Undisclosed	*1*	
Type of Teacher		
Regular Education	80	96.4
Special Education	3	3.6
Undisclosed	*1*	
Type of School		
Full Primary	54	64.3
Contributing	24	28.6
Intermediate	6	7.1
Teaching Experience (Years)		
0-5	12	14.6
6-10	12	14.6
11-15	26	31.7
16-20	8	9.8
21-25	9	11.0
26-30	7	8.5
≥ 31	8	9.8
Undisclosed	*2*	

Note. n = 84.

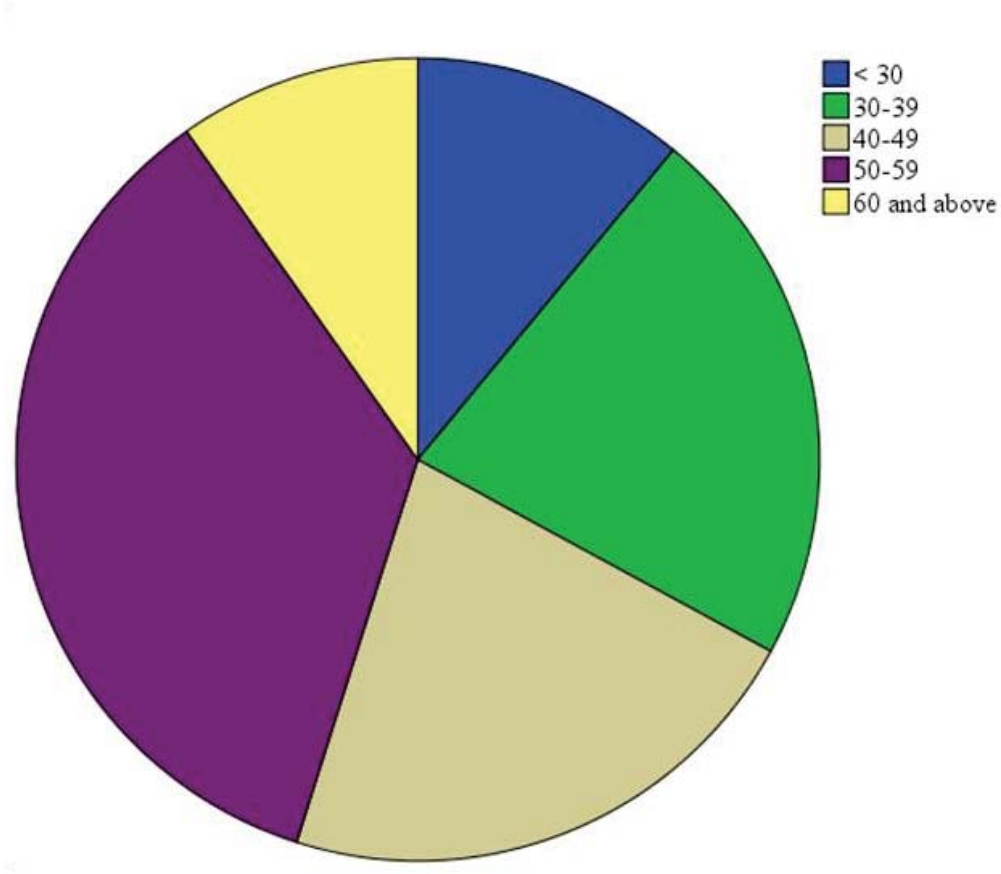

Figure 1. Age of Respondents

Teachers' Experiences with ADHD

The survey included several questions which addressed teachers' experiences with ADHD (for example, whether or not they had ever taught a student with ADHD, if they knew anyone outside of the classroom who had ADHD, whether they had been involved in developing individual education plans [IEPs] and individual behaviour plans [IBPs] for students with ADHD).

Almost all participants (94%) reported having taught a student with ADHD before; 28% had taught one or two students, 35% had taught three to five students, and 31% had taught six or more students with ADHD. Forty-two percent of teachers had taught a female student with ADHD, 92% had taught a male student with ADHD, and 79% had taught a student prescribed medication for ADHD. The

majority of teachers who have had students with ADHD in their classroom had at some time participated in developing an IBP (Figure 2), or an IEP (Figure 3) for a student affected by the disorder. In addition, 63% of participants reported knowing someone outside of school who had ADHD.

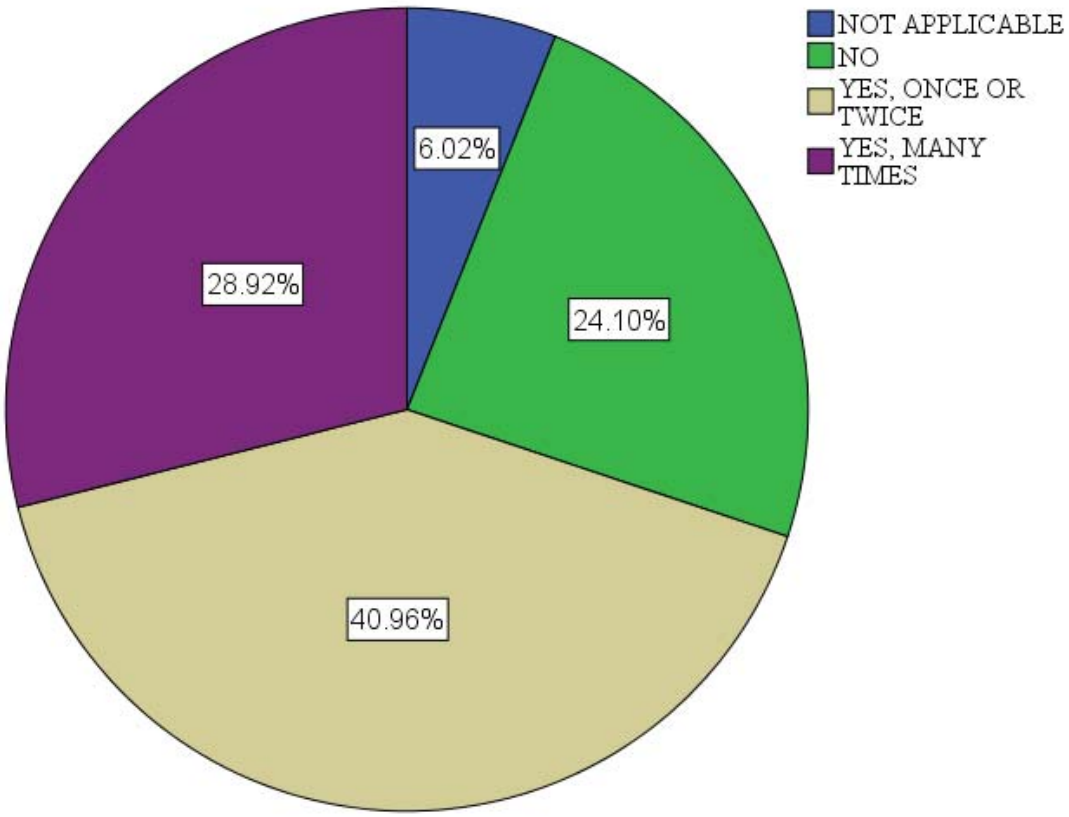

Figure 2. Participants' Responses to the Question "If you have had students with ADHD in your classroom, have you ever participated in developing an individual behaviour plan (IBP)?"

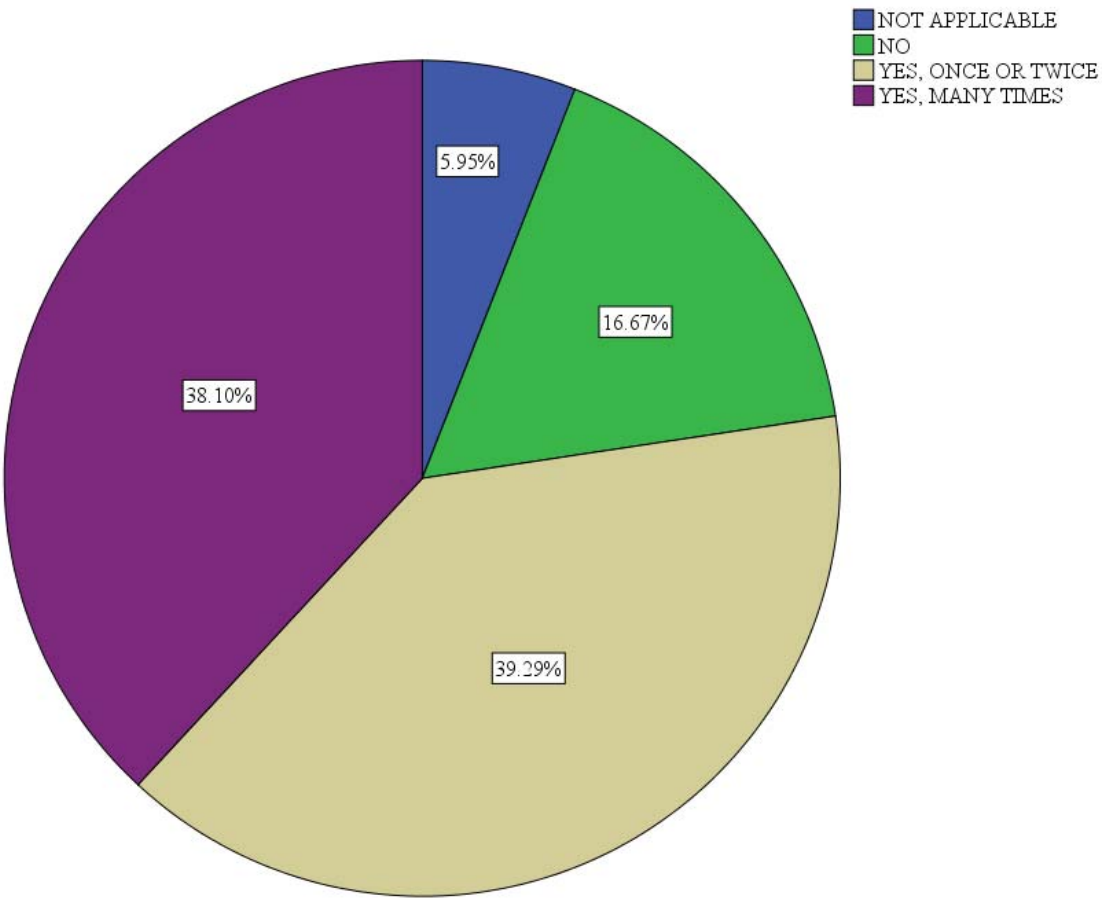

Figure 3. Participants' Responses to the Question "If you have had students with ADHD in your classroom, have you ever participated in developing an individual education plan (IEP)?

Teachers' Perceptions of ADHD

The first section of the questionnaire also collected information regarding teachers' perceptions of ADHD. All teachers reported that they believed ADHD impacts on the educational experiences of students diagnosed with the disorder. Ninety percent of participants indicated that additional training on working with students with ADHD could be beneficial to them. Sixty-one percent of teachers felt confident in their ability to work with and support students with ADHD. With

regards to the type of educational setting they believed was most appropriate for a student with ADHD, the majority of teachers (78%) felt full-time general education was the most appropriate educational setting for a student with ADHD. Five percent of teachers in the sample believed a full-time special education setting was most appropriate for students with ADHD, 6% were in favour of part-time special education, and 11% indicated *other* setting. An analysis of open ended responses made by teachers who indicated *other* revealed that these teachers felt that the most appropriate educational setting for a student with ADHD depends on the nature of the symptoms displayed by the student, the impact they have on other students, and the level of support provided to the classroom teacher by the teacher aide or other specialist.

Teachers' Education and Training about ADHD

Participants also provided information regarding their ADHD education and training (Table 4). The majority of respondents did not learn about ADHD during their teacher training (80%) or did not attend an in-service professional learning and development programme or workshop on ADHD (60%). Articles were the source most commonly identified by the respondents in acquiring information about ADHD (92%).

Table 4

Teachers' Education and Training about ADHD

Category	Frequency	Percent (Valid)
Teacher Training		
Yes	17	20.5
No	66	79.5
Undisclosed	*1*	
In-service Programme/Workshop		
Yes	33	39.8
No	50	60.2
Undisclosed	*1*	
Books		
Yes	51	60.7
No	33	39.3
Articles		
Yes	76	91.6
No	7	8.4
Undisclosed	*1*	
Pamphlets/Handouts		
Yes	69	83.1
No	14	16.9
Undisclosed	*1*	
Television Programs		
Yes	56	67.5
No	27	32.5
Undisclosed	*1*	
Internet		
Yes	57	68.7
No	26	31.3
Undisclosed	*1*	

Note. $n = 84$.

KADDS Assessment of ADHD Knowledge

Performance per KADDS Item

Teachers' responses to each KADDS item were tabulated and teachers' average score per individual question on the full scale and subscales calculated (Table 5). These scores were analysed in terms of knowledge, gaps in knowledge, and misperceptions that teachers hold.

The total KADDS mean score per item was 48% (Range = 7% to 88%). Thus on average, slightly less than half of the participants answered a question correctly. The relative high mean score of 37% (Range = 7% - 77%) for *don't know* responses compared to 48% for correct responses on the total KADDS scale, suggest an overall lack of knowledge. Teachers were approximately 2.5 times more likely to have a gap in their knowledge of ADHD than to hold a misperception (*M* = 14%, Range = 0% – 66%).

Table 5

Mean Correct, Don't Know and Incorrect Responses per KADDS item for full and subscales

	Response		
Scale	Correct	*Don't know*	Incorrect
KADDS total	48.3	37.3	14.4
Associated Features	41.9	41.5	16.6
Symptoms/Diagnosis	61.7	26.7	11.5
Treatment	46.1	40.1	13.8

The mean score of correct responses per item of 42% (Range = 7% to 82%) for the Associated Features subscale was lower than the overall scale and other subscales. This finding indicates that on average, less than half of participants answered a question correctly. The equivalent mean scores per item for correct and *don't know* responses (*M* = 42%, Range = 17% - 73%) suggest that teachers had equal amounts of knowledge and gaps in their knowledge. Teachers had fewer misperceptions than gaps in their knowledge of associated features of ADHD. However, teachers had more misperceptions relating to items on this subscale (*M* = 17%, Range = 1% - 66%) than the total scale and other subscales, with over a fifth of the sample holding misperceptions for six items on this scale. The percentage scores of responses for items belonging to the Associated Features subscale are displayed in Table 6 and presented graphically in Figure 4.

Table 6

Frequency Distribution of Correct, Don't Know and Incorrect Responses for Items Assigned to the Associated Features Subscale

	Number of responses				Percentage (valid)		
Item	Correct	*Don't know*	Incorrect	Total	Correct	*Don't know*	Incorrect
1	7	51	25	83	8.4	61.4	30.1
4	8	48	27	83	9.6	57.8	32.5
6	20	60	4	84	23.8	71.4	4.8
13	69	14	1	84	82.1	16.7	1.2
17	22	61	1	84	26.2	72.6	1.2
19	42	32	10	84	50	38.1	11.9
22	69	14	1	84	82.1	16.7	1.2
24	57	25	2	84	67.9	29.8	2.4
27	6	23	55	84	7.1	27.4	65.5
28	30	36	18	84	35.7	42.9	21.4
29	54	24	6	84	64.3	28.6	7.1
30	11	55	18	84	13.1	65.5	21.4
31	53	21	10	84	63.1	25.0	11.9
32	61	15	8	84	72.6	17.9	9.5
33	19	42	23	84	22.6	50.0	27.4
Mean	**35.2**	**34.7**	**13.9**		**41.9**	**41.5**	**16.6**

Note: n=84

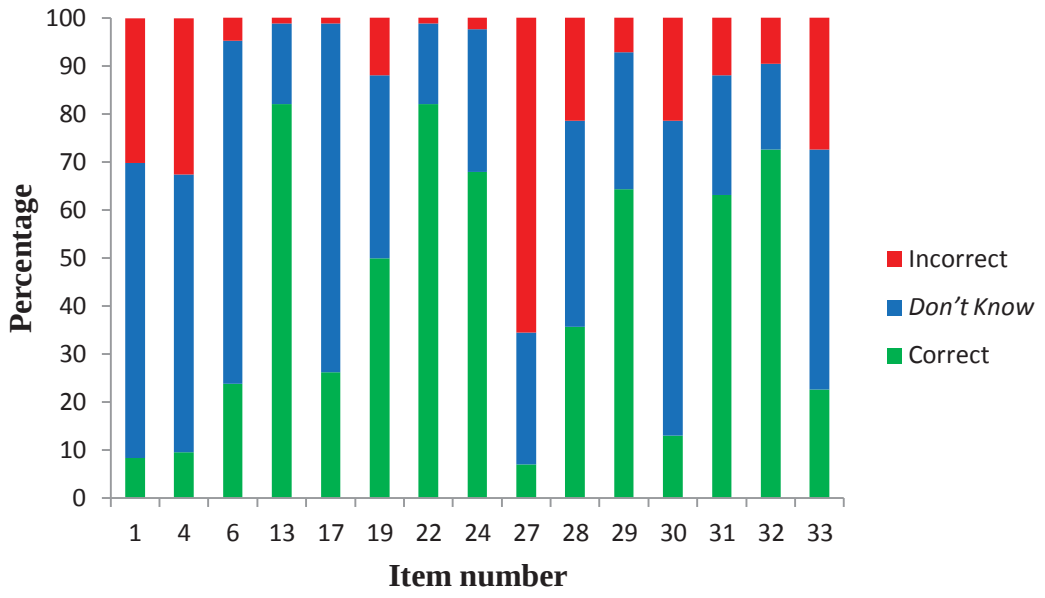

Figure 4: Stacked bar graph showing percentages of correct, *don't know* and incorrect responses to the 15 Associated Features subscale questions

The mean score per item of 62% (Range = 10% to 88%) for the Symptoms/Diagnosis subscale was higher than the overall scale and other subscales. This finding indicates that on average, more than half of participants answered a question correctly. The relative low mean score of 27% (Range = 7% - 54%) for *don't know* responses compared to 62% for correct responses on the Symptoms/Diagnosis scale, suggest teachers' had a substantial amount of knowledge in this area. Teachers had fewer misperceptions (*M* = 12%, Range = 0 % – 37%) than gaps in their knowledge of symptoms and diagnosis of ADHD, and were approximately five times more likely to have accurate information about this area than to hold a misperception. The percentage scores of responses for items belonging to the Symptoms/Diagnosis subscale are displayed in Table 7 and presented graphically in Figure 5.

Table 7

Frequency Distribution of Correct, Don't Know and Incorrect Responses for Items Assigned to the Symptoms/Diagnosis Subscale

	Number of responses				Percentage (%)		
Item	Correct	*Don't know*	Incorrect	Total	Correct	*Don't know*	Incorrect
3	74	6	4	84	88.1	7.1	4.8
5	8	45	31	84	9.5	53.6	36.9
7	52	22	10	84	61.9	26.2	11.9
9	72	6	5	83	86.7	7.2	6.0
11	35	35	14	84	41.7	41.7	16.7
14	38	33	13	84	45.2	39.3	15.5
16	71	0	13	84	84.5	15.5	0
21	52	29	3	84	61.9	34.5	3.6
26	64	13	7	84	76.2	15.5	8.3
Mean	**51.8**	**21.0**	**11.1**		**61.7**	**26.7**	**11.5**

Note: n=84

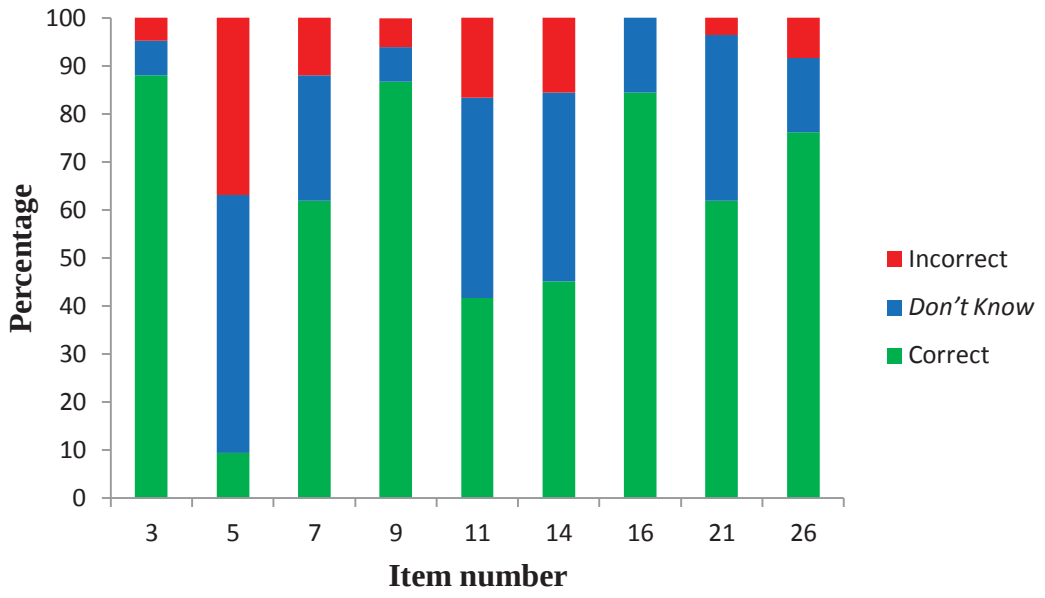

Figure 5: Stacked bar graph showing percentages of correct, *don't know* and incorrect responses to the nine Symptoms/Diagnosis subscale questions

The mean score of correct responses per item of 46% (Range = 17% to 86%) for the Treatment subscale was only slightly higher than the Associated Features scale. This finding indicates that on average, less than half of participants answered a question correctly. The similar mean scores per item for correct and *don't know* responses (*M* = 40%, Range = 15% - 77%) suggest that teachers' had almost equal amounts of knowledge and gaps in their knowledge. Teachers had fewer misperceptions (*M* = 14%, Range = 0% - 45%) than gaps in their knowledge of treatment of ADHD. However, one in seven teachers in the sample held a misperception for 50% of items on this subscale. The percentage scores of responses for items belonging to the Treatment subscale are displayed in Table 8 and presented graphically in Figure 6.

Table 8

Frequency Distribution of Correct, Don't Know and Incorrect Responses for Items Assigned to the Treatment Subscale

	Number of responses				Percentage (%)		
Item	Correct	*Don't know*	Incorrect	Total	Correct	*Don't know*	Incorrect
2	69	13	2	84	82.1	15.5	2.4
8	19	51	13	83	22.9	61.4	15.7
10	57	18	7	82	69.5	22.0	8.5
12	48	34	1	83	57.8	41.0	1.2
15	62	21	1	84	73.8	25.0	1.2
18	30	42	12	84	35.7	50.0	14.3
20	35	28	21	84	41.7	33.3	25.0
23	17	29	37	83	20.5	34.9	44.6
25	22	48	14	84	26.2	57.1	16.7
34	14	41	28	83	16.9	49.4	33.7
35	17	64	2	83	20.5	77.1	2.4
36	71	12	0	83	85.5	14.5	0
Mean	**38.4**	**33.4**	**11.5**		**46.1**	**40.1**	**13.8**

Note: n=84

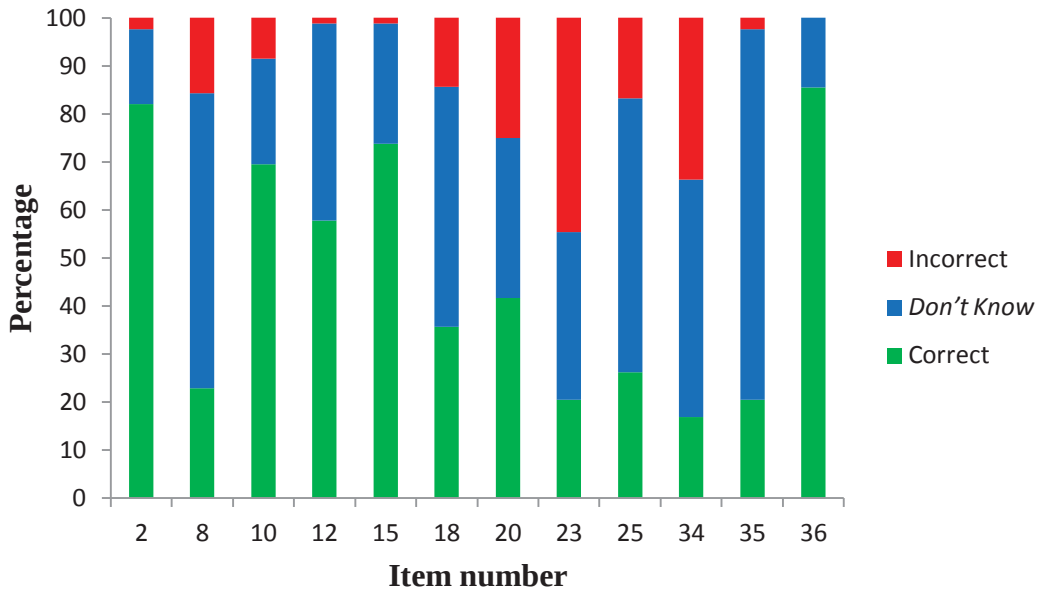

Figure 6: Stacked bar graph showing percentages of correct, *don't know* and incorrect responses to the 12 Treatment subscale questions

Teachers' Knowledge of the Associated Features, Symptoms/Diagnosis, and Treatment of ADHD

To measure the amount of accurate information about ADHD that New Zealand primary school teachers have, descriptive statistics, including the mean, standard deviation, and range on the total KADDS were calculated. To determine where their strengths lie in relation to the three areas of knowledge examined in this study (associated features, symptoms/diagnosis, and treatment), descriptive statistics for each subscale were also computed. As the number of items in each subscale and the full KADDS scale differed, scores were converted into percentages of correct responses to allow comparisons to be made. This conversion involved dividing the number of correct items by the total number of items and converting this number to a percentage, by multiplying the result by 100 as per Sciutto and colleagues (2000). Higher KADDS scores indicate more ADHD knowledge. Total scores on the KADDS ranged from 0% to 69% (M = 34.89%, SD = 13.69). For the subscales,

participants scored the highest on the Symptoms/Diagnosis subscale (*M* = 50.07%, *SD* = 19.20) and ranged from 0% to 100%. They obtained lower rates of knowledge on the Associated Features subscale (*M* = 30.57%, *SD*=15.82) which ranged from 0% to 67%. Teachers scored the lowest on the Treatment subscale (*M* = 27.92 %, *SD*=14.67), with scores ranging from 0% to 75%. These results suggest that teachers in this sample were better informed about the symptoms and diagnosis of ADHD than the nature, causes, outcomes, and treatment of the disorder.

Differences in Amount of Teachers' Knowledge about the Associated Features, Symptoms/Diagnosis, and Treatment of ADHD

A Friedman's test was conducted to determine whether observed differences in teacher knowledge among these three areas were statistically significant. A significant difference among teacher scores on the three KADDS subscales was found, $\chi 2$ (2, n = 75) = 64.48, $p < .05$. To examine the nature of these differences, a Post-hoc analysis with Wilcoxon signed-rank tests was conducted with a Bonferroni correction applied (to maintain the familywise error rate), resulting in a significance level set at $p < 0.017$. Results indicated that teacher scores on the Symptoms/Diagnosis subscale were significantly higher (*M* = 50.07%, *SD* = 19.20) than on both the Associated Features subscale (*M* = 30.57%, *SD*=15.82), *Z* = -7.321, $p < 0.001$ and the Treatment subscale (*M* = 27.92 %, *SD* =14.67, *Z* = -6.836, $p < 0.001$. Teachers' scores on the Associated Features subscale were not significantly higher than on the Treatment subscale, *Z*= -2.174, $p > 0.017$.

Common Knowledge about ADHD

In order to determine the specific information about ADHD that most teachers had, teachers' correct responses were examined at the item level (See Appendix H for correct responses to items on the KADDS). The seven KADDS

items with the highest percentage of correct responses were identified, and are listed in Table 9. These were answered correctly by more than 80% of respondents, which indicates that the majority of New Zealand teachers are knowledgeable about some aspects of ADHD.

Table 9

Most Common Correct Responses on the KADDS

	Question	Scale[a]	%
3.	Children with ADHD are frequently distracted by extraneous stimuli.	S	88.1
9.	Children with ADHD often fidget or squirm in their seats.	S	86.7
36.	Treatments for ADHD which focus primarily on punishment have been found to be the most effective in reducing the symptoms of ADHD.	T	85.5
16.	Current wisdom about ADHD suggests two clusters of symptoms: One of inattention and another consisting of hyperactivity/impulsivity.	S	84.5
2.	Current research suggests that ADHD is largely the result of ineffective parenting skills.	T	82.1
13.	It is possible for an adult to be diagnosed with ADHD.	A	82.1
22.	If a child with ADHD is able to demonstrate sustained attention to video games or TV for over an hour, that child is also able to sustain attention for at least an hour of class or homework.	A	82.1

[a]A = Associated Features, S = Symptoms/Diagnosis, T = Treatment

Commonly Held Misperceptions about ADHD

To determine which of the three areas of knowledge examined in this study (associated features, symptoms/diagnosis, and treatment) teachers' misperceptions about ADHD were more or less likely to be related to, a Friedman's test was completed on the incorrect responses as a measure of common misperceptions about ADHD. A significant difference among teachers' incorrect scores on the three subscales of the KADDS was found, $\chi 2$ (2, N = 75) = 6.636, $p < .05$. Table 10 lists the means and standard deviations for the error responses of the three subscales. To examine the nature of these differences, a post-hoc analysis with Wilcoxon signed-rank tests was conducted with a Bonferroni correction applied (to maintain the familywise error rate), resulting in a significance level set at $p < 0.017$ (Table 11). Results indicated teacher errors on the Associated Features subscale were more frequent than their errors on the Treatment (Z = -2.432, p <0.02) and Symptoms/Diagnosis (Z =-3.294, p = .001) subscales. There was no significant difference between teachers' scores on the Symptoms/Diagnosis subscale as compared to the Treatment subscales, Z=-1.147, $p > 0.02$. To establish the specific areas of misperceptions of the content areas of ADHD, the scores of the teacher participants were examined at the item level. The six KADDS items with the highest percentage of incorrect responses are listed in Table 12. These were held by over 30% of respondents, which indicates that a substantial proportion of New Zealand primary school teachers held misperceptions about ADHD.

Table 10

Teacher Incorrect Scores (Errors) on the KADDS Subscales

Scale	Mean	*SD*
Associated Features	16.89	9.26
Symptoms/Diagnosis	12.15	10.36
Treatment	13.35	8.98

Note. Mean scores represent the percentage of incorrect responses.

Table 11

Differences Among Teachers' Incorrect Scores on the Three subscales of the KADDS

Comparison	***N***	***Z***	Significance
Symptoms/Diagnosis – Associated Features	81	-3.294	.001
Treatment – Associated Features	75	-2.432	.015
Symptoms/Diagnosis -Treatment	77	-1.147	.251

Note. Z statistics are based on positive ranks.

Table 12

Most Common Incorrect Responses on the KADDS

	Question	Subscale[a]	%
27.	Children with ADHD generally experience more problems in novel situations than familiar situations.	A	65.5
23.	Reducing dietary intake of sugar or food additives is generally effective in reducing the symptoms of ADHD.	T	44.6
5.	In order to be diagnosed with ADHD, the child's symptoms must have been present before age seven.	S	36.9
34.	Behavioural/Psychological interventions for children with ADHD focus primarily on the child's problems with inattention.	T	33.7
4.	Children with ADHD are typically more compliant with their fathers than with their mothers.	A	32.5
1.	Most estimates suggest that ADHD occurs in approximately 15% of school age children.	A	30.1

[a]A = Associated Features, S = Symptoms/Diagnosis, T = Treatment

Gaps in Teachers' Knowledge about ADHD

To detect gaps in teachers' knowledge of ADHD and determine where these gaps occurred in relation to the three areas of knowledge examined in this study (associated features, symptoms/diagnosis, and treatment), the frequency of teachers *don't know* responses were examined at both the item and subscale level. The means and standard deviations for the *don't know* responses of the three subscales were calculated, as a measure indicating lack of information about ADHD. In addition, the KADDS items with the highest percentage of *don't know* responses were

identified. Finally, a Friedman's test was completed on the *don't know* responses for each subscale to determine whether observed differences in teacher knowledge among these three areas were statistically significant. The results indicated a significant difference among teacher *don't know* scores on the three KADDS subscales, $\chi 2$ (2, N = 75) = 43.187, $p < .001$. The means and standard deviations for the three *don't know* subscale scores are displayed in Table 13.

To examine the nature of these differences, a post-hoc analysis with Wilcoxon signed-rank tests was conducted with a Bonferroni correction applied (to maintain the familywise error rate), resulting in a significance level set at $p < 0.017$. Results indicated that teacher scores on the Symptoms/Diagnosis subscale were significantly less frequent than their scores on the Treatment, Z = -4.892, $p < 0.001$ and Associated Features subscales, Z = -6.402, $p < 0.001$. The mean percentage of teachers' *don't know* responses on the Treatment and Associated Features subscales did not differ significantly, Z = -.175, $p > 0.017$. The six KADDS items with the highest percentage of *don't know* responses are listed in Table 14. These were held by over 60% of teachers in the sample, thus the majority of teachers were lacking knowledge about a sixth of items featured in the KADDS. The fact that the majority of teachers in the sample responded to a sixth of items featured in the KADDS by selecting the *don't know* option indicates that teachers are lacking a significant amount of knowledge about ADHD. However, misperceptions about ADHD were far less common among participants than gaps in knowledge.

Table 13

Teachers' Don't Know Scores on the KADDS Subscales

Scale	Mean	*SD*
Associated Features	40.44	22.23
Symptoms/Diagnosis	26.22	23.22
Treatment	40.00	22.47

Note: Mean scores represent the percentage of *don't know* responses.

Table 14

Most Common Don't Know Responses on the KADDS

	Question	Subscale[a]	%
35.	Electroconvulsive Therapy (i.e. shock treatment) has been found to be an effective treatment for severe cases of ADHD.	T	77.1
17.	Symptoms of depression are found more frequently in children with ADHD than in children without ADHD.	A	72.6
6.	ADHD is more common in the 1st degree biological relatives (i.e. mother, father) of children with ADHD than in the general population.	A	71.4
30.	In very young children (less than 4 years old), the problem behaviours of ADHD children (e.g. hyperactivity, inattention) are distinctly different from age-appropriate behaviours of children without ADHD.	A	65.5
1.	Most estimates suggest that ADHD occurs in approximately 15% of school age children.	A	61.4
8.	Antidepressant drugs have been effective in reducing symptoms for many children with ADHD.	T	61.4

[a]A = Associated Features, S = Symptoms/Diagnosis, T = Treatment

Differences in Teachers' Knowledge of ADHD based on their Demographic Group

To examine whether teachers with certain characteristics have higher or lower levels of knowledge of ADHD in relation to the three areas examined in this study (associated features, symptoms/diagnosis, and treatment), a series of Spearman's rank-order correlations was used to identify relationships between teachers' scores on the KADDS scales and their age, highest level of education completed, and years of teaching experience. The results of these correlations are presented in Table 15. The analyses indicate that teachers' with more years of teaching experience obtained significantly higher scores on the Symptoms/Diagnosis subscale, r (81) = .255, $p < .05$. All other correlations between teachers' knowledge of ADHD and teachers' characteristics were non-significant, $p > 0.05$.

Table 15

Correlations for Teachers Demographic Characteristics

	Age	Education	Teaching experience (years)
Associated Features	.122	.253	.201
Symptoms/Diagnosis	.216	.036	.255*
Treatment	.171	.043	.078
KADDS (full-scale)	.193	.150	.200

*$p < .05$

In addition, a series of Mann-Whitney U tests was conducted to examine the effect of gender on teachers' knowledge of ADHD as measured by their scores on the KADDS scales. The results of these tests are presented in Table 16. The analysis indicates that teachers' total KADDS, Symptoms/Diagnosis, and Treatment subscale scores were not significantly impacted by teachers' gender, $p > .05$.

However, teachers' scores on the Associated Features subscale varied according to gender, with females (M = 4.98, SD = 2.42) answering more questions correctly than males (M = 3.27, SD = 1.62), Z =-2.246, $p < .05$.

Table 16

Gender Differences in Teachers' Knowledge of ADHD.

Scale	Gender
Associated Features	-2.246*
Symptoms/Diagnosis	-.908
Treatment	-1.423
KADDS full-scale	-.729

*$p < .05$

Finally, a series of Kruskal-Wallis tests was conducted to examine differences in teachers' knowledge as a result of the type of school in which they taught. Results of these tests are displayed in Table 17. These values indicate that teachers' knowledge of ADHD does not significantly differ across the three types of schools, $p > .05$.

Table 17

Differences in Teachers' Knowledge as a Result of the Type of School in which they taught

Scale	*n*	$\chi 2$	Significance
KADDS (full-scale)	75	.306	.858
Associated Features	82	1.414	.493
Symptoms/Diagnosis	83	.581	.748
Treatment	77	.315	.854

Differences in Teachers' Knowledge of ADHD based on their Experiences and Perceptions of ADHD

To examine whether teachers with certain experiences and perceptions of ADHD tend to have higher or lower levels of knowledge of ADHD in relation to the three areas examined in this study (associated features, symptoms/diagnosis, and treatment), a series of Spearman's rank-order correlations was used to identify possible relationships between teachers' knowledge of ADHD (as measured by the KADDS scales) and their experiences and perceptions of ADHD. The data are presented in Table 18. All significant correlations in Table 18 are positive. These results will be discussed in detail below.

Teachers' knowledge of ADHD as measured by their scores on the four KADDS scales was unrelated to whether: they had taught a male student with ADHD, learnt about ADHD during their teacher training, knew someone outside of school who had ADHD, believed they would benefit from additional training on ADHD, had watched a TV program, read an article about ADHD, or read a pamphlet/handout on ADHD ($p > .05$ in all cases).

The relationship between teachers' overall knowledge of ADHD, as measured by their total score on the KADDS and 10 variables was statistically significant. The strength of these correlations were moderate ($0.40 \leq r_s \leq 0.59$) for number of students with ADHD taught ($r = 0.443$, $p < 0.01$), and whether teachers' had participated in developing an IBP ($r = 0.427$, $p < 0.01$) or IEP ($r = 0.408$, $p < 0.01$). Weak ($0.20 \leq r_s \leq 0.39$), yet statistically significant correlations were observed between total KADDS score and whether teachers had taught a student with ADHD ($r = 0.335$, $p < 0.01$) or a female student with ADHD ($r = 0.242$, $p < 0.05$), whether they had: attended an in-service professional learning and

development programme or workshop on ADHD ($r = 0.325$, $p < 0.01$), read a book about ADHD ($r = 0.245$, $p < 0.05$), searched the internet for information on ADHD ($r = 0.269$, $p < 0.05$), the number of sources teachers' utilised for self-directed study ($r = 0.248$, $p < 0.05$), and whether they felt confident in their ability to work with and support students with ADHD ($r = 0.322$, $p < 0.01$).

Teachers' knowledge about the nature, causes, and outcomes of ADHD, as measured by their score on the Associated Features subscale of the KADDS was weakly but significantly related to 10 variables: whether participants had taught a student with ADHD ($r = 0.289$, $p < 0.01$), the number of ADHD students they had taught ($r = 0.370$, $p < 0.01$), whether they had taught a female student with ADHD ($r = 0.256$, $p < 0.05$), their participation in developing an IBP ($r = 0.301$, $p < 0.01$) or an IEP ($r = 0.256$, $p < 0.05$), whether they had: attended an in-service professional learning and development programme or workshop on ADHD ($r = 0.305$, $p < 0.01$), read a book on ADHD ($r = 0.233$, $p < 0.05$), searched the internet for information about ADHD ($r = 0.342$, $p < 0.01$), the number of sources teachers utilised for self-directed study ($r = 0.329$, $p < 0.01$), and whether they felt confident in their ability to work with and support students with ADHD ($r = 0.323$, $p < 0.01$).

The relationship between teachers' knowledge of symptoms and diagnosis of ADHD, as measured by their scores on the Symptoms/Diagnosis subscale of the KADDS, and 10 variables were statistically significant. The strength of these correlations was moderate for the number of students with ADHD taught ($r = 0.421$ $p < 0.01$), and whether teachers' had participated in developing an IBP ($r = 0.437$, $p < 0.01$) or an IEP ($r = 0.464$, $p < 0.01$). Teachers' scores on the Symptoms/Diagnosis subscale were also related to the number of sources they utilised for self-directed study about ADHD ($r = 0.282$, $p < 0.05$), whether they felt

confident in their ability to work with and support student with ADHD ($r = 0.362$, $p < 0.01$), as well as whether they had: taught a student with ADHD ($r = 0.344$, $p < 0.01$) or a student prescribed medication for ADHD ($r = 0.217$, $p < 0.05$), attended an in-service professional learning and development programme or workshop on ADHD ($r = 0.331$, $p < 0.01$), read a book about ADHD ($r = 0.250$, $p < 0.05$), or searched the internet for information about ADHD ($r = 0.270$, $p < 0.05$).

Teachers' knowledge about the treatment of ADHD (as measured by their scores on the Treatment subscale of the KADDS) was weakly but significantly related to five variables: whether participants had taught a student with ADHD ($r = 0.245$, $p < 0.05$), the number of ADHD students they had taught ($r = 0.263$, $p < 0.05$), whether they had taught a student who had been prescribed medication for ADHD ($r = 0.227$, $p < 0.05$), and their participation in developing an IBP ($r = 0.274$, $p < 0.05$) or an IEP ($r = 0.348$, $p < 0.01$).

The strongest association found was that between participating in developing an IEP and knowledge of symptoms and diagnosis of ADHD. Knowledge of treatment of ADHD was only linked to variables relating to exposure to a student with ADHD in an educational context. Receiving instruction on ADHD during teacher training was unrelated to teachers' knowledge, however attending an in-service workshop about the disorder was. Only certain forms of self-directed study were associated with teachers' knowledge of ADHD. Teachers' confidence in their ability to work with and support students with ADHD was associated with their knowledge of most aspects of ADHD. However, teachers' knowledge of ADHD was unrelated to whether they felt they would benefit from additional training on ADHD.

Table 18

Relationships between Teachers' Knowledge of ADHD, as Measured by the KADDS Scales and their Experiences and Perceptions of ADHD

Variable	A	S	T	K
Taught a student with ADHD	.289**	.344**	.245*	.335**
Number of ADHD students taught	.370**	.421**	.263*	.443**
Taught a female student	.256*	.204	.149	.242*
Taught a male student	.176	.207	.176	.216
Taught a student prescribed medication	.199	.217*	.227*	.220
Participated in developing an IBP	.301**	.437**	.274*	.427**
Participated in developing an IEP	.256*	.464**	.348**	.408**
Teacher training	.056	.103	.018	.071
In-service	.305**	.331**	.185	.325**
Book	.233*	.250*	.066	.245*
Article	-.113	-.017	-.022	-.063
Pamphlet/handout	.149	.024	.005	.076
TV program	.166	.203	.028	.125
Internet	.342**	.270*	.060	.269*
Number of sources utilised for self study	.329**	.282*	.052	.248*
Know someone outside of school	.150	-.021	.019	.129
Benefit from additional training on ADHD	-.125	-.123	-.125	-.168
Confidence	.323**	.362**	.187	.322**

Note. A = Associated Features subscale, S = Symptoms/Diagnosis subscale, T = Treatment subscale, K= KADDS full-scale.

*$p < .05$, **$p < .01$

Variation in teachers' knowledge of ADHD according to the educational setting they felt was most appropriate for students with ADHD. Finally, a series of Kruskal-Wallis tests was conducted to examine whether teachers' knowledge of ADHD, as measured by the KADDS scales, varied according to the educational setting that teachers felt was most appropriate for a student with ADHD. Mean scores for teachers who selected each of these educational placements are displayed in Table 19. Analyses indicated that effect of educational placement was significant for total knowledge, $\chi 2$ (3, N = 74) = 8.878, $p < .05$, knowledge of symptoms/diagnosis of ADHD, $\chi 2$ (3, N = 81) = 9.271, $p < .05$, and treatment for ADHD, $\chi 2$ (3, N = 76) = 11.311, $p = .01$. The effect of educational placement on teachers' knowledge of associated features of ADHD was not significant, $\chi 2$ (3, N = 80) = 6.200, $p > .05$. The nature of these differences was examined by conducting a post-hoc analysis. A series of non-parametric Levene's tests was used to verify the equality of variances (homogeneity of variance) among the levels of the independent variable (type of educational setting considered to be most appropriate for a student with ADHD), $p > .05$ (Nordstokke & Zumbo, 2010; Nordstokke, Zumbo, Cairns, & Saklofske, 2011). Thus, the Tukey–Kramer method for pair-wise differences of means was used.

Post hoc analyses using the Tukey-Kramer method indicated that in general, teachers who indicated *other* obtained significantly lower total KADDS scores (M = 20.6, SD = 14.4) than those who believed a type of special education setting (part and full-time responses combined) (M = 42.3, SD = 13.1), or a general education setting was the most appropriate for students with ADHD (M = 35.3, SD = 12.7).

Teachers who indicated *other* setting also scored lower on the Symptoms/Diagnosis subscale (M = 30.6, SD = 19.5) than both teachers who

believed a general education setting was the most appropriate for students with ADHD(M = 51.9, SD = 18.2), and teachers who felt either part-time or full-time special education was most appropriate (M = 58.0, SD = 13.4). With regards to their knowledge of treatment, teachers who indicated *other* obtained the lowest scores once more (M = 14.3, SD = 14.2). These scores were significantly different from scores obtained by teachers who felt general education (M = 28.2, SD = 14.0), or a type of special education (M = 37.0, SD = 13.9) were the most appropriate educational setting for a student with ADHD.

Across all three measures of knowledge examined during post-hoc analysis, there were no significant differences between teachers who felt students with ADHD should be placed in a general education setting and those who indicated a type of special education setting was most appropriate in terms of their scores, ($p < .05$).

Table 19

Teachers' Knowledge of ADHD According to the Educational Setting they Felt was Most Appropriate for Students With ADHD

	General Ed			*Special Ed*[a]			*Other*		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
KADDS total	58	35.3	12.7	9	42.3	13.1	7	20.6	14.4
Associated Features	62	31.2	15.3	9	37.0	14.9	9	20.7	13.9
Symptoms/Diagnosis	64	51.9	18.2	9	58.0	13.4	8	30.6	19.5
Treatment	60	28.2	14.0	9	37.0	13.9	7	14.3	14.2

[a] = part-time or full-time response options combined.

Summary

Results from the quantitative analysis of teachers' responses to the KADDS revealed that teachers' overall knowledge of ADHD was limited. They were able to answer just over a third of items on the KADDS correctly. In addition, the sum of the scores for teachers' *don't know* and incorrect responses exceeded the score for the correct responses. Teachers in the sample had greater knowledge of the primary symptoms of ADHD, and more misperceptions about the criteria used to diagnose the disorder. The majority of teachers were aware that ADHD could be diagnosed in adulthood and that although children affected by the disorder may not be able to focus on their school work for the same length of time that they are able to focus on video games or TV. However, a substantial proportion of teachers held misperceptions about other situational variations, and the prevalence of the disorder. With regards to treatment, the vast majority of teachers were aware that punishment was not the most effective way of managing symptoms of ADHD. However, a large proportion of teachers in the sample held the misperception that dietary modifications were an effective treatment option, and that behavioural/psychological interventions for children affected by ADHD mainly target symptoms of inattention.

Participants' knowledge of the symptoms/diagnosis of the disorder was significantly greater than their knowledge of associated features and treatment. Teachers had significantly less misperceptions than gaps in knowledge about the associated features, symptoms/diagnosis, and treatment of ADHD. Teachers were also significantly less likely to have gaps in their knowledge about this aspect of knowledge about ADHD. Teachers' misperceptions about ADHD were significantly more likely to be in relation to the associated features of the disorder than the symptoms/diagnosis or treatment. The item that received the largest number of

correct responses was related to children with ADHD's distractibility. The item that received the greatest amount of incorrect responses was related to how symptoms of ADHD vary in novel versus familiar situations. The item that the most teachers were uncertain about was concerning electroconvulsive therapy (i.e. shock treatment) as a treatment for ADHD.

Although some of the teacher characteristics examined correlated statistically with teachers' knowledge of ADHD, the majority of these correlations were weak. The only exceptions to this were the relationships between the number of students with ADHD teachers had taught, participation in an IBP, as well as participation in an IEP, which were all moderately associated with teachers total KADDS and Symptoms/Diagnosis scale scores.

CHAPTER 5

DISCUSSION

This research sought to investigate the knowledge and perceptions of ADHD held by primary school teachers in New Zealand. Forty-four primary schools participated in the study with 84 teachers completing the survey. The total response rate was 30%. The first aim of this study was to examine teachers' knowledge and perceptions of ADHD. The second aim was to determine whether variables that are associated with teachers' knowledge of ADHD could be identified. Each of these will be discussed in turn, after a brief exploration of the characteristics of the sample.

Characteristics of the Sample

Many of the characteristics of respondents in this study were comparable to those of respondents in other studies that have examined teachers' knowledge of ADHD (e.g., Bussing et al., 2002; Jerome et al., 1994; Piccolo-Torsky & Waishwell, 1998; Power, Hess, & Bennett, 1995; Reid et al., 1994; Sciutto et al., 2000). Like the large majority of studies in the literature, most participants were female teachers who held a bachelor's degree. The study conducted by Sciutto and colleagues (2000) is an exception to this finding, with most participants holding a master's degree. The majority of participants (67%) were aged 40 years or older. This finding is similar to that obtained in the study conducted by Bussing and colleagues (2002), where 54% of the teachers were more than 41years old. Participants in the current study reported an average of 16.1 years of teaching experience, which is similar to that found in the Castenova (2008) study and the Kleynhans (2005) study, in which the average number of years of teaching experience was 15.5 and 16.7 respectively.

In line with the findings of Piccolo-Torsky and Waishwell (1998), as well as Barbaresi and Olsen (1998), 80% of teachers in the current study received no information about ADHD during their teacher training, yet 90% of these teachers indicated they could benefit from further training on working with students with ADHD. The proportion of teachers in the present study that attended an in-service workshop about ADHD (40%) was comparable to the proportion found in a study of 365 elementary school teachers that was conducted by Bussing and colleagues (2002). However, the proportion of teachers in the present study who reported that they would benefit from additional training in relation to ADHD was larger than the proportion of New Zealand teachers in the study conducted by Curtis and colleagues (2006), which was 66%. It is unclear whether this discrepancy can be attributed to prior training for ADHD, as the latter study combined both types of training into one category. In addition, the study conducted by Curtis et al. (2006) had a much larger sample of 261 regular and special education teachers. The present study on the other hand, with its smaller sample, only had three special education teachers. The number of special education teachers included in the sample is likely to have contributed to the discrepancy in these results, as research has found that teachers who were qualified to teach special education tended to score higher on measures of ADHD knowledge (Piccolo-Torsky & Waishwell, 1998). However, Curtis and colleagues did not disclose the number of special education teachers that participated in their study.

Consistent with the findings of Bussing and colleagues (2002), almost all teachers in the present study reporting having read an article on ADHD (97% and 92% respectively). In addition, the proportion of teachers in the present study who had read a book about ADHD, 61%, was identical to that obtained by Bussing and

colleagues (2002). Thirty-nine percent of teachers in the current study did not feel confident teaching a student with ADHD. This finding is somewhat lower than that of Lazarus (2011), where 55% of teachers indicated that they were *not at all confident* in their ability to teach students with ADHD. Finally, it is important to note that all teachers in the present study reported that they believed ADHD impacts on the educational experiences of students diagnosed with the disorder. This finding is in line with the findings of Curtis and colleagues (2006), where 96% of their sample of New Zealand teachers also felt this way.

The usable response rate of this study, 30%, was similar to that of Sciutto et al. (2000) and Small (2003), who obtained response rates of 37% and 35% respectively. However, other studies examining teachers' knowledge of ADHD, acceptability of interventions, and experiences with ADHD reported response rates of 55% - 86% (Bussing et al., 2002; Piccolo-Torsky & Waishwell, 1998; Power et al., 1995; Reid et al., 1994). The response rate reported for the New Zealand sample of primary school teachers in the study conducted by Curtis et al. (2006) was even higher than these, with only 10% of their sample declining to participate.

The higher response rates obtained in other studies could be attributed to several methodological differences. These differences include the sampling method, geographical location, socioeconomic status of participants, and incentives that were included with the survey or for participation such as gift vouchers (Small, 2003). For example, the study conducted by Curtis et al. (2006) utilised convenience samples and participants were selected from a cross-section of teachers from one major metropolitan city within each country. They also promised participants that they would present the findings and discuss the implications of their study in person

at their school once the study was completed (which was made possible by the fact that their participants stemmed from one geographical area).

Teachers' Knowledge and Misperceptions of ADHD

Primary school teachers' knowledge and misperceptions of ADHD were examined in relation to three areas: symptoms/diagnosis of ADHD, treatment of ADHD, and general information about the nature, causes, and outcomes of ADHD (which will be referred to as associated features). The total scores and percentages of correct, *don't know* and incorrect responses to the individual KADDS questions as well as subscales were presented to distinguish between the concepts on which there is a lack of information and concepts on which respondents have misperceptions. The differentiation between misperceptions and lack of knowledge may be especially important when contemplating likely actions that could result when faced with a child presenting with ADHD symptoms (Sciutto et al., 2000).

Responses to the KADDS questionnaire imply that primary school teachers in New Zealand are generally lacking a substantial amount of knowledge about ADHD. Overall, teachers answered 35% of questions correctly, which is slightly more than can be expected by chance (33%) and identical to results obtained by Lazarus (2011). However, this percentage is lower than those obtained in other international studies that utilised the KADDS, which ranged from 43% (Kleynhans, 2005; Perold et al., 2010) to 59% (Liesveld, 2007). The relatively smaller proportion of KADDS items answered correctly by teachers in the present study may be due to cross-national differences in the educational practices of nations where these studies were conducted. For example, educational policies in New Zealand such as the Special Education policy for inclusive education (2000), do not offer a standard definition for student disability and renounce the use of categorical labels in schools

to encourage "need-based," "non-categorical services" (Ballard, 1993; Fraser & Moltzen, 2000; Ministry of Education [MOE], 1996; Mitchell, 2000). These policies differ from the categorical model of service delivery utilised in the United States (Curtis et al., 2000, as cited in Curtis et al., 2006).

The mean percentage of correct answers on all items in the present study was also less than half that obtained by Curtis and colleagues (2006), who reported that 76% of items measuring knowledge of ADHD were answered correctly by their sample of teachers in New Zealand. However, this discrepancy may be attributed to several methodological differences between the study conducted by Curtis et al. (2006) and the present study. These differences include sample size, sampling method, demographic characteristics of participants and instruments used. For example, Curtis et al.'s study (2006) utilised the Knowledge Of ADHD Scale (K-ADHD, Jerome et al., 1994), which may magnify teachers' knowledge of ADHD through its dichotomous *true*/*false* response format (Sciutto et al., 2000). Failing to offer a *don't know* response option leaves teachers with no choice but to guess answers to items relating to issues they lack knowledge of, and increases the chances of teachers answering a question correctly by guessing from 33% (for current study and three responses) to 50% (Jarque et al., 2007; Martinez Arias et al., 2006, as cited in Soroa et al., 2012). Increasing the likelihood that a teacher will answer a question correctly by guessing the answer leads to a reduction of the reliability and validity of the questionnaire by producing an increase in the error variance of the scores (Martinez Arias et al., 2006, as cited in Soroa et al., 2012). In addition, the scale utilised in the present study contains a significantly larger amount of items (36) than the scale utilised by the study conducted by Curtis et al. (20 items). Scales comprised of a larger number of items, which potentially target a wider range of

subject matter, may overemphasize gaps in teachers' knowledge of ADHD (Kos et al., 2006).

Symptoms/Diagnosis of ADHD

On average, teachers answered 50% of questions on the Symptoms/Diagnosis subscale correctly. Their knowledge of this area of ADHD was considered an area of strength, as comparisons between subscales revealed that teachers answered a significantly larger amount of items on this scale correctly. This finding is consistent with the literature in this area in which the KADDS was also used (e.g., Castenova, 2008; Herbert et al., 2004; Kleynhans, 2005; Sciutto et al., 2004; Sciutto et al., 2000; Small, 2003). Despite the fact that teachers in this sample obtained the highest scores on this area of knowledge about ADHD, the results reveal that the teachers still could not correctly answer half of the KADDS items. This finding is consistent with that of Lazarus (2011), who reported the exact same proportion of correct responses.

Symptoms. Of the nine items included in the Symptoms/Diagnosis subscale, three were amongst the four questions that the largest proportion of teachers answered correctly. More specifically, over 75% of teachers in the sample correctly identified the symptoms of distractibility, fidgeting, as well as difficulties with organisation, and were aware that ADHD has two clusters of symptoms, inattention and hyperactivity/impulsivity. These findings are consistent with mounting research that has demonstrated that teachers are well versed in the hallmark symptoms of ADHD (Kleynhans, 2005; Durbach, 2001, as cited in Lazarus, 2011; Economou, 2002, as cited in Lazarus, 2011; Kern, 2008, as cited in Lazarus, 2011; Perold et al., 2010; Sciutto et al. 2000) and are not surprising given that teachers are likely to

observe the hallmark symptoms of ADHD within the classroom on a daily basis (Lazarus, 2011; Small, 2003).

Diagnosis. Teachers in the current study were much less knowledgeable about the diagnosis of ADHD. Only 10% of teachers were aware that the child's symptoms must have been present before age seven, with 37% of teachers holding a misperception about this item. These findings differ from those obtained by Kleynhans (2005) (47% correct, 12% incorrect) and Small (2003) (10% incorrect), where a larger proportion of teachers answered the question correctly and smaller proportion of teachers held a misperception. A possible explanation for this discrepancy is that New Zealand uses an ecological model of service delivery to address educational issues. This framework promotes a non-categorical approach to addressing students' needs, and rejects the use of diagnostic labels in schools (Ballard, 1993; Fraser & Moltzen, 2000; MOE, 1996; Mitchell, 2000).

In the present study, only 42% - 62% of teachers seemed to be able to distinguish between ADHD and other related mental disorders, with 12% - 17% of respondents attributing negative behaviours more distinctive of other mental disorders (conduct disorder [CD], oppositional defiant disorder [ODD], and bipolar disorder) to ADHD. These four disorders have common characteristics. For example, symptoms of mania that are exhibited by children with bipolar disorder mimic the extreme irritability and disruptiveness displayed by children with ADHD (Cullinan, 2007). Thus, it is not unusual for teachers to mistake the hyperactive and overt behaviours of students with ADHD, with the behaviours of student's with CD, ODD, or bipolar disorder. However, it has been well established that the four disorders are separate and distinct in form (Brown, 2005). Results of the present study support the findings of Lazarus (2011) and Reid and Johnson (2011), which

suggested that teachers were unaware that a history of stealing or destroying other people's things or physical cruelty towards other people were symptoms related to CD and ODD. Most children with ADHD experience other difficulties, which are unrelated to the primary symptoms of the disorder (Soroa et al., 2012). The fact that between 35% - 70% of children with ADHD develop ODD and/or CD (Biederman, Newcorn, & Sprich, 1991; Johnston & Ohan, 1999) may also be adding to the confusion and tendency to attribute all these behaviours to ADHD exhibited by some teachers.

Associated Features of ADHD

The present data suggest that New Zealand primary school teachers' knowledge of the nature, causes, and outcomes of ADHD is weak, as the percentage of incorrect and *don't know* responses was largest for this subscale (17% and 40% of items respectively). These findings are consistent with those obtained by Kleynhans (2005) and Castenova (2008). The most common correct response on this subscale was that it is possible for an adult to be diagnosed with ADHD (82%). This finding is in line with previous studies conducted by Castenova (2008), Sciutto et al. (2000), and Small (2003). Interestingly, over a fifth of teachers incorrectly believed that there are particular physical characteristics that can be identified by medical doctors, which establish a definitive diagnosis of the disorder. A further 43% of teachers responded to this item with *don't know*. These results are consistent with the findings of Lazarus (2011), where the majority of teachers were unaware of this fact, and 27% of teachers held a misperception about this item. These findings provide further support for the notion that teachers in the current study are lacking knowledge about the diagnosis of ADHD. The fact that the majority of teachers were unaware of the absence of specific physical characteristics that can be

identified by medical doctors, which establish a definitive diagnosis of the disorder may also suggest that they are unaware of the critical role they plan in providing information to assist in the diagnostic process (Wolraich et al., 2003).

Situational variations of ADHD symptoms. With regards to situational variations of the symptoms of ADHD, 82% of teachers recognised that a child with ADHD may be able to demonstrate sustained attention to video games or TV for over an hour, but unable to sustain attention for at least an hour of class or homework. Sixty-three percent of the sample in the present study was also aware that the distinction between a student with ADHD and a student without ADHD is more easily made in a classroom setting as opposed to a free play situation. This was consistent with the results obtained by Lazarus (2011), Perold et al. (2010), and Sciutto et al. (2000) where the majority of teachers answered this item correctly. These results indicate that teachers are aware that in a classroom setting students are expected to behave in ways that are contrary to the fundamental symptoms of ADHD, thus causing symptoms of ADHD to be more apparent in the classroom (Kos et al., 2006). However, only 7% of teachers (least common correct response) were aware that children with ADHD generally do not experience more problems in novel situations than familiar situations; 66% of participants held a misperception and 27% lacked knowledge about this item. These findings are consistent with those produced by Sciutto et al. (2000), where the majority of teachers held a misperception about this item. An extremely low percentage of correct responses (10%) were obtained for item four, where teachers seemed to be unaware that children with ADHD are usually more compliant with their fathers than with their mothers; 58% of teachers in this sample lacked knowledge and 33% of teachers held a misperception about this item. The proportion of teachers in the present study who

lacked knowledge about this item was comparable to that obtained by Castenova (2008), Sciutto et al (2000), and Kleynhans (2005).

Epidemiology and aetiology of ADHD. An in depth examination of the sample group's responses to items on the Associated Features subscale also highlights clear gaps and to a lesser extent misperceptions in teachers' knowledge regarding the epidemiology and aetiology of ADHD. For example, a very low percentage of correct responses (8%) was obtained for item one, which falsely states that "most estimates suggest that ADHD occurs in approximately 15% of school age children". This item was among the six KADDS items that received the highest percentage of *don't know* and incorrect responses. Glass and Wegar (2003) found that teachers' often perceive the incidence of ADHD in their classrooms to be significantly higher than empirically established prevalence rates, and the results of the current study are consistent with this finding. Evidence suggests that many diagnoses of ADHD are made based upon school reports alone (Carey, 1999), and have identified teachers as the most common initial source of referrals (Snider et al., 2003; Stroh et al., 2008; Vereb & DiPerna, 2004). Teachers in the current sample may overestimate the incidence of ADHD as they are lacking knowledge about the diagnostic criteria, which would otherwise rule out a number of cases, and mistakenly attributing behaviours of other disorders to ADHD. Teachers' overestimation of the incidence of ADHD may lead to a number of inaccurate referrals, and an overdiagnosis of the disorder.

In addition, over 70% of teachers did not know whether symptoms of depression are found more frequently in children with ADHD than in children without ADHD, or that ADHD is more common in the 1st degree biological relatives (i.e., mother, father) of children with ADHD than in the general population. These

results are consistent with the findings of Castenova (2008) and Small (2003) who also found these items to among the five that received the highest amount of *don't know* responses. Furthermore, only 13% of the sample recognised that in very young children (less than 4 years old), the problem behaviours of ADHD children (e.g., hyperactivity, inattention) are not distinctly different from age-appropriate behaviours of non-ADHD children. This finding is not surprising, as the sample only included primary school teachers, whose youngest students would be five years of age (New Zealand Ministry of Education [NZMOE], 2013a). Finally, only 23% of teachers were aware that symptoms of ADHD are frequently witnessed in non-ADHD children who come from inadequate and chaotic home environments, with a larger proportion of teachers holding a misperception (27%) and half of the sample indicating a lack of knowledge (50%) in relation to this item. A lack of teacher awareness of ADHD symptoms may lead teachers to make inaccurate referrals and over-diagnosis for children who come from socially disadvantaged home backgrounds, especially if these homes are perceived by teachers to be "disordered".

Teachers in the current study also demonstrated little knowledge of the long term outcomes of ADHD; only half of the sample was aware that most children with ADHD do not outgrow their symptoms by the onset of puberty. This finding is consistent with that of Ohan et al. (2008) and may be attributed to the fact that both samples only included primary school teachers, whose relationship with students with ADHD terminates in the early stages of adolescence, and therefore have less experience with the future trajectory of ADHD (Ohan et al., 2008). Primary school teachers who believe that students will outgrow their symptoms by the time they are adolescents and are unaware of the difficulties that a substantial proportion of their students with ADHD may face during their youth or adulthood lifetime such as

substance abuse problems or school drop-out (American Psychiatric Association [APA], 2000) may underestimate the need for early intervention and be less motivated to assist these children (Kleynhans, 2005; Ohan et al., 2008).

Treatment of ADHD

Although they did not significantly differ from their Associated Features scores, teachers' scores on the Treatment subscale were the lowest, with participants answering an average of 28% of related items correctly. These results are consistent with those found by West et al. (2005) and Lazarus (2011), where educators were the least knowledgeable about treatment for the disorder. However, this finding differs from those obtained by Guerra and Brown (2012) in which teachers scored lower on the Associated Features subscale than the Treatment subscale (47% and 57%). The discrepancy between these results may be due to differences in characteristics of the samples. For example, the latter study included only middle school teachers, while the other studies involved elementary school teachers. Teachers do not technically treat ADHD, and therefore may not feel the need to stay informed about possible treatments for ADHD. Furthermore, information about treatment may not have been covered adequately or included in teacher training or workshops due to the same notion (Anderson et al., 2008). It is important to note however, that teachers' had substantially larger gaps in their knowledge of this area than misperceptions. This is a positive finding, as evidence suggests that misperceptions about ADHD are difficult to change (Kos et al., 2004; Sciutto et al., 2000).

Knowledge of treatment of ADHD. At least 70% of respondents in the current study correctly answered a third of the questions on this subscale correctly. Eighty-six percent of teachers were aware that treatments for ADHD, which focus primarily on punishment, have not been found to be the most effective in reducing

the symptoms of ADHD. This item obtained the third largest amount of correct responses on the KADDS, with no teachers holding a misperception about this fact. These findings are not surprising, and may reflect New Zealand teachers' beliefs about the efficacy of punishment in general. In recent years, the Ministry of Education has adopted the Positive Behaviour for Learning (PB4L) approach to managing the disruptive behaviour of students in New Zealand (NZMOE, 2013c). This approach "recognises that punitive and exclusionary approaches to discipline do not bring about long-term and sustainable changes in behaviour" (NZMOE, 2013d). The results of the present study are consistent with those obtained in U.S. studies conducted by Garcia (2009) and Krowski (2009), where 75% and 83% of teachers, respectively, correctly answered this item. However, these findings are inconsistent with those obtained by Lazarus (2011) and Kleynhans (2005), who found that 47% and 59% of teachers in their sample correctly answered this item. Given that the findings of Lazarus (2011) and Kleynhans (2005) for this item were somewhat similar and both these studies were conducted in South Africa, this discrepancy may be due to cross-national differences.

The vast majority of teachers in the present study were also aware that current research does not suggest that ADHD is for the most part caused by ineffective parenting skills, with 82% of teachers answering this question correctly. This finding is in line with the results obtained by Kos (2004) and Sciutto et al (2004), where 91% of Australian teachers and 80% of American teachers, respectively, knew that ADHD was not caused by poor parenting practices. However, these results differ greatly from those obtained by Lazarus (2011) and Kleynhans (2005) who found that only 37% and 48% of teachers in their sample demonstrated this knowledge. These findings provide further support for the

existence of cross-national differences in teachers' knowledge of ADHD. Finally, 74% of teachers were knowledgeable about the side effects of stimulant medication, and 70% were aware that treatment for students with ADHD that combines medication with parent and teacher training focused on managing a child with ADHD is usually effective. These results are consistent with those reported by Castenova (2008), Garcia (2009), and Krowski (2009), where the majority of teachers studied answered these items correctly.

Gaps in knowledge of treatment of ADHD. Interestingly, the majority of teachers were not aware that stimulant medication is the most common type of drug used to treat children with ADHD, with only 26% of teachers answering this question correctly. This finding is somewhat surprising given the *New Zealand Guidelines for the Assessment and Treatment of Attention-Deficit/Hyperactivity Disorder* identify stimulant therapy as the first line of treatment (MOH, 2001), and the substantially higher proportion of teachers who identified the side effects of stimulants correctly. However, given that 61% of teachers responded to the statement "Antidepressant drugs have been effective in reducing symptoms for many children with ADHD" with *don't know* and 16% with an incorrect answer, these findings may reflect a general lack of knowledge about other drugs utilised in the treatment of ADHD. The apparent lack of knowledge about medical treatments for ADHD displayed by teachers in the present study may be attributed to the lower prescription rate of medication for children with ADHD in New Zealand, and general rejection of pharmacological treatment for ADHD. As Curtis and colleagues explain: "Only 1 to 1.5% of school-aged children in N.Z. were estimated to have been prescribed medication for ADHD (Lee, 2003; Pharmaceutical Management Agency, 2003) compared to the estimated 4.2% in the U.S. (Cox et al., 2003).

Lower psychostimulant prescription rates combined with relatively similar rates of ADHD diagnoses may have, therefore, contributed to N.Z. teachers' lower endorsements of medication as an appropriate intervention" (2006, p.188).

Misperceptions about treatment of ADHD. Consistent with the findings of previous studies examining teachers' knowledge of ADHD (e.g., Jerome et al., 1994; Piccolo-Torsky and Waishwell, 1998), a mere 20% of the sample recognised that reducing dietary intake of sugar or food additives does not effectively reduce the symptoms of ADHD. Forty-five percent of participants held a misperception about this item; it was the treatment subscale item with the highest proportion of incorrect responses and the KADDs item with the second highest number of incorrect responses. The prevalence of misperceptions about the effects of sugar and food additives in this study was comparable to the prevalence of this misperception (42%) in a study conducted by Sciutto and colleagues (2000) that utilised the KADDS and involved a sample of primary school teachers in New York.

It is important to distinguish between misperceptions and lack of knowledge when considering teachers' responses to this item, as they have different implications for students with ADHD (Sciutto et al., 2000). The role of food additives and diet in the aetiology of ADHD is a subject that has received a great deal of public and media attention (Moir, 2010). Teachers who lack knowledge of the effects of sugar intake and additives on symptoms of ADHD may be cautious and search for more information. Teachers who have been exposed to non-scientific information about this matter and thus incorrectly believe that diet has an impact on ADHD symptoms on the other hand, may not search for additional information and recommend that changes to the child's diet be made (DiBattista & Shepherd, 1993). Furthermore, teachers who turn to the media when seeking information about the impact of dietary

modifications on ADHD may acquire incorrect information (Stormont & Stebbins, 2005).

In line with the findings obtained by Lazarus (2011), Kleynhans (2005), and Sciutto et al. (2000), over a third of teachers in the present study incorrectly believed that behavioural/psychological interventions for children with ADHD focus primarily on the child's problems with inattention. A further 28% of teachers in the current study provided a *don't know* response to this item. Behavioural and psychological interventions for children with ADHD can be efficiently used to address issues linked to hyperactivity and impulsivity, as well as inattention (Anastopoulos, 2000). It appears that although the majority of teachers in the present sample were aware that behavioural parent training and training teachers to implement behavioural interventions in the classroom were effective treatments for ADHD when they are combined with medication, they also lacked knowledge of the type of issues that can successfully be addressed using these methods.

Finally, the statement "Electroconvulsive Therapy (i.e., shock treatment) has been found to be an effective treatment for severe cases of ADHD" was the KADDS item that received the largest number of *don't know* responses (77%). This proportion is highly comparable to those reported by Kleynhans (2005), Lazarus (2011), Sciutto et al. (2000), and Small (2003). On a positive note, only two teachers in the present study held a misperception about this item. Kleynhans (2005) proposes that the large number of *don't know* responses to this item simply points to gaps in teachers' knowledge of the treatment of ADHD in general.

Teacher Characteristics that are Related to their Knowledge of ADHD

When the relationships between teachers' demographic characteristics and knowledge of ADHD were examined, interesting results were obtained. In line with

the findings of Kos (2008), Lazarus (2011), Piccolo-Torsky and Lynn Waishwell, (1999), Perold et al. (2010), and Sciutto et al. (2004), there was no association between teachers' knowledge of ADHD and their ages. Furthermore, teachers' education level was unrelated to their knowledge of ADHD. This result is in line with the findings of Guerra and Brown (2012), Perold et al. (2010), Sciutto et al. (2004), and Small (2003). However, these findings differ from those found by Kleynhans (2005) and Ghanizadeh et al. (2006), who reported a small but statistically significant positive relationship between teachers' overall knowledge of ADHD and their education level. The inconsistency in these findings may be due to variation in the amount of coursework relating to ADHD featured in degrees obtained by teachers in these studies.

Teaching Experience

The results obtained in the current study are consistent with the majority of research in this area, which has demonstrated a lack of association between teachers' overall knowledge of ADHD and their years of teaching experience (e.g., Guerra & Brown, 2012; Kos et al. 2004; Lazarus, 2011; Perold et al., 2010). However, they are inconsistent with the findings of Sciutto et al. (2000) who found a small yet statistically significant relationship between years of teaching experience and total KADDS scores. This finding is somewhat surprising, as it is easy to assume that gains in teaching experience would amount to gains in teachers' knowledge across all areas of education (Guerra & Brown, 2012). In the present study, years of teaching experience was only related to teachers' knowledge of the symptoms/diagnosis of ADHD, with more experienced teachers obtaining higher scores on this subscale. These findings differ from those obtained by Small (2003) and Castenova (2008), who both found no relationship between teachers scores on

the Symptoms/Diagnosis subscale of the KADDS, and their number of years of teaching experience. The inconsistencies in these results may be due to methodological issues. For example, the study conducted by Sciutto et al. (2000) failed to mention the sampling technique used. Thus, it is impossible to determine how representative or biased the sample was, which ultimately restricts the generalisability of the results (Johnson & Christensen, 2012). Teachers who have more years of teaching experience are likely to have encountered a larger number of students with ADHD, referred students with ADHD for assessment, provided information to medical practitioners to assist with the diagnostic process, or discussed the diagnosis or symptoms with parents. The results of the present study lend support to the notion that teachers gain knowledge about the fundamental symptoms of ADHD by observing them within the classroom on a daily basis (Lazarus, 2011; Small, 2003).

Teacher Training and Professional Development

According to a study conducted by Christopher and David (2004), the more a person educated in the area of ADHD, the more knowledge he/she will have on the condition. An interesting finding of the present study is that the association between teacher training and teachers' knowledge of ADHD different based on the type of training. Results indicate that teachers who previously attended in-service workshop on ADHD knew more about the associated features and symptoms/diagnosis of the condition, and obtained higher scores on the KADDS. However, there was a lack of statistical significance in the relationship between learning about ADHD during teacher training and teachers' knowledge of ADHD. The results obtained in the current study are in agreement with prior research by Guerra and Brown (2012), who found that the number of courses teachers attended during their teacher training

which featured coursework dealing with ADHD was unrelated to their knowledge of ADHD. However, these findings are in contrast to those found by Small (2003), who found a significant positive relationship between teacher training about ADHD and KADDS total and Treatment scale scores, yet no statistically significant relationship between workshop attendance and teachers' knowledge of ADHD. Furthermore, an Australian study conducted by Bekle (2004) found no relationship between teachers' knowledge of ADHD and either teacher training or in-service workshops.

The inconsistent findings obtained in studies relating teacher training and professional development to knowledge of ADHD may reflect cultural factors or differences in training programmes and workshops. Alternatively, these discrepancies may be due to methodological differences such as variation in sample sizes. It is possible that teachers who had been educated about ADHD during their teacher training also had many years of teaching experience, and as a result, the knowledge they had gained about ADHD had now become outdated (Garcia, 2009). The lack of association between workshop attendance and teachers' knowledge of treatment for ADHD observed in the present study lends support to the notion that information about treatment may be relatively absent from workshops on ADHD in light of the view that teachers do not technically treat the disorder (Anderson et al., 2012). The lower prescription rate of medication for children with ADHD in New Zealand (Lee, 2003; Pharmaceutical Management Agency, 2003, as cited in Curtis et al., 2006) may also be a contributing factor.

Prior Exposure to and Experience of Students with ADHD

In the current study, whether participants had taught a student with ADHD and the number of ADHD students they had taught was positively related to

teachers' knowledge of ADHD as measured by all four scales. These results are consistent with the findings of Sciutto et al. (2000), Kleynhans (2005), and Kos et al. (2004). However, the findings of the present study differ from those obtained by Small (2003) and Lazarus (2011), where none of these measures of teachers' knowledge of ADHD were significantly related to having taught a student with ADHD. The discrepancy in these findings may be attributed to several reasons. For example, while the studies conducted by Kleynhans (2005), Small (2003), and Lazarus (2011) were all conducted in South Africa, the sample sizes utilised ranged from 72 (Small) to 522 (Kleynhans). The sampling method employed by these studies also differed from the present study. For example, Lazarus (2011) utilised a convenience sampling method, which restricts generalisability of the results, Kleynhans used a purposive sampling method, the current study used a random sampling method, and Sciutto et al. (2000) did not disclose their method. Finally, the ability to compare the results of these studies may be compromised by the fact that the nature and severity of the ADHD symptoms of the students with the participating teachers' had previously been exposed to was unknown to the researchers. The symptoms of ADHD displayed by students that a teacher has taught are likely to influence the knowledge of ADHD they develop (Small, 2003). For example, if a teacher had only had experience with students with milder symptoms, he or she might not have had to implement or monitor treatments for more severe symptoms and thus lack knowledge about these treatments.

A significant positive association between teachers' participation in the development of an IBP or IEP for a student with ADHD and their scores on all four scales was also found in the present study. These findings are in line with those obtained by Curtis and colleagues (2006) in their cross-cultural comparison of

teachers in the United States and New Zealand, in which teachers in the U.S. sample reported a greater frequency of involvement in the implementation of an individualised behaviour plan in the previous two years and obtained higher scores on the K-ADHD.

The combination of these results suggests that primary school teachers' obtain knowledge of ADHD through teaching students who have the disorder and participating in the development of intervention plans. In the course of these experiences, teachers are likely to be exposed to the symptoms of ADHD, gain information relating to the diagnostic criteria, and collaborate or receive assistance from other professionals or parents concerning school-based interventions (Sciutto et al., 2000).

Self-directed Study

The number of different resources teachers utilised when engaging in self-directed study about ADHD was weakly but positively associated with their knowledge of associated features and symptoms/diagnosis of ADHD as well as their overall KADDS scores. The same pattern was found for teachers who had read a book or searched the internet for information about ADHD. These findings differ slightly from those obtained by Small (2003) where self-directed study was positively yet weakly associated with total KADDS scores, moderately associated with Treatment but not significantly associated with either Associated Features or Symptoms/Diagnosis subscale scores. The results of the present study also differ from those obtained by Lazarus (2011) who found a positive association between reading an article on ADHD and teachers scores on all 3 subscales. These inconsistent results may be due to methodological differences. For example, Small (2003) combined all methods of self-directed study and then used a *yes*/*no* response

format, while Lazarus (2011) correlated the number of articles about ADHD read with teachers knowledge.

Self-efficacy

Teachers' confidence in their ability to work with and support students with ADHD was significantly positively related to their overall knowledge of ADHD, as well as the amount of accurate information they had about the associated features and symptoms/diagnosis of the condition. These finding supports the results of studies conducted by Sciutto et al. (2000), Perold et al. (2010), Lazarus (2011), Kleynhans (2005), where teachers who felt more confident about teaching a child with ADHD had more knowledge about the condition. However, these findings differ from those obtained by Ohan and colleagues (2008), where teachers with higher levels of ADHD knowledge reported less confidence in managing a child with ADHD in their classroom. This discrepancy may be methodological differences between the two studies. For example, Ohan and colleagues (2008) divided their sample of teachers into three groups based on their knowledge of ADHD (low, average and high knowledge) and took a mean group-difference approach to analysis. Furthermore, teachers in their low knowledge group had scores on 69% correct or less, which is higher than the mean scores for the current study. In addition, Ohan et al. utilised the K-ADHD (Jerome et al., 1994) to measure teachers' knowledge of ADHD, which introduces several sources of variability in results, as outlined previously in this section.

The results of the present study also differ slightly from those obtained by Lazarus (2011), who also found a significant positive association between knowledge of treatment and teachers' confidence. This inconsistency is likely to be due to methodological differences between the study by Lazarus (2011) and the

present study. For example, to answer the question about teachers' confidence in working with students with ADHD, Lazarus used a 4 point Likert scale with responses ranging from *not at all confident* to *very confident*, while the present study used a dichotomous, *yes* or *no* format. In addition, Lazarus utilised difference testing while the current study used correlations to obtain these findings. The use of these different methods is likely to have resulted in differences in statistical power, and ultimately discrepant conclusions to be drawn.

Implications

Several theoretical and practical implications of this study are evident. The results of the current study indicate that primary school teachers are very knowledgeable about the hallmark symptoms of ADHD; however evidence suggests that these symptoms have very poor predictive value (Pelham et al., 1992). Children with ADHD exhibit a great variability in their symptom severity and presentation in different contexts and across tasks (Mash & Wolfe, 2005; Barkley, 1998). A substantial proportion of teachers in the present study held misperceptions about certain situational variations of ADHD, namely novel versus familiar situations and behaviour in the presence of father versus mother. Accurate knowledge of how the symptoms of ADHD vary in different settings is important for teachers to have as it may help them predict how a child will behave in certain contexts, leaving them better prepared to support the child or manage behaviour problems. Furthermore, this knowledge is expected to assist teachers ease parental acceptance of a diagnosis of ADHD, as well as to preclude discord, when behavioural symptoms occur in one environment but not another (e.g., school but not home, or when staying with mother but not father if the child's parents are not living together) (Anastopoulos, 1996).

Interventions that address teachers misperceptions and provide them with accurate knowledge relating to this area is therefore of utmost importance.

A substantial proportion of teachers were unable to distinguish between symptoms of similar or comorbid disorders thus indicating gaps in knowledge or misperceptions about the nature of students with ADHD. These results are in line with prior research which indicated that a substantial number of children referred for ADHD are more suitably diagnosed with some other mental disorder or none at all (Cotugno, 1993; Desgranges et al., 1995; Sabatino & Vance, 1994). While many children who have inaccurately been referred for an assessment on the grounds of ADHD may have other genuine needs which necessitate treatment, that are acknowledged and attended to subsequent to a thorough evaluation, inaccurate referrals can lead to negative outcomes (Cotugno, 1993; Desgranges et al., 1995). For example, in some circumstances, referrals for suspected ADHD have the potential to lead to a "preconceived diagnosis" which is resistant to change despite the availability of information to the contrary, and neglect of other legitimate treatment needs. Misdiagnosed cases of ADHD also have a tendency to terminate treatment prematurely (Desgranges et al. 1995). In addition, treatment for misdiagnosed ADHD has the potential to make symptoms of the actual disorder worse. For example, stimulants can seriously worsen the manic symptoms of bipolar disorder (Hammen & Rudolph, 2003). Teachers were also lacking in their knowledge of the diagnostic criteria for ADHD, which can also lead to inaccurate referrals as well as both an underdiagnosis and overdiagnosis of ADHD.

In light of these findings, it is important that New Zealand primary school teachers are provided with the information needed to better engage in the differential diagnostic procedure and provide more accurate referrals as well as information to

assist in the diagnostic process. To achieve this, primary school teachers should be educated about situational variations, the concept of comorbidity as well as comorbid conditions, and the defining features of ADHD that have more predictive power than the fundamental symptoms of the condition. Furthermore, increasing teachers' awareness of the absence of physical features that a medical practitioner can use to diagnose ADHD may be beneficial, as this may help them realise the role they therefore play as an informant.

The results of the current study suggest that New Zealand primary school teachers should also be educated about the epidemiology of ADHD as they have significant gaps in their knowledge of this area. For example, the majority of the sample was unaware that ADHD can be hereditary or that depression is common in children with the disorder. There are several reasons why providing this information to teachers should be a high priority. Given that the incidence of ADHD is higher among first degree biological relatives, it is likely that when a student is diagnosed with ADHD either one or both of this student's parents could have or had ADHD (APA, 2000). This could compromise a parent's ability to implement recommended interventions for their child. A study conducted by Sonuga-Barke and colleagues (2002) found that children with ADHD whose mothers exhibited high levels of ADHD symptoms showed less improvement after a program of parent training than those whose mothers had lower or moderate level of ADHD symptoms. Teachers who are aware of this information can consider these factors when interacting with parents of a child with ADHD and conceivably be more practical when providing parents with procedures to assist their child with structure and homework (Kleynhans, 2005). Primary school teachers in New Zealand should be aware that depression affects up to 33% of children with ADHD (Pliszka et al., 1999), as

research indicates that a third of individuals with ADHD make suicide attempts (Barkley, 2006). Informing teachers about this matter is a particularly urgent requirement in New Zealand, as the nation has consistently had one of the highest youth suicide rates in developing countries (Ferguson, Blakely, Allan, & Collings, 2005). In addition, the existence of a family history of ADHD, or comorbid psychiatric disorders in children and adolescents with ADHD, predict the persistence of the disorder into adulthood (Hart et al., 1995; Mash & Wolfe, 2005; Taylor, Sandberg, Thorley, & Giles, 1991). In general, teachers should be aware of these high rates of comorbidity and realise that symptoms associated with ADHD are often just one of their problems. This should improve teachers' ability to support students with ADHD in their classroom (Kellner et al., 2003).

Implementing recommended treatment plans and monitoring progress made by the student as a result of treatment are responsibilities that are delegated to teachers of students with ADHD (Tannock & Martinussen, 2001). Results of the present study suggest that although New Zealand primary school teachers participate in developing individual education and behaviour plans for students with ADHD they generally lack adequate knowledge of treatment of ADHD. Given their involvement in developing IEPs and IBPs for students affected by ADHD, teachers' insufficient knowledge of the disorder is concerning as evidence suggests that an individual's knowledge about a specific treatment is positively related to their rating of that treatment's acceptability (Elliott, 1988; Miltenberger, 1990). Teachers who do not understand or accept a recommended treatment may therefore decline to implement it, fail to implement it in the proper manner, or fail to complete the intervention (Eckert &Hintze, 2000; Wilson & Jennings, 1996).

Most teachers in the present study were unaware that the most common treatment for ADHD is stimulant medication, although they were familiar with the side effects. This is surprising given the fact that the *New Zealand Guidelines for the Assessment and Treatment of Attention-Deficit/Hyperactivity Disorder* identify stimulant therapy as the first line of treatment (NZMOH, 2001). It may however support a previous finding that New Zealand primary school teachers hold unfavourable views towards medication for ADHD (Curtis et al., 2006). Furthermore, despite exhibiting knowledge of the efficacy of one treatment option for ADHD, they seemed to lack knowledge of the behaviours that can be effectively addressed using this treatment option. Even when treatment for ADHD is not implemented by the teacher, teachers require knowledge of the symptoms or behaviours being targeted, as they are likely to be involved in assessing the effects of the treatment. For example, even though teachers do not prescribe stimulant medication, the Ministry of Health (MOH, 2001) asserts that careful monitoring of symptoms and side effects is vital when utilising stimulant therapy, and should be informed by parent and teacher observations and reports when possible. The results of the present study raise questions over New Zealand primary school teachers' ability to monitor progress made by students with ADHD because of treatment.

Given these findings, it is also likely that the range of interventions that teachers are selecting from when developing IEPs and IBPs for students with ADHD is limited. As a result, teachers could be using less effective methods of dealing with the learning and behavioural difficulties experienced by students with ADHD due to a lack of knowledge about more effective options. "Teachers' knowledge of …treatments of ADHD seems critical for the child who has ADHD in their classroom, as the information and beliefs that teachers' hold regardless of the

accuracy of content is potentially impacting their choices in intervention strategies and how they feel and behave towards their students with ADHD" (Hepp, 2009, p.2). Given that every learner has distinctive needs (Small, 2003), and ADHD is a heterogeneous disorder (Faraone & Biederman, 1999), it is important for teachers to be equipped with a repertoire of interventions to enable them to meet the needs of learners with ADHD (Small, 2003).

The findings of this study suggest that a large proportion of New Zealand primary school teachers hold several misperceptions about the symptoms, diagnosis, characteristics, causes, prognosis, and treatment of ADHD. For example, almost half of teachers in the sample believed that dietary modifications namely reducing intake of sugar and food additives was effective at reducing symptoms of ADHD. Teachers' misperceptions about treatment for ADHD can have a particularly detrimental impact on the wellbeing of the child, as these may be passed on to parents. Communication with parents of children with ADHD has been found to be one of the main strategies that teachers use to deal with ADHD (Snider et al., 2003). Research has also found that teachers often give incorrect advice to parents, which parents frequently follow (DiBattista & Shepherd, 1993). Teachers who incorrectly believe that diet has an impact on ADHD symptoms may recommend that changes to the child's diet be made to parents (DiBattista & Shepherd, 1993) who may then follow this advice. Treatments based on dietary modifications can be costly, offer false hope for a quick cure, and ultimately delay implementation of evidence-based treatments whose efficacy is established (Mash & Wolfe, 2002).

Teachers are frequently responsible for implementing educational and behavioural interventions for students with ADHD in the classroom (DuPaul & Stoner, 2003; Snider et al., 2003). The substantial lack of knowledge about ADHD

exhibited by teachers is alarming as research indicates that where teachers have a poor understanding of the nature, course, outcome, and causes of ADHD, and hold misperceptions about appropriate interventions, attempts to establish behaviour management programs within that classroom will have little impact (Pfiffner et al., 2006). Misperceptions about ADHD were also common among teachers. The need for immediate provision of accurate information about ADHD through workshops and seminars becomes clear when considering the consequences of alternate actions. For example "turning to work colleagues for advice and information can be a risky strategy as these colleagues might provide insufficient or false information" (Soroa et al., 2012, p.131).

Practical Recommendations

Between 1% to 6.7% of New Zealand children are affected by ADHD (Anderson et al., 1987; Lee, 2003, as cited in Curtis et al., 2006; Goldman et al., 1998). Given the nation's inclusive education policy and the lack of knowledge and misperceptions about ADHD displayed by primary school teachers in the present study, educational psychologists, resource teachers: learning and behaviour (RTLBs), and special education needs coordinators (SENCOs) should be made aware of the training and support seriously needed for primary school teachers to efficiently instruct students with ADHD. Educational psychologists are in a good position to take on an active role in designing and implementing teacher training on ADHD and effective classroom interventions. Given the academic, behavioural and social difficulties that children with ADHD face, it is not unlikely for an educational psychologist to be involved with a child with ADHD. Considering a multidisciplinary team approach in working with children who have ADHD is preferred, educational psychologists should be included as key players in

participating in meetings and collaborating with SENCOs, RTLBs, school administrators, staff, teachers, and parents when working with children with ADHD. Furthermore, interactions between medical professionals, teachers, and educational psychologists should be promoted. "A closer working relationship between classroom teachers, psychologists and medical practitioners would be likely to enhance the diagnostic process, and to improve the efficacy of medication management, as well as the treatment process" (Louw, Oswald & Perold, 2009, as cited in Perold et al., 2010, p.471).

Given the positive relationship between workshop attendance and knowledge of ADHD found in this study, educational psychologists should design and implement in-service workshops on ADHD. Training should be aimed at teachers' current level of understanding of ADHD (Kos et al., 2004). It is therefore essential that decisions made about the content to include in these workshops be made in light of the findings of the present study and the differential impact of inaccurate beliefs and gaps in knowledge (Perold et al., 2010). Workshops should initially focus on the nature of ADHD, as understanding the nature of ADHD may prevent teachers from viewing students with ADHD in a negative light, and enables them to have realistic expectations of these learners. As a result teachers may be motivated to adjust their classroom management style, modify the curriculum, and use a range of teaching strategies in hopes of establishing a positive learning environment that facilitates the academic, social, and emotional success of students with ADHD (DuPaul & Stoner, 2003; Holz & Lessing, 2002; Zental, 2006).

These workshops should also provide professional support to teachers about the diagnostic criteria for ADHD, and how these symptoms present themselves in the classroom and at home. This professional support is likely to increase the chances

that teachers will accurately identify and seek assistance for children with ADHD. Professional support for teachers could be supplemented with an exercise where the educational psychologist models the differential diagnostic process and then provides the teachers with case studies of students with and without ADHD and encourages them to go through the differential diagnostic process together, while guiding them through the process. Discussion around predictors of prognosis, comorbidity, and situational variations can be stimulated using these case studies. This should be followed by extensive instruction on treatment. The same case studies can be used throughout the session. With regards to treatment, the instructor would model how to decide which treatments to use based on the presenting issues, justifying his/her choices as they go along. Then teachers would be guided through the same process, and probed about why they selected those treatments. By utilising these case studies, the instructor can gauge the level of knowledge that has been gained and adjust the session accordingly. Such workshops are likely to increase teachers' confidence and help them become more effective in management of ADHD in the classroom (Reid et al., 1994).

Educational psychologists can also establish partnerships with mental health organisations and professionals to offer education about ADHD and related mental health issues in children to primary school teachers. Given the significant association between reading a book about ADHD and teachers knowledge about the associated features of ADHD, which is the area they had the most misperceptions about, a short book addressing common myths about ADHD based on those held by teachers in the present study should be written and published by the Ministry of Education in collaboration with the Ministry of Health and distributed to schools. In light of the positive association between self-directed study through the internet and

teachers knowledge of ADHD, a website featuring evidence-based articles about ADHD that is of use to teachers should be developed. This website should feature an online forum where teachers can pose questions, which are then answered by psychologists and psychiatrists in New Zealand who specialise in ADHD. The availability of such a website should reduce the need for teachers to utilise unreliable sources of information for self-directed study such as magazine articles, which often contain inaccurate information about ADHD that may negatively influence their perceptions of students with the disorder (Snider et al., 2003; Stormont & Stebbins, 2005).

Reid et al. (1994) found that a lack of appropriate training was one of the major barriers to teachers' successful management of ADHD within the classroom. Under existing New Zealand educational policies or laws, schools are not mandated to provide teachers with training about ADHD. Educational psychologists can advocate at the Ministry of Education level or with SENCO's, RTLBs, or School Boards to necessitate professional development for teachers concerned with the needs of students with ADHD. Additionally, university departments of Psychology and Education can offer seminars or conferences specifically on the topic of children with ADHD and mental health problems to generate a greater awareness of the challenges, risks, and interventions for children with ADHD and mental health problems.

Strengths

The present study is unique and improves on the only other study which involves a New Zealand sample of teachers (Curtis et al., 2006) in that it represents a relatively heterogeneous sample of New Zealand primary school teachers from both urban and rural areas across New Zealand, rather than focusing on teachers from one

geographical area (e.g., a single major metropolitan city). The heterogeneous nature of the sample facilitates the extrapolation of conclusions to the general population of primary school teachers in New Zealand. In addition, the possibility that a selection bias occurred was reduced and conflict of interest avoided by randomly selecting schools, and ensuring the researcher had no previous contact with them. This could also have enhanced the generalisability of the results and reduced participants' potential desire to provide responses that place them in a favourable light.

The present study utilised self administered surveys, a method of collecting data that has numerous advantages. Research suggests that participants have a tendency to provide more positive and socially desirable responses when being directly interviewed than when completing self-administered surveys (Jackson, 2009). There is also evidence which indicates that when addressing health-related issues, participation is more likely when data is collected by means of self-administration than when face to face interviews and over the telephone techniques are used. This method also improved researchers' ability to collect data on more delicate issues (Perkins & Sanson-Fisher, 1998). Self-administered surveys also permit respondents to spend as much time as they need to think through their answers (Jackson, 2009). Thus, the utilisation of self-administered and anonymous postal surveys in the present study may have lead to more truthful or accurate results and a higher response rate than might have been obtained through the use of interviews.

In the current study, a multidimensional instrument was used to assess teachers' knowledge of ADHD, to gain as much information about areas of strengths and weaknesses in their knowledge as possible and to reduce possible error and bias. The KADDS (Sciutto et al., 2000) is considered to be superior to the previously used

K-ADHD (Jerome et al.,1994) for measuring teachers' knowledge of ADHD, as it addressed the limitations of providing a dichotomous (*true* or *false*) response format by introducing a third response option, *don't know* (Soroa et al., 2012). By making a third response option available, participants are no longer required to pick between a negative and positive response when in doubt. Increasing the number of response alternatives also reduces the likelihood of obtaining the correct answer by chance (from 50% for 2 responses to 33.3% for 3 responses), and enables participants to communicate their stance in a more precise manner (Muñiz, 2000, as cited in Soroa et al., 2012). Therefore, increasing the number of available response options facilitates the attainment of more reliable information about teachers' knowledge of ADHD (Kos et al., 2006; Sciutto et al., 2000; Jarque et al., 2007, as cited in Soroa et al., 2012). The *true/false/don't know* response options utilised by the KADDS allows for a distinction between teachers lack of knowledge and misperceptions of ADHD to be made. This distinction is desirable as lack of knowledge and misperceptions have different implications (Sciutto et al., 2000).

In addition, evidence stemming from the literature on questionnaires which measure teachers' knowledge of ADHD suggests that the inclusion of both true and false statements in an instrument (such as the KADDS) is advantageous to avoid the occurrence of an acquiescence response set (the tendency to agree to a whole series of items regardless of their content) and social desirability response set (the tendency to provide answers the participant thinks the researcher wants to obtain) (Martínez Arias, Hernández Lloreda & Hernández Lloreda, 2006, as cited in Soroa et al., 2012) which would otherwise reduce the reliability and validity of scores (Sciutto et al., 2000; West et al., 2005). Furthermore, the KADDS includes items relating to negative behaviours more distinctive of other psychological disorders which enables

the possibility of a negative response bias (the attribution of all negative behaviours to ADHD) to be considered (Sciutto & Feldhamer, 2005).

Limitations

Several limitations of the present study need to be acknowledged. The current study involved 84 primary school teachers from 44 primary, contributing and intermediate schools in New Zealand. This sample size was smaller than desired, which was the result of a low response rate. A good response rate prevents sample bias and is an important part of obtaining a representative sample (Jackson, 2006) which allows generalisations to be made from the sample to the population (Jackson, 2009). The sample size and low response rate can be partially attributed to the fact that the researcher was unable to directly approach participants to maintain their anonymity. The researcher was also unable to directly approach principals as the sample involved schools located all over New Zealand. Furthermore, it was not possible to gauge how many principals read the information about the study that was sent to them or distributed the packs to their teaching staff, and how many teachers read the information distributed to them in these packs.

The sample size of this study limited the variables that were included in the analyses and prevented comparisons being made between differing types of demographic groups due to a lack of statistical power. As a result some response categories were combined and others excluded from the analysis. For example, the generalisability of the results may be limited to general education teachers due to the small number of special education teachers in the sample of the current study. While a small sample size restricted the number of variables explored in the present study, it does not necessarily imply that the data are less accurate. The current study, while

limited in size provides a starting point for the exploration of primary school teachers' knowledge and perceptions of ADHD in New Zealand.

The voluntary nature of participation in this study may have produced a self-selection bias. Certain teacher qualities may be over-represented or under represented because they correlate (positively or negatively) with willingness to be included, such as teachers who are also mothers of children with ADHD or those who spend more time teaching (who may feel they do not have the time to complete the survey). Thus, a self-selection bias may potentially have restricted the generalisability of findings.

Results of the correlation analyses assessing the relationship between knowledge and various teacher characteristics indicated that the majority of significant correlations were only weak to moderate. The strength of these correlations may be a sign that other variables may be related to teachers' knowledge of ADHD. Alternatively, the weak to moderate strength of correlations in the present study may be due to the limited response options provided for questions relating to teachers' characteristics. It is therefore recommended that variables such severity of student behaviour problems, class sizes, and teachers' familial experience with children with ADHD be examined, and more precise measures (a larger number of response options) utilised in future studies. Finally, the internal consistency of the treatment subscale of the KADDS was relatively low, thus findings involving this subscale need to be interpreted with caution.

Future Directions for Research

Future research should examine the nature of in-service workshops about ADHD that are available to, and have been attended by New Zealand primary school teachers. This includes collecting information about content areas of knowledge

about ADHD that are addressed, the orientation of these sessions- theory based or applied, the length of these workshops, and the provision of resources or suggestions for further self-study during in-service workshops. A similar investigation into coursework that relates to ADHD that is included in teacher training is also recommended. This investigation should include a calculation of the number of hours or assignments assigned that focus on ADHD. Examining this information in light of the findings of the present study will enable researchers to identify areas for improvement. Furthermore, research that investigates the relationships between teachers' knowledge of ADHD and their professional development in relation to the disorder should quantify the amount of training either by number of courses or hours of training, as this will increase statistical power and provide more useful information.

Future studies should also examine the nature and extent of teachers' involvement in developing IEPs and IBPs for students with ADHD, the range of interventions they have utilised, and determine which of these are most common. An investigation into primary school teachers' involvement in referring students for assessment of ADHD, and monitoring the use of stimulant medication is also recommended. This should assist educational psychologists in deciding whether schools are managing ADHD in the optimum manner. A New Zealand study that examines primary school teachers' knowledge of ADHD in relation to their acceptance of various treatments for ADHD and attitudes as well as behaviours towards students with ADHD is also highly recommended. Research findings should inform decisions relating to the content to be covered during workshops about ADHD for primary school teachers in New Zealand.

Future studies linking teachers' self-directed study about ADHD to their knowledge of the disorder should examine the amount of self-directed study that teachers had engaged in such as the number of books or articles read. Furthermore, research investigating teachers' sources of information about ADHD should distinguish between magazine articles and journal articles, as the media has been known to portray inaccurate information about ADHD (Perold et al., 2010). The relationship between utilising various sources for self-study about ADHD and teachers' misperceptions about the disorder should also be examined.

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APPENDIX A

First Section of the Questionnaire

PART I- DEMOGRAPHICS SECTION

Please answer the following questions by either writing your answer on the dotted line or circling your response.

A. Identifying Data

1. **Your gender** *(tick)*:

☐ **male** ☐ **female**

2. **Your age group** *(tick)*:

☐ **< 30** ☐ **31-39** ☐ **40-49** ☐ **50-59**

☐ **≥60**

3. **Your highest level of education completed**
(Please tick one answer only):

☐ **Bachelor's degree** ☐ **Graduate diploma**

☐ **Postgraduate degree**

4. **What year(s) do you currently teach?**

.....

5. **What type of teacher are you?**

☐ **Regular Education** ☐ **Special Education**

6. **Total number of years of teaching experience?**

.....

7. **What type of school do you teach in?**

☐ **Full Primary School** ☐ **Contributing School**

☐ **Intermediate School**

Please turn to the next page

A. Experiences and Perceptions of ADHD

8. Did you learn about ADHD during your teacher training?

☐ **Yes** ☐ **No**

9. Have you ever taught a:

a. female student with ADHD?

☐ **Yes** ☐ **No**

b. male student with ADHD?

☐ **Yes** ☐ **No**

c. student prescribed medication for ADHD?

☐ **Yes** ☐ **No**

10. How many students with ADHD have you taught?

☐ **0** ☐ **1 or 2** ☐ **3-5** ☐ **≥6**

11. If you have had students with ADHD in your classroom, have you ever participated in developing an individual behaviour plan (IBP)?

☐ **Not applicable** ☐ **No**

☐ **Yes, once or twice** ☐ **Yes, many times**

12. If you have had students with ADHD in your classroom, have you ever participated in developing an individual education plan (IEP)?

☐ **Not applicable** ☐ **No**

☐ **Yes, once or twice** ☐ **Yes, many times**

13. Have you ever:

a. attended an in-service professional learning and development programme or workshop on ADHD?

☐ **Yes** ☐ **No**

b. read any books on ADHD?

☐ **Yes** ☐ **No**

c. read any articles on ADHD?

☐ **Yes** ☐ **No**

d. read any pamphlets/handouts on ADHD?

☐ **Yes** ☐ **No**

e. watched any television programs on ADHD?

☐ **Yes** ☐ **No**

f. searched the internet for information on ADHD?

☐ **Yes** ☐ **No**

14. Do you know anyone outside of school who has ADHD (either child or adult)?

☐ **Yes** ☐ **No**

15. What do you think/believe is the most appropriate educational placement for a student with ADHD?

☐ **Full-time General Education** ☐ **Full-time Special Education**

☐ **Part-time Special Education** ☐ **Other**

If other please elaborate below:

.....

.....

.....

16. Do you believe ADHD impacts on the educational experiences of students diagnosed with the disorder?

☐ **Yes** ☐ **No**

17. Do you believe you could benefit from additional training on working with students with ADHD?

☐ **Yes** ☐ **No**

18. Do you feel confident in your ability to work with and support students with ADHD?

☐ **Yes** ☐ **No**

APPENDIX B

Modified Version of the Knowledge Of Attention Deficit Hyperactivity Disorders

True (T), False (F), or Don't Know (DK) *(circle one)*:

1.	**Most estimates suggest that ADHD occurs in approximately 15% of school age children.**	**T**	**F**	**DK**
2.	**Current research suggests that ADHD is largely the result of ineffective parenting skills.**	**T**	**F**	**DK**
3.	**Children with ADHD are frequently distracted by extraneous stimuli.**	**T**	**F**	**DK**
4.	**Children with ADHD are typically more compliant with their fathers than with their mothers.**	**T**	**F**	**DK**
5.	**In order to be diagnosed with ADHD, the child's symptoms must have been present before age seven.**	**T**	**F**	**DK**
6.	**ADHD is more common in the 1st degree biological relatives (i.e. mother, father) of children with ADHD than in the general population.**	**T**	**F**	**DK**
7.	**One symptom of children with ADHD is that they have been physically cruel to other people.**	**T**	**F**	**DK**
8.	**Antidepressant drugs have been effective in reducing symptoms for many children with ADHD.**	**T**	**F**	**DK**
9.	**Children with ADHD often fidget or squirm in their seats.**	**T**	**F**	**DK**
10.	**Parent and teacher training in managing a child with ADHD are generally effective when combined with medication treatment.**	**T**	**F**	**DK**
11.	**It is common for children with ADHD to have an inflated sense of self-esteem.**	**T**	**F**	**DK**
12.	**When treatment of a child with ADHD is terminated, it is rare for the child's symptoms to return.**	**T**	**F**	**DK**
13.	**It is possible for an adult to be diagnosed with ADHD.**	**T**	**F**	**DK**
14.	**Children with ADHD often have a history of stealing or destroying other people's things.**	**T**	**F**	**DK**
15.	**Side effects of stimulant drugs used for treatment of ADHD may include mild insomnia and appetite reduction.**	**T**	**F**	**DK**

16.	**Current wisdom about ADHD suggests two clusters of symptoms: One of inattention and another consisting of hyperactivity/impulsivity.**	**T**	**F**	**DK**
17.	**Symptoms of depression are found more frequently in children with ADHD than in children without ADHD.**	**T**	**F**	**DK**
18.	**Individual therapy is usually sufficient for the treatment of most children with ADHD.**	**T**	**F**	**DK**
19.	**Most children with ADHD "outgrow" their symptoms by the onset of puberty and subsequently function normally in adulthood.**	**T**	**F**	**DK**
20.	**In severe cases of ADHD, medication is often used before other behaviour modification techniques are attempted.**	**T**	**F**	**DK**
21.	**In order to be diagnosed as ADHD, a child must exhibit relevant symptoms in two or more settings (e.g. home, school).**	**T**	**F**	**DK**
22.	**If a child with ADHD is able to demonstrate sustained attention to video games or TV for over an hour, that child is also able to sustain attention for at least an hour of class or homework.**	**T**	**F**	**DK**
23.	**Reducing dietary intake of sugar or food additives is generally effective in reducing the symptoms of ADHD.**	**T**	**F**	**DK**
24.	**A diagnosis of ADHD by itself makes a child eligible for placement in special education.**	**T**	**F**	**DK**
25.	**Stimulant drugs are the most common type of drug used to treat children with ADHD.**	**T**	**F**	**DK**
26.	**Children with ADHD often have difficulties organising tasks and activities.**	**T**	**F**	**DK**
27.	**Children with ADHD generally experience more problems in novel situations than familiar situations.**	**T**	**F**	**DK**
28.	**There are specific physical features which can be identified by medical doctors (e.g. paediatrician) in making a definitive diagnosis of ADHD.**	**T**	**F**	**DK**
29.	**In school age children, the prevalence of ADHD in males and females is equivalent.**	**T**	**F**	**DK**

30.	**In very young children (less than 4 years old), the problem behaviours of ADHD children (e.g. hyperactivity, inattention) are distinctly different from age-appropriate behaviours of children without ADHD.**	**T**	**F**	**DK**
31.	**Children with ADHD are more distinguishable from children without ADHD in a classroom setting than in a free play situation.**	**T**	**F**	**DK**
32.	**The majority of children with ADHD evidence some degree of poor school performance in primary school years.**	**T**	**F**	**DK**
33.	**Symptoms of ADHD are often seen in children without ADHD who come from inadequate and chaotic home environments.**	**T**	**F**	**DK**
34.	**Behavioural/Psychological interventions for children with ADHD focus primarily on the child's problems with inattention.**	**T**	**F**	**DK**
35.	**Electroconvulsive Therapy (i.e. shock treatment) has been found to be an effective treatment for severe cases of ADHD.**	**T**	**F**	**DK**
36.	**Treatments for ADHD which focus primarily on punishment have been found to be the most effective in reducing the symptoms of ADHD.**	**T**	**F**	**DK**

APPENDIX C

KADDS Recode Statements and Composition of Subscales

Recodes:

Correct answer is *false*:

(1 = 0) (2=1) (3=0) Items: 1, 2, 7, 11, 12, 14, 18, 19, 22, 23, 24, 27, 28, 29, 30, 34, 35, 36

Correct answer is *true*:

(1=1) (2=0) (3=0) Items: 3, 4, 5, 6, 8, 9, 10, 13, 15, 16, 17, 20, 21, 25, 26, 31, 32, 33

KADDS Subscales:

Associated Features: 1, 4, 6, 13, 17, 19, 22, 24, 27, 28, 29, 30, 31, 32, 33

Symptoms/Diagnosis: 3, 5, 7, 9, 11, 14, 16, 21, 26

Treatment: 2, 8, 10, 12, 15, 18, 20, 23, 25, 34, 35, 36

APPENDIX D

Ethics Approval for the Study

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA

1st May 2013

Alia Dilaimi
11 Norman Lesser Drive
St Johns
AUCKLAND 1072

Dear Alia

Re: **New Zealand Primary School Teachers' Knowledge and Perceptions of Attention-Deficit/Hyperactivity Disorder (ADHD)**

Thank you for your Low Risk Notification which was received on 26 April 2013.

Your project has been recorded on the Low Risk Database which is reported in the Annual Report of the Massey University Human Ethics Committees.

The low risk notification for this project is valid for a maximum of three years.

Please notify me if situations subsequently occur which cause you to reconsider your initial ethical analysis that it is safe to proceed without approval by one of the University's Human Ethics Committees.

Please note that travel undertaken by students must be approved by the supervisor and the relevant Pro Vice-Chancellor and be in accordance with the Policy and Procedures for Course-Related Student Travel Overseas. In addition, the supervisor must advise the University's Insurance Officer.

A reminder to include the following statement on all public documents:

> *"This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research.*
>
> *If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Professor John O'Neill, Director (Research Ethics), telephone 06 350 5249, e-mail humanethics@massey.ac.nz".*

Please note that if a sponsoring organisation, funding authority or a journal in which you wish to publish requires evidence of committee approval (with an approval number), you will have to provide a full application to one of the University's Human Ethics Committees. You should also note that such an approval can only be provided prior to the commencement of the research.

Yours sincerely

J.O'Neill

John G O'Neill (Professor)
Chair, Human Ethics Chairs' Committee and
Director (Research Ethics)

cc Michael Townsend
Institute of Education
ALBANY

James Chapman
Institute of Education
PN 500

A/Prof Sally Hansen, HoI
Institute of Education
PN 500

Roseanne MacGillivray
Institute of Education
PN 500

Massey University Human Ethics Committee
Accredited by the Health Research Council

Research Ethics Office
Massey University, Private Bag 11222, Palmerston North 4442, New Zealand T +64 6 350 5573 +64 6 350 5575 F +64 6 350 5622
E humanethics@massey.ac.nz animalethics@massey.ac.nz gtc@massey.ac.nz **www.massey.ac.nz**

APPENDIX E

Initial Letter to Principal

Dear Principal,

I am an enrolled student in the Master of Educational Psychology programme at Massey University. For my thesis I am conducting a study of teachers' training and experiences of children with Attention-Deficit/Hyperactivity Disorder (ADHD). I invite your participation in this project by allowing me to invite the teachers at your school to complete a survey. By participating in this study, teachers will be providing information to identify teachers' understanding of and professional preparation for assisting children with ADHD. This could inform and improve future policies and interventions aimed at understanding, assisting, and supporting students with ADHD and their teachers.

The study consists of an anonymous, voluntary survey consisting of two sections. The first section is designed to understand teachers' experiences with children with ADHD. The second section addresses teachers' knowledge of ADHD. The survey would require approximately 10 minutes to complete. A copy of the survey is enclosed.

If you agree to participate, I would like to send enough survey packs for the teachers at your school. The pack would contain an invitation to participate in the survey, a brief background to the study and instructions for completing the survey, the survey itself, and postage paid envelopes for the return of the survey.

I anticipate that the packs could be distributed at a staff meeting or placed in teachers' pigeon/cubbyholes for completion.

All information identifying participants and schools obtained in connection with the study will be kept confidential. Additionally when the study is complete, I will forward to the school a summary of the study and its findings.

If you are willing to participate please return the following page to me in the self addressed stamped envelope by *DATE*. Please feel free to contact me if you have any questions.

I realise that you and your teachers are very busy so any assistance that you can give to further our understanding of the needs of teachers as they work with children with ADHD will be greatly appreciated. Thank you very much.

Sincerely,

Alia Dilaimi, PGDipEd, BHSc (Hons)
021 280 1199
aliadilaimi@hotmail.com

Supervised by:
Prof James Chapman
(06) 356 9099 ext. 84301
j.chapman@massey.ac.nz

Prof Michael Townsend
(09) 443 9700 ext. 41099
m.townsend@massey.ac.nz

This project has been evaluated and judged to be low risk. If you have any concerns about the research, please feel free to contact my supervisors, whose details are listed above.

APPENDIX F

Principal's Consent Form

New Zealand Primary School Teachers' Knowledge and Perceptions of Attention-Deficit/Hyperactivity Disorder (ADHD)

PARTICIPATING SCHOOLS' CONSENT FORM - PRINCIPAL

I have read the Information Sheet and have had the details of the study explained to me. Any questions I raised have been answered to my satisfaction, and I understand that I am free to ask further questions at any time.

Please select an option:

a) I agree to allow teachers in my school to participate in this study conducted by Alia Dilaimi under the conditions set out in the Information Sheet ❒

b) I decline the request to participate in this project ❒

If you selected option a for the question above, please specify the number of teachers employed by your school below, so you can be provided with correct number of surveys.

Number of teachers employed/surveys required ……..

Signature: …… **Date:** ……

Full Name - printed ……..

APPENDIX G

Participant Information Sheet

New Zealand Primary School Teachers' Knowledge and Perceptions of Attention-Deficit/Hyperactivity Disorder (ADHD)

INFORMATION SHEET

An Invitation

I am inviting you to participate in a research project that seeks to understand New Zealand primary school teachers' knowledge and perceptions of ADHD.

My name is Alia Dilaimi and this study is the thesis component of my Masters Degree in Educational Psychology at Massey University.

Participation in this research is voluntary and anonymous.

What is the purpose of this research?

This research is looking at primary school teachers' understandings and perceptions of Attention-Deficit/Hyperactivity Disorder (ADHD).

This questionnaire will provide the data for our research. It focuses on your knowledge of ADHD in terms of general information, symptoms/diagnosis, and treatment, and sets out to understand your perceptions of ADHD.

Participant Identification and Recruitment

I am seeking participation from a number of randomly selected primary schools across the country. Only full primary schools, contributing schools, and intermediate schools were selected for this study. While I know teachers are very busy, your participation in this study will help us to build a picture of an important area of concern in many New Zealand schools.

Project Procedures

Principals of the randomly selected schools will be contacted to gain consent for their staff to be involved. A pack containing an invitation to participate in the survey, a brief background to the study and instructions for completing the survey, the survey itself, and postage paid envelopes for the return of the survey, will be distributed at a staff meeting or placed in teacher's mail boxes for completion. Participants will be asked to fill out a questionnaire about their knowledge and perceptions of ADHD and mail them to the researcher. The answers to these questions will be in a true/false/don't know format.

A demographics section will also be included in the survey. Responses from these surveys will be used to better understand the knowledge and perceptions of ADHD that primary school teachers in New Zealand hold. The survey should take approximately 10 minutes to complete.

What are the benefits?

By undertaking this study you will be helping to provide information that could inform and improve future policies and interventions aimed at understanding, assisting and supporting children with ADHD and their teachers.

Data Management

All individual data will be treated anonymously and in confidence. Questionnaires will be stored in a locked filing cabinet in supervisor Prof Michael Townsend's office, in building 94, Massey University, Oteha Rohe Campus. Only the researcher and her supervisors will have access to the data. The supervisors will be responsible for the eventual shredding of paperwork containing data and the researcher will delete all computer files containing data.

Participant's Rights

I would very much appreciate your participating in this study. If you decide to participate:

- Your completion and return of the questionnaire will indicate that you consent to participating in the study;
- Your responses will be totally anonymous and confidential. Participants can not be identified from their responses;

- You have the right to decline to answer any particular question.

Who do I contact for further information about this research?

Researcher Contact Details: **Project Supervisors' Contact Details**

Alia Dilaimi
aliadilaimi@hotmail.com
Tel.: +64 21 280 1199

Prof James Chapman
j.chapman@massey.ac.nz
Tel.: +64 6 356 9099 ext 84301

Prof Michael Townsend
m.townsend@massey.ac.nz
Tel.: +64 9 443 9700 ext 41099

This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researchers named above are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you wish to raise with someone other than the researchers, please contact Professor John O'Neill, Director, Research Ethics, telephone 06 350 5249, email: humanethics@massey.ac.nz

APPENDIX H

Correct Responses to Items on the KADDS

Subscale[a]		Item	Correct response
A	1.	Most estimates suggest that ADHD occurs in approximately 15% of school age children.	False
T	2.	Current research suggests that ADHD is largely the result of ineffective parenting skills.	False
S	3.	Children with ADHD are frequently distracted by extraneous stimuli.	True
A	4.	Children with ADHD are typically more compliant with their fathers than with their mothers.	True
S	5.	In order to be diagnosed with ADHD, the child's symptoms must have been present before age seven.	True
A	6.	ADHD is more common in the 1st degree biological relatives (i.e. mother, father) of children with ADHD than in the general population.	True
S	7.	One symptom of children with ADHD is that they have been physically cruel to other people.	False

Subscale[a]		Item	Correct response
T	8.	Antidepressant drugs have been effective in reducing symptoms for many children with ADHD.	True
S	9.	Children with ADHD often fidget or squirm in their seats.	True
T	10.	Parent and teacher training in managing a child with ADHD are generally effective when combined with medication treatment.	True
S	11.	It is common for children with ADHD to have an inflated sense of self-esteem.	False
T	12.	When treatment of a child with ADHD is terminated, it is rare for the child's symptoms to return.	False
A	13.	It is possible for an adult to be diagnosed with ADHD.	True
S	14.	Children with ADHD often have a history of stealing or destroying other people's things.	False
T	15.	Side effects of stimulant drugs used for treatment of ADHD may include mild insomnia and appetite reduction.	True

Subscale[a]		Item	Correct response
S	16.	Current wisdom about ADHD suggests two clusters of symptoms: One of inattention and another consisting of hyperactivity/impulsivity.	True
A	17.	Symptoms of depression are found more frequently in children with ADHD than in children without ADHD.	True
T	18.	Individual therapy is usually sufficient for the treatment of most children with ADHD.	False
A	19.	Most children with ADHD "outgrow" their symptoms by the onset of puberty and subsequently function normally in adulthood.	False
T	20.	In severe cases of ADHD, medication is often used before other behaviour modification techniques are attempted.	True
S	21.	In order to be diagnosed as ADHD, a child must exhibit relevant symptoms in two or more settings (e.g. home, school).	True
A	22.	If a child with ADHD is able to demonstrate sustained attention to video games or TV for over an hour, that child is also able to sustain attention for at least an hour of class or homework.	False

Subscale[a]		Item	Correct response
T	23.	Reducing dietary intake of sugar or food additives is generally effective in reducing the symptoms of ADHD.	False
A	24.	A diagnosis of ADHD by itself makes a child eligible for placement in special education.	False
T	25.	Stimulant drugs are the most common type of drug used to treat children with ADHD.	True
S	26.	Children with ADHD often have difficulties organising tasks and activities.	True
A	27.	Children with ADHD generally experience more problems in novel situations than familiar situations.	False
A	28.	There are specific physical features which can be identified by medical doctors (e.g. paediatrician) in making a definitive diagnosis of ADHD.	False
A	29.	In school age children, the prevalence of ADHD in males and females is equivalent.	False
A	30.	In very young children (less than 4 years old), the problem behaviours of ADHD children (e.g. hyperactivity, inattention) are distinctly different from age-appropriate behaviours of children without ADHD.	False

Subscale[a]		Item	Correct response
A	31.	Children with ADHD are more distinguishable from children without ADHD in a classroom setting than in a free play situation.	True
A	32.	Children with ADHD are more distinguishable from children without ADHD in a classroom setting than in a free play situation.	True
A	33.	Symptoms of ADHD are often seen in children without ADHD who come from inadequate and chaotic home environments.	True
T	34.	Behavioural/Psychological interventions for children with ADHD focus primarily on the child's problems with inattention.	False
T	35.	Electroconvulsive Therapy (i.e. shock treatment) has been found to be an effective treatment for severe cases of ADHD.	False
T	36.	Treatments for ADHD which focus primarily on punishment have been found to be the most effective in reducing the symptoms of ADHD.	False

[a]A = Associated Features, S = Symptoms/Diagnosis, T = Treatment