

**INFORMANT DISCREPANCIES IN THE ASSESSMENT OF
ATTENTION-DEFICIT/HYPERACTIVITY DISORDER**

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ABSTRACT

Attention-deficit/hyperactivity disorder (ADHD) is characterised by developmentally inappropriate levels of hyperactivity, impulsivity, and/or inattention, leading to significant impairment across multiple domains of functioning. To receive a diagnosis, symptoms must be present across two or more settings; thus requiring information to be collected from multiple informants, typically parents and teachers. Research consistently shows low to moderate agreement between parent and teacher reports; however, mechanisms underlying these discrepancies remain unclear. The present study aimed to: (1) describe patterns of reporting children's ADHD symptoms by parents and teachers in New Zealand; (2) replicate previous research examining agreement between parents and teachers; and (3) investigate the role of several potential mechanisms for informant discrepancies; those being contextual influences (i.e. *situational specificity*) or biases in informants' reports (i.e. *source biases*). Fifty five children and their parents/guardians and teachers participated. Parent and teacher ratings were measured using standardised questionnaires (i.e. ADHD-RS-IV, BASC-2) and children's off-task behaviour using a clinician-rated classroom observation scheme (i.e. BOSS). T-tests showed that overall parents rated their children as more symptomatic of ADHD than teachers. Diagnostically, the choice of informant and the rule for combining information from multiple informants dramatically altered the ADHD subtype assigned to the child. Correlations and kappa statistics showed that parent-teacher agreement was slightly higher than previous studies; however, it remained within the moderate range. The level of agreement differed across the type of symptoms reported, with hyperactive/impulsive symptoms being rated more concordantly than inattentive. Finally, results concerning the mechanisms underlying discrepancy suggest a combination of factors. Implications for the assessment of ADHD in clinical practice are discussed.

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INFORMANT DISCREPANCIES IN THE ASSESSMENT OF ATTENTION-DEFICIT/HYPERACTIVITY DISORDER

Attention-deficit/hyperactivity disorder (ADHD) is a chronic condition which affects between two and five percent of school age children in New Zealand (NZ; Faraone, Sergeant, Gillberg, & Biederman, 2003). It is a debilitating disorder which begins in childhood and is characterised by developmentally inappropriate levels of hyperactivity, impulsivity, and/or inattention (American Psychiatric Association, APA, 2000). This persistent and pervasive pattern of behaviours is typically diagnosed at age seven (APA, 2000), and leads to significant impairment across academic, social, and later occupational domains of functioning (Pelham, Fabiano, & Massetti, 2005). Empirical research has shown that children with ADHD have difficulties optimising education, forming and maintaining social relationships, and are at higher risk of having poor self-esteem, developing co-morbid conditions, and later, of criminal offending and occupational difficulties (Edborn, Granlund, Lichtenstein, & Larsson, 2008; Evans & Youngstrom, 2006; Ryden et al., 2009). Altering the developmental trajectory of this disorder as early as possible is important for ameliorating associated negative outcomes. However, to be eligible for access to the available interventions and support services, children, their families, and other socially significant individuals must contribute to an assessment process from which the child must receive the formal diagnosis of ADHD (Barkley, 2003).

1.1. Diagnosing ADHD

The process by which a child is given a diagnosis of ADHD is subjective. There are no medical tests that can diagnose ADHD and, despite its biological aetiology, ADHD does not manifest in any characteristic changes in physical appearance which

could be indicators of the disorder (Antrop, Roeyers, Oosterlaan, & Van Oost, 2002). Furthermore, cognitive and neuropsychological markers indicative of ADHD are yet to be identified (Antrop et al., 2002). Thus, the current empirically supported diagnostic process for ADHD is based on an evaluation of the presence of symptoms and impairments associated with the disorder, relative to the appropriate diagnostic criteria (Frazier & Youngstrom, 2006; Smoot, Boothby, & Gillett, 2007). Barkley (2003) suggested that, over the course of defining diagnostic labels for ADHD, the criteria have changed many times and will continue to be revised.

In NZ, the current diagnostic criteria used to diagnose ADHD are that of the fourth edition, text revision of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; APA, 2000). The DSM-IV-TR lists 18 symptoms of ADHD, nine indicate hyperactivity and impulsivity, and nine of which indicate inattention. Furthermore, the DSM-IV-TR defines three subtypes of ADHD, which are assigned based on the individual's symptom profile in the six months prior to diagnosis. The 'predominantly hyperactive/impulsive' subtype is characterised by excessive movement and an inability to calm down. The 'predominantly inattentive' subtype is characterised by extreme difficulty in remaining focused on and completing tasks, as well as an inability to filter out distracters. The 'combined' subtype is characterised by excesses in both hyperactivity/impulsivity and inattention. In order to meet the criteria for a subtype, an individual needs to present with six of the nine symptoms within that domain; and for the combined subtype, six symptoms in both the hyperactive/impulsive and inattentive domains (APA, 2000). Across all subtypes, the DSM-IV-TR specifies that symptoms must be present before age seven years and have persisted for a period longer than six months (APA, 2000).

In addition to the symptom threshold, the DSM-IV-TR stipulates that significant impairment, as a result of symptoms, must be present (APA, 2000). Given that the symptom profiles differ across the subtypes of ADHD, logically, the patterns of impairment observed also vary (Stefantos & Garrett, 2007). For example, children in the predominantly inattentive subtype demonstrate poorer academic achievement (Pingault et al., 2011). Conversely, behavioural disturbances are more prevalent in children with hyperactive/impulsive diagnoses (Gadow et al., 2004). Furthermore, the DSM-IV-TR criteria specify that symptoms must be ‘pervasive’, where pervasiveness is defined as across two or more settings (APA, 2000). As a consequence of pervasive symptomology, individuals with ADHD often experience impairment spanning most important aspects of life (Barkley, 2003). Thus, to meet the impairment criteria, an individual must show clinically significant impairment, as a result of the symptoms, which is clearly evidenced across educational, social, and/or occupational settings (APA, 2000).

1.2. Establishing Pervasiveness – The Cross-Situationality Criterion

To establish the pervasiveness of symptomology and impairment, clinicians need to obtain information regarding the child’s functioning across multiple contexts (Frazier & Youngstrom, 2006). It is well established that young children, due to their developmental stage, are often unable to provide reliable accounts of their own behaviour (Antrop et al., 2002; Frick & McMahon, 2008). Cantwell, Lewinsohn, Rhode and Seely (1997) stated that children, when recounting their own behaviour, have a tendency to minimise or exclude socially unacceptable behaviours. More specifically, children with ADHD have a tendency to engage in positive illusory biases (Emeh & Mikami, 2012; Owens, Goldfine, Evangelista, Hoza, & Kaiser, 2007). That is, their self-

reported behaviour is viewed more positively when compared to reports obtained from multiple external informants and performance on standardised tests (Owens et al., 2007). It has been argued that these biases serve self-protective functions (e.g. shielding the child from further psychological distress) which persist across their lifespan (Hoza, Pelham, Dobbs, Owens & Pillow, 2002; Owens et al., 2007). In summary, this body of literature suggests that children, particularly those with ADHD, are unable to provide reliable and valid information to inform the diagnostic process.

In light of this, evidence based practice guidelines for the assessment of ADHD emphasise that clinicians should gather information from as many informants and across as many settings as is feasible (Frazier & Youngstrom, 2006; Mash & Hunsley, 2005; Pelham et al., 2005). For children around the average age of diagnosis (seven and a half years; Cavitt, 2005), these informants are typically parents, caregivers, and teachers; as the primary environments of children at this age are home and school respectively (Barkley, 1998; Pelham et al., 2005).

Given that there is not a definitive means of identifying the ‘best’ informant (Achenbach, McConaughy, & Howell, 1987), there has been a historical tendency towards mothers being considered the most accurate and useful informant (Phares, 1997). Practice guidelines have consistently reflected this in their recommendations (American Academy of Child & Adolescent Psychiatry, 2002; American Academy of Paediatrics, 2000). However, reliance solely on parent report has been increasingly criticised (Evans & Youngstrom, 2006). Mounting evidence illustrating variability between mothers’ reporting, and that of other informants, has raised doubt. For example, Langberg et al. (2010) found only moderate concordance between mothers’ and fathers’ ratings of their children. Therefore, the question of who can best report a child’s symptomology and impairment remains controversial.

Secondly, a growing evidence base purports the limited utility of parent reports in accounting for children's symptoms in the school setting. Sayal and Taylor (2005) demonstrated this effect, showing that parents, relative to teachers, consistently underrated their child's symptoms in the school setting. Related to diagnosis, Sayal and Goodman (2009) documented that, of a community sample who met criteria based on both parent and teacher report, only half continued to do so based on parent reports in isolation. Valo and Tannock (2010) displayed similar findings at both the disorder and subtype diagnosis levels, with either parent or teacher reports in isolation significantly altering the diagnostic decision. Explanations for these effects are numerous, but some include: parents' limited insight into children's behaviour outside of the home setting, the amount of teacher feedback provided to parents about their child at school, parents basing their judgements on the child's account of their school behaviour, and parents projecting their personal opinions onto reports of school behaviour (Cantwell et al., 1997; Sayal & Goodman, 2009; Sayal & Taylor, 2005).

Complementarily, the incremental validity of obtaining teacher reports, in addition to parent reports, has been supported for gaining a better understanding of the child's functioning, and for informing diagnosis and intervention (Amador-Campos, Forns-Santacana, Guardia-Olmos, & Pero-Cebollero, 2006; Barkley, 2003; Frazier & Youngstrom, 2006). Studies have suggested that teachers provide diagnostically relevant information (Sayal & Goodman, 2009), which informs clinicians regarding behaviours specific to the school setting (Frazier & Youngstrom, 2006; Nijis et al., 2004) and provides a more holistic conceptualisation of the child's difficulties (Sayal & Taylor, 2005). Furthermore, teacher reports can identify areas of disproportionate impairment and facilitate delineation of intervention targets, improving treatment utility (Sayal & Taylor, 2005). In summary, the abovementioned research brings to the fore a

number of issues that warrant cautioning of the use of parent reports singularly in the assessment of ADHD. Rather, an amalgamation of information from multiple informants is required to provide a holistic representation of a child's behaviour across multiple environments.

1.3. Informant Discrepancies

To fulfil the pervasiveness criterion (i.e. cross-contextual symptomology and impairment), the reviewed literature proposes that a synthesis of information from multiple informants provides the best conceptualisation of a child's difficulties when assessing for ADHD (Stefantos & Baron, 2007). Informants would ideally agree to some extent on the presence and severity of symptoms and associated impairment, thus contributing to accurate diagnosis. Despite this seemingly easy task, the cross-situationality specification of the diagnostic criteria has become one of the most problematic and controversial issues in diagnosing ADHD (Barkley, 2003).

In their seminal paper, Achenbach et al. (1987) first documented disparity in reporting, which is now considered one of the most pressing and persistent issues in child psychopathology research. Their meta-analyses showed that across 119 studies, parent, child, teacher, support worker and clinician ratings of a child's symptomology differed greatly. Agreement rates between informants showed an average effect size of only 0.2, falling into the low to moderate range of agreement (Achenbach et al., 1987). In addition, correlations between informants in similar roles, such as mother and father, were stronger than those with differing roles, such as parent and teacher (Achenbach et al., 1987). Thus, it was concluded that multiple informants often diverge when evaluating the symptoms of emotional and behavioural disorders of childhood (Achenbach et al., 1987). Since then, a substantial amount of research has consistently

demonstrated low to moderate rates of agreement across multiple informants rating symptoms of child psychopathology (De Los Reyes & Kazdin, 2005; Youngstrom, Loeber, & Stouthamer-Loeber, 2000). Furthermore, informant discrepancies are not limited to generic measures of children's psychological, emotional, and behavioural functioning; rather they also persist across assessment of symptomology and impairment for specific disorders (De Los Reyes & Kazdin, 2005), and are particularly pronounced when evaluating specific symptom profiles (Youngstrom et al., 2000). Lack of agreement between informants has been well documented in the assessment of disruptive behaviour disorders, particularly ADHD.

1.4. Informant Discrepancies in the Assessment of ADHD

It was not until the introduction of the fourth edition of the DSM (DSM-IV; APA, 1994), followed by the presently used DSM-IV-TR (APA, 2000), that the criteria for ADHD required that cross-situational symptoms and impairment be evidenced for a child to receive a diagnosis. This specification, along with increasing awareness of the importance of diagnostic accuracy, led to research becoming increasingly focused on the issue of multiple informant agreement in the assessment of ADHD.

Recent literature, predominantly conducted in the United States of America (USA), has shown that discrepancies between parents and teachers, when assessing ADHD, are of similar magnitude to those observed with other child externalising behaviours. A small number of studies have assessed whether multiple informants agreed on the presence of ADHD. These studies reported low to moderate parent-teacher agreement for an ADHD diagnosis of any subtype (Malhi, Singhi, & Sidhu, 2008, kappa statistic (κ) = 0.11; Mitsis, McKay, Schulz, Newcorn, & Halperin, 2000, κ

= 0.20; Sollie, Larsson, & Mørch, 2012, $\kappa = 0.24$ for mother-teacher agreement and $\kappa = 0.43$ for father-teacher agreement).

An alternative approach to illustrate such discrepancies is to compare the proportion of children meeting criteria for ADHD when rated by either informant. Mitsis et al. (2000) showed that, of 74 clinically referred children, 85% met criteria for ADHD based solely on parent report and 76% based solely on teacher report. Similarly, of a sample of 119 children, Mahli et al. (2008) found that 81% met criteria based on parent report and 57% on teacher report. Likewise, Sollie et al. (2012) showed that, of 45 clinically referred children, 65% meet diagnostic criteria based on mother report, 46% on father report, and 62% on teacher report. However, none of the studies reported on the percentage of children that met criteria by *both* parent and teacher.

Considering that the presence of discrepancies appears well established, researchers have sought to identify patterns in the occurrence and nature of discrepancies. Firstly, identifying the magnitude of ratings across informants has yielded capricious results. That is, neither parents, nor teachers, consistently under or over report relative to the other. Some studies have documented that teachers have a tendency to report higher frequencies of symptoms and impairment, relative to parents, across age groups (Amador-Campos et al., 2006, Mitsis et al., 2000; Wolraich et al., 2004). Others have displayed the opposite pattern in similar aged samples, with teachers under reporting relative to parents (Gomez, 2007; Malhi et al., 2008; Sollie et al., 2012). Furthermore, in regards to diagnosis, several studies have shown that parent-teacher agreement is higher for clinically referred children than in community samples (Amador-Campos et al., 2006); particularly for those children whose referral was parent initiated, rather than teacher initiated (Biederman et al., 1993; Stefanos & Baron, 2007). In contrast, Wolraich et al. (2004) documented poorer agreement in a clinically

referred sample, especially for those children whose referral was teacher initiated (i.e. teachers were reporting children's significant symptoms and impairment, yet parents were unconcerned about their child's behaviour).

Secondly, there is some evidence to suggest that within-informant (parent-parent) ratings are more concordant than across-informant (parent-teacher) ratings (Nijis et al., 2004; Sayal & Goodman, 2009). The authors concluded that this supported the reliability of informant reports. However, as previously discussed, the validity of parents' and teachers' reports of children's behaviour in the school and home environments respectively is questionable (Sayal & Goodman, 2009; Sayal & Taylor, 2005). More consistently evidenced is the association between the similarity of informants' roles with respect to the child, and the degree of convergence between informant reports of the presence of the disorder. Efstratopoulou, Simons and Janssen (2012) documented higher agreement between teachers of classroom subjects and physical educators, than either teacher or educator with parents. Similarly, agreement between mothers and fathers has been shown to be higher than that between either of the parents and the child's teacher (Langberg et al., 2010). Conversely, in a recent study, Sollie et al. (2012) showed that, despite all agreement levels falling within the moderate range, fathers were more likely to be concordant with teachers, than mothers with teachers, when rating the presence of ADHD. Furthermore, as with other child psychopathologies, the specificity or level of assessment appears to influence discrepancies between informants. A review of these studies follows.

1.5. Informant Discrepancies in the Assessment of ADHD Subtypes

Despite research professing the imperfections of the subtype classification system (Lahey, Pelham, Loney, Lee, & Wilcutt, 2005; Valo & Tannock, 2010),

assigning a subtype remains a fundamental part of an assessment of ADHD (APA, 2000). It has been argued that subtypes enable clinicians to predict the nature and extent of likely impairments (Stefantos & Baron, 2007) and determine possible intervention targets (e.g. children with inattentive subtype require more intensive academic intervention than those with the hyperactive/impulsive subtype; Massetti et al., 2008; Polderman, Boomsma, Bartels, Verhulst, & Huizink, 2010). Given that research has evidenced larger discrepancies when rating specific symptom profiles of other behavioural disorders (Youngstrom et al., 2000), a number of studies have investigated informant discrepancies across the core symptom domains of ADHD, those of hyperactivity/impulsivity and inattention.

Again, the literature is fraught with variability. Antrop et al. (2002) found no correlations between parent and teacher rated hyperactive/impulsive or inattentive symptoms. In contrast, Sayal and Goodman (2009) documented moderate correlations between parent and teacher rated inattention ($r = 0.23, p < 0.001$), hyperactivity ($r = 0.25, p < 0.001$) and impulsivity ($r = 0.21, p < 0.001$). Moreover, when parents were asked to specifically rate their child's school behaviour, the correlations found between parents and teachers were stronger (inattention $r = 0.31, p < 0.001$ and hyperactivity $r = 0.36, p < 0.001$). Moderate positive correlations for both symptom domains were also found by Mitsis et al. (2000), Wolraich et al. (2004), Gomez (2007), Malhi et al. (2008) and Rettew et al. (2011). Efstratopoulou et al. (2012) examined inattention specifically, and found a positive correlation ($r = 0.62, p < 0.001$) between parent and teacher ratings. Finally, Van der Oord, Prins, Oosterlaan and Emmelkamp (2006) displayed a differing pattern, with moderate parent-teacher agreement on the ADHD inattentive symptom scale ($r = 0.38, p < 0.01$) and no correlation for the ADHD hyperactivity scale ($r = -0.04, p = \text{n.s.}$). Several studies also correlated parent and teacher reports for

individual symptoms. Antrop et al. (2002) found significant positive correlations for three inattentive and two hyperactive/impulsive symptoms. Similarly, Nijis et al. (2004) found moderate agreement for only one of the 18 symptoms (difficulty playing quietly; $\kappa = 0.41$). Finally, Gomez (2007) reported significant positive correlations for seven inattentive symptoms and one hyperactive/impulsive symptom ($p < 0.01$). Overall, parent-teacher agreement for the core symptoms domains appears to fall within the low to moderate range; however, agreement on the specific symptoms appears more variable.

Given that subtypes are assigned based on symptom thresholds, it is unsurprising that they too are subject to discrepancy across informants. Mitsis et al. (2000) found no significant correlations between the subtypes assigned by parents and teachers for children with ADHD. The discrepancy between informants was most evident for those children classified as hyperactive/impulsive subtype; where out of 24 cases rated by either informant, both informants agreed on the subtype classification for two children (Mitsis et al., 2000). Antrop et al. (2002) tested the presence of symptoms in each core domain for a sample of clinically referred children, as rated by parents and teachers. Ratings at or above the 95th percentile were considered indicative of disorder in that domain. Based on parent reports, the percentage of children rated above the 95th percentile was 41% for inattention and 33% for hyperactivity/impulsivity. Based on teacher reports, 11% of children met criteria for inattention and 13% for hyperactivity/impulsivity. When both parents and teachers were required to rate the child above the 95th percentile, 19% of children met criteria for inattention and 32% for hyperactivity/impulsivity. Overall, parents and teachers agreed on the subtype assigned in only 41% of clinically referred children (Antrop et al., 2002). Moreover, it was noted that combining parent and teacher reports resulted in redundancy of the inattentive and

hyperactive/impulsive subtypes, as the majority of children were classified as combined subtype (Lahey et al., 1994).

Several studies have also calculated kappa statistics to determine the level of parent-teacher agreement on the prevalence of subtypes. Amador-Campos et al. (2006) reported kappa values of 0.24 for inattentive, 0.21 for hyperactive/impulsive, and 0.25 for combined symptoms. Murray et al. (2007) demonstrated that the diagnostic concordance for preschool children “at risk” of ADHD ranged between $\kappa = 0.24$ and $\kappa = 0.26$ for the inattentive and hyperactive/impulsive subtypes respectively. Relative to the abovementioned, Malhi et al. (2008) documented lower levels of agreement, with kappa values of 0.16 for inattentive subtype, 0.05 for hyperactive/impulsive subtype, and 0.02 for combined subtype. Collectively, the abovementioned findings are indicative of slight to moderate parent-teacher agreement in assigning subtypes of ADHD.

1.6. Implications of Informant Discrepancies for Children with ADHD and their Families

Acknowledging the presence of informant discrepancies and the documented effects on diagnostic classifications, it is vital to further examine the implications of informant discrepancies for children with ADHD and their families. A reliable and valid assessment provides an individualised framework for determination of intervention targets and strategies, delineation of treatment goals, and estimation of prognosis and potential barriers (Mash & Hunsley, 2005). There are many evidence-based psychosocial and pharmacological interventions available which may reduce symptomology and improve functioning in individuals with ADHD (Mash & Hunsley, 2005). However, access to interventions, and eligibility for support services and

funding, which may remediate some of the effects of the disorder and provide support for the family, are often contingent on diagnosis (Mash & Hunsley, 2005). Moreover, misdiagnosis carries significant implications for the child and their family, including ineffective or inappropriate interventions (e.g. unnecessary medication), decreased eligibility to services and funding, and increased risk of the child experiencing comorbid conditions, academic and occupational underachievement, and delinquency (Ministry of Health, MOH, 2001; Ryden et al., 2009). Therefore valid and reliable diagnoses are paramount to improving the outcomes for children with ADHD (Hoagwood, Burns, Kiser, Ringeisen, & Scheonwald, 2001). Nass (2006) suggested that informant discrepancies substantially reduce a clinician's confidence in giving a diagnosis, and may alter the likelihood of a diagnosis being given and the type of diagnosis assigned. Furthermore, De Los Reyes and Kazdin (2005) raised concerns that if multiple informants disagree with the diagnosis given to the child, it is likely that there may also be disagreement concerning intervention targets. The MOH (2001) emphasised that co-operation and communication between influential parties, including families, health professionals and teachers, is paramount to the success of psychosocial interventions for ADHD.

Overall, it is well established that informant discrepancies are prevalent and have significant implications for children with ADHD and their families. However, to remediate such discrepancies, an understanding of why they occur is necessary.

1.7. Theories of Informant Discrepancies

The mechanisms engendering informant discrepancies are not well understood (De Los Reyes & Kazdin, 2005). Historically, informant discrepancies were considered assessment method artefacts that could and should be minimised by rigorous assessment

methodology (McGuire, 1969). Attempts to minimise method variance, through standardised procedures for administration, consistency of instruments used across informants (Valo & Tannock, 2010), and increased specificity in interpretation guidelines, have proved only somewhat useful (Dirks, De Los Reyes, Briggs-Gowan, Cella, & Wakschlag, 2012). Moreover, De Los Reyes (2011) demonstrated that informant reports on the same measures were both reliable and valid, yet the discrepancies between informants persisted. Hence, lack of reliability or validity cannot fully explain why discrepancies exist (Achenbach & Rescorla, 2001; De Los Reyes, 2011). Two alternative theoretical perspectives have received considerable support in accounting for the lack of agreement between informants' ratings of disorders of childhood; namely, informant influences and contextual influences.

Informant Influences. Systematic bias in the responses of one or more informants, termed *source bias* or source error variance, has been long been argued as a possible explanation for informant discrepancies (Achenbach et al., 1987; Campbell & Fiske, 1959). Campbell and Fiske's (1959) multi-trait, multi-method perspective asserts that discrepancies inform us about the characteristics of the informant, rather than the child's behaviour. Substantial empirical research has documented numerous factors which mediate informants' reports of children's behaviour. Some evidenced examples include: individual informant characteristics (e.g. stress, socioeconomic status, anxious or depressive symptomology; Chi & Hinshaw, 2002; Van der Oord et al., 2006), family factors (e.g. family size, type and values, the family milieu, discord; De Los Reyes & Kazdin, 2005), cultural and social group factors (e.g. differences in expectations, level of acceptance, attributions for behaviour, and interpretative frame of reference; Efstratopoulou et al., 2012; Pelham et al., 2005; Stefanos & Baron, 2007), and halo effects (i.e. when the informant's overall perception of the child influences their reports

of the child's behaviour; Nisbett & Wilson, 1977; Nass, 2006). De Los Reyes and Kazdin (2005) linked the aforementioned factors to other theoretical models in accounting for informant discrepancies, for example, actor-observer attribution bias (Jones & Nisbett, 1972) and memory recall bias (Tversky & Marsh, 2000).

Thus, in theory, clinicians must assess the credibility of informants' reports considering the abovementioned biases (e.g. screening for informant depression and stress has been suggested; McConaughy et al., 2010), yet whether this is a practicable endeavour is questionable (Dirks et al., 2012).

Contextual Influences. An alternative explanatory perspective is that of *situational specificity* or setting error variance. Founded in contextualism, this approach holds that, quite simply, children's behaviour varies across environments (Dumenci, Achenbach, & Windle, 2011). As such, the characteristics of the environment shape and maintain the way an individual responds to and behaves within that environment (Merrell, 2000). Based on this, informant discrepancies arise from informants accurately reporting real differences in children's behaviour across settings (Kazdin, 1979; Richters, 1992). Richters (1992) further argued that the observed low to moderate parent-teacher agreement may be indicative of both high agreement on those behaviours that are stable across environments, and poor agreement for those behaviours that are specific to a situation. Thus, this perspective proposes that informant discrepancies reflect meaningful variation in children's behaviour, which should inform assessment and treatment planning (Burns, Walsh, & Gomez, 2003; Dirks et al., 2012).

For children with ADHD, situation specific behaviour is well documented (APA, 2000; Stefanos & Baron, 2007). Some environmental characteristics shown to influence children's behaviour include: the structure of the environment (Stefantos & Baron, 2007), instructional level and task demands/complexity (Burns, 2004), rules and

degree of self-regulation/restraint required (Barkley & Ullman, 1975), rate of stimulation (Antrop, Roeyers, Van Oost, & Buysse., 2000), time of day (Dane, Schachar, & Tannock, 2000), reinforcement contingencies (Solanto et al., 2001), and the ecology of the environment (e.g. noise and surrounding activity by peers; Merrell, 2000). For example, in environments which require sustained attention and provide low stimulation, ADHD symptoms appear exacerbated; whereas, in novel or one-on-one tasks that are highly stimulating, ADHD symptoms typically ameliorate (Antrop et al., 2000). As a consequence, the symptom profile of children with ADHD may differ greatly across the environments examined (Merrell, 2000).

Further support for the role of *situational specificity* in informant discrepancies derives from several lines of research. Firstly, as previously discussed, the level of agreement between informants is higher for those observing children in similar environments (e.g. mother-father and teacher-physical educator) than those in different environments (e.g. parent-teacher; Achenbach et al., 1987). Additionally, stronger agreement between informants in different contexts is associated with increased consistency of interpersonal events experienced by the child across the different environments (Hartley, Zakriski, & Wright, 2011). Secondly, several investigations of the psychometric properties of ADHD rating scales have provided support for the *situational specificity* hypothesis. Gomez (2008, 2007) documented low parent-teacher agreement, yet no differential item functioning for any of the symptoms of ADHD, which the author concluded was indicative of variations in behaviour across contexts, rather than differences in informants' interpretations of symptoms. Moreover, Murray et al. (2007) used internal consistency estimates to support the reliability of both parent and teacher reports of behaviour. Likewise, Burns et al. (2003) showed that ADHD

scales display strong convergent and discriminant validity, despite significant variance across informants, which is suggestive of the *situational specificity* of behaviour.

Overall, there is a considerable amount of empirical support for both the informant and contextual explanatory frameworks. Researchers in this field have proposed that elucidating whether informant discrepancies reflect bias or accuracy, or the conditions under which each effect is precipitated, is of vital importance (De Los Reyes, 2011).

1.8. Informant Discrepancies – Current Best Practice

Cumulatively, this research portrays the marked effects of informant discrepancies in the assessment of ADHD. Yet the literature is fraught with inconsistencies, and, in the absence of formal guidelines, clinicians are left to decide who to ask, which informant is ‘correct’, and what to do with the information received from multiple informants (Valo & Tannock, 2010). Up until now, attempts to reduce informant discrepancies have been unsuccessful. De Los Reyes and Kazdin (2005) reported that efforts to reduce discrepancies (e.g. informational and questioning methods) have been plagued by performance biases. That is, once aware that discrepancies in reporting will be discussed, informants tend to rate the child based on how they believe the other informant will rate the child, rather than providing a true representation of the child’s behaviour (Angold et al., 1987).

Antrop et al. (2002) argued that there are numerous ways to interpret and fulfil the ‘pervasiveness’ criterion (i.e. to demonstrate that a child experiences symptoms and impairment across two or more settings). Several studies have since examined different rules for combining information to fulfil the pervasiveness criterion, with disconcerting results. Several rules for determining presence of the disorder and assigning subtypes

include: the ‘OR’ rule (total number of symptoms reported regardless of informant, e.g., to fulfil the symptom criteria ($\geq$ six symptoms), a parent could report six and a teacher none; alternatively, a parent could report three and a teacher three), the ‘AND’ rule (number of symptoms rated by *both* informants, i.e. parents and teachers must rate six or more symptoms each), and the ‘AND duplicated’ rule (both informants required to concur on a symptom for it to be endorsed, i.e. number of duplicated symptoms must equal six or more). Wolraich et al. (2004) documented the percentage of children meeting criteria as 10% using the AND duplicated rule and 35% using the OR rule. More specifically, this disparity across the different combinational rules was more pronounced for inattentive symptoms (17% of children met criteria for inattentive ADHD using the AND rule and 47% using the OR rule; Wolraich et al., 2004). Moreover, Valo and Tannock (2010) showed that, of a clinical sample, 95% of children met criteria for ADHD using the OR rule, 42% using the AND rule, and 78% based on parent report alone. More prominent was the effect on subtype distribution, where 83% of children were classified as combined-type using the OR rule, compared with 19% using the AND rule (Valo & Tannock, 2010). Interestingly, Malhi et al. (2008) reported that increasing the stringency of criteria for combining multiple informants’ reports increased rates of children in the hyperactive/impulsive subtype (5.8 to 19.3%) and inattentive subtype (15.0 to 28.6%). However, those meeting criteria for combined subtype decreased dramatically (62.8 to 5.9%) with the increased stringency. Thus, the increased stringency of criteria resulted in a wider subtype distribution, relative to the OR rule where majority of children were classified within the combined subtype (Malhi et al., 2008). In summary, at present, strategies for reducing discrepancies and/or methods of combining information from informants are in their infancy. Therefore

clinicians must consider alternate approaches to achieving a holistic and accurate conceptualisation of the child's functioning.

1.9. The Importance of Independent Observations

Clinicians may consider the use of alternative assessment tools, in addition to parent and teacher ratings, to achieve this holistic and accurate conceptualisation of the child's functioning (Barkley, 2003). Of the available tools, direct behavioural observations have demonstrated incremental validity in the assessment of ADHD (Dirks et al., 2012; McConaughy et al., 2010; Volpe, DiPerna, Hintze, & Shapiro, 2005). When faced with informant discrepancies, direct observations provide an external means of validating, or indeed refuting, the reports of informants within a particular context (McConaughy et al., 2010).

Direct observations can be conducted in clinical or research settings (e.g. testing sessions) or in naturalistic settings (e.g. home or school; Volpe et al., 2005). Clinical/research observations are advantageous in that they provide a controlled setting, relatively free from external influences, in which a child's behaviour can be evaluated (McConaughy, 2005). However, as previously discussed, children with ADHD perform better in one-on-one and novel situations, of which the clinical/research setting is both (APA, 2000). Thus, direct observations in these settings may elicit behavioural reactivity, that is, a change in behaviour that deviates from the child's typical functioning, as a result of the novel setting or presence of the clinician (Antrop et al., 2000). In these situations, children may respond to response-contingent encouragement and the non-judgemental approach clinicians are trained to adopt during assessment (McConaughy, 2005). Alternatively, the absence of peers or other distracting stimuli might facilitate on-task behaviour (Burns, 2004). Subsequently,

children with ADHD may behave in a manner considered within the normal range of functioning and thus may be misdiagnosed. Therefore naturalistic observations are recommended for children being assessed for ADHD (Merrell, 2000).

Naturalistic observations may be anecdotal or systematic. Anecdotal observations are distinguished from systematic observations as they have no predefined target behaviours (Volpe & McConaughy, 2005). In contrast, systematic observations are reliant upon a structured, standardised observation, and recording of a series of carefully selected predefined target behaviours which operationalise the construct of interest (Volpe & McConaughy, 2005). Although useful in certain circumstances, anecdotal observations have been criticised as they lack specific operationalised target behaviours, they produce qualitative data for which reliability and validity is not easily established (Volpe & McConaughy, 2005), and they rely heavily on clinical judgement (Mash & Hunsley, 2005). Hence, a number of systematic direct observation systems have been developed, with the aim of minimising clinical judgement and information variance (Anastasi & Urbina, 1997; Rapport, 2005).

With increasing empirical support, these systematic direct observations are fast becoming a part of the assessment repertoire for ADHD, particularly in the school environment (Hintze, 2005). Some researchers have argued that symptoms are more apparent in school settings (DuPaul & Stoner, 2003) and classroom observations are more accurate than their laboratory analogues (Platzman et al., 1992). Furthermore, these observations not only aid diagnosis, but also provide valuable insight into the ecology of the environment (Volpe et al., 2005). Identifying problematic child-environment interactions, and delineating environmental factors that are triggering or maintaining the problem behaviours, have been shown to improve the likelihood of treatment success (Rapport, 2005; Wheeler, Pumfrey, & Wakefield, 2009). In addition,

clearly defined target behaviours and standardised procedures for administration and scoring, render systematic direct observations less susceptible to interference (Volpe & McConaughy, 2005; Hintze, 2005). However, it is cautioned that strict procedures may restrict how much contextual information contributes to the assessment (Wright, Zakriski, Hartley, & Parad, 2011). Furthermore, some observation codes have utilised a nomothetic assessment approach, whereby an individual's behaviours and functioning are interpreted relative to comparable aged peers, either of a normative sample or a peer within the same environment (Volpe & McConaughy, 2005). This approach to assessment allows clinicians to determine how developmentally inappropriate the behaviours are, and when comparing with a peer in the same context, to determine appropriateness whilst controlling for the influence of the environment (Rapport, 2005). It has been argued that, for children with ADHD, this approach may best determine the atypicality of behaviour (Volpe et al., 2005).

Overall, systematic direct observations in naturalistic settings, which employ a nomothetic assessment approach, appear to best capture child-specific and contextual information, whilst maintaining methodological rigour (McConaughy et al., 2010). One such tool is the Behavioural Observation of Students in Schools (BOSS; Shapiro, 2004), which measures a range of academic engagement and non-engagement behaviours relative to a peer in the classroom environment. The BOSS has received considerable empirical support in assessing disruptive behaviour disorders, particularly ADHD (Kofler, Rapport, & Alderson, 2008; Volpe et al., 2005).

1.10. The Present Study

To satisfy the cross-situationality criterion of the diagnostic criteria for ADHD, children must have evidenced symptoms and impairment across multiple settings, for

which current best practice relies on multiple informants to contribute to the assessment process. However, as highlighted in this literature review, informant discrepancies are ubiquitous and have marked implications for assessment, diagnosis, and subsequent intervention. Despite variations in the patterns of reporting, it is well supported that multiple informants, typically parents and teachers, display only low to moderate rates of agreement; however, these effects have not been documented in a NZ context.

Firstly therefore, the present study aimed to describe patterns of reporting ADHD symptoms by parents and teachers of NZ children. The magnitude and directionality of parents' and teachers' reports were compared. Considering the inconsistencies across previous research, the directionality and magnitude were considered exploratory. To further illustrate the pattern of informants' reports, the distribution of diagnostic classifications was compared across informants and methods of combining multiple informant ratings. The levels of comparison included: (1) parent or teacher reports in isolation; (2) parent and teacher reports only, that is where a child is rated as symptomatic by only one informant indicating either home-specific or school-specific problems respectively; and (3) three combinational rules (OR rule, AND rule, AND duplicated rule). Again, for levels (1) and (2) the aim was considered exploratory. However, for (3) it was hypothesised that the differing methods would have substantial effects on the distribution of subtypes. That is, relative to individual informant reports, combinational rules would result in an increased number of children receiving combined subtype diagnoses. Furthermore, across the three combinational rules, it was hypothesised that increasingly stringent criteria would lead to a decrease in the number of children meeting the formal criteria for ADHD and would result in redistribution of children from the combined subtype into the hyperactive/impulsive and inattentive subtypes.

Secondly, this study sought to replicate previous international research examining the patterns of agreement between parents and teachers in a sample of NZ children. This was investigated on three levels of assessment: for overall symptoms, for the core symptom domains (i.e. hyperactive/impulsive and inattentive), and at an individual symptom level. In accordance with previous literature, it was anticipated that parents and teachers would show low to moderate agreement across all assessed levels.

For clinicians to fully consider and navigate the implications informant discrepancies have for assessment and intervention, an understanding of why discrepancies arise is necessary (Dirks et al., 2012). Furthermore, the importance of conducting direct observations as part of the assessment framework was highlighted; therefore a clinician-rated observation (also referred to as the school observation) was included in the present study. The third aim of the study was therefore to explore whether source or contextual effects best explain these discrepancies, through a comparison of the patterns of agreement between parent report, teacher report, and clinician-rated systematic direct observations of children in the classroom setting. Given that the clinician-rated observation was conducted in the classroom, it was hypothesised that the correlation between teacher and school observation would be stronger than those correlations between parent-school observation and parent-teacher. Based on previous literature, this would be suggestive of contextual factors influencing children's behaviour across different settings (i.e. *situational specificity*). If, however, the correlation between teacher-school observation was not significantly stronger than the correlation between parent-school observation, it was hypothesised that contextual factors are unlikely to account for the observed discrepancies; rather *source bias* may be influencing the discrepant reports between informants. These analyses of the pattern of agreement were completed for total symptoms and for the two core symptom domains

(i.e. hyperactivity/impulsivity and inattention). The rationale for this was to determine whether the mechanisms that engendered informant discrepancy differed for the two symptom domains, as determined by the relative strengths of correlations between parent, teacher, and observational data.

In addition to the abovementioned aims, several supplementary analyses addressed the effects of a number of additional variables on parent-teacher agreement, including: medication, child IQ, and the use of an alternative rating scale to assess ADHD symptomology. The effects of stimulant medication on children's behaviour are well established; however, the medication type, dose and timing (e.g. school only), and the child's response to medication varies markedly across children (Faraone & Buitelaar, 2010). Given the medication can alter children's behaviour in specific settings, the analyses were re-run with a subsample of children not taking medication, to determine if the effects of medication influenced agreement between parents and teachers ratings. Related to child IQ, a recent paper by Sollie et al. (2012) documented the effects of IQ on agreement between parents and teachers, whereby children with lower IQs were rated more concordantly by parents and teachers, than children with higher IQs (Sollie et al., 2012). Thus the present study sought to replicate this finding. Related to the use of an alternative rating scale, the rationale for doing so was that there are numerous parent and teacher rating scales available to assess ADHD symptoms and although the key measure, the ADHD Rating Scale, Fourth Edition (ADHD-RS-IV; DuPaul, Power, Anastopoulos, & Reid, 1998) is commonly used, it is not employed ubiquitously in clinical practice. Therefore the analyses of the present study were replicated using an alternative rating scale to determine if the choice of rating scale had any effects on informant agreement.

2. METHOD

2.1. Participants

Fifty five NZ children (i.e. residing in and attending school in NZ) between six and 12 years of age and their families participated in the present study. Participants and their families were recruited from two sources: (1) a pre-existing database within the Department of Psychology at the University of Otago, which provided a record of children with ADHD and their families who had participated in previous research, and had consented to being contacted about future research; and (2) children who were referred from the Southern District Health Board's Paediatric Outpatients and Child and Family Mental Health Services. The present study formed part of a wider study which involved children being assessed for ADHD. Fifty five children who were rated by at least one rater (i.e. parent or teacher) as displaying six or more symptoms were included in Part I, as the full sample for the present study. Of those, 44 children met full criteria for ADHD, as evidenced by cross-situational symptoms and significant impairment as a result of symptoms. Of those 44 children, 41 consented to and completed a clinician-rated school observation. These 41 children were included in Part II, as the subsample for the present study.

Full Sample. Those 55 children who met the inclusion criteria following the diagnostic assessment, included 44 males and 11 females with a mean age of 104.33 months ($SD = 23.67$) and a mean intelligence quotient (IQ) of 89.42 ($SD = 12.36$). Eight children (14.5%) were adopted or living in permanent foster care at the time of the study. Information regarding parents' age, ethnicity, education (highest qualification) and current income was obtained. Demographic data was missing for one mother (1.8%) and six fathers (10.9%). Mothers of the children were aged 27 to 59 years old ($M = 39.29$, $SD = 7.16$). Of these, 78.2% were NZ European, 7.3% were NZ European/

Māori, 5.5% were Māori, 3.6% British, and 1.8% from each of Australian and Chinese ethnicities. The mean highest qualification for mothers was 'NZ seventh form certificate', with a range of 'some high school' to 'postgraduate degree'. The average current income for mothers was between \$15,001 and \$20,000 annually, with a range of \$1-\$5000 to \$70,000-\$100,000 annually. Fathers of children were aged 28 to 63 years of age ($M = 42.02$, $SD = 7.45$). Of these, 74.5% were NZ European, 7.3% British, 3.6% Australian and 1.8% from each of NZ European/Māori and Pasifika ethnicities. The mean highest qualification level for fathers was 'NZ seventh form certificate' with a range of 'some high school' to 'postgraduate degree'. The mean current income for fathers was \$35,001-\$40,000 annually, with a range of \$1-\$5000 to \$100,001 or more.

As concluded by the diagnostic assessment, 44 children (80%) met formal criteria for ADHD and 11 children (20%) displayed significant symptoms, but did not meet full criteria due to lack of cross-situationality or significant impairment. Of those that met full criteria, 19 children were classified as ADHD-predominantly inattentive subtype (34.5%), five as ADHD-predominantly hyperactive/impulsive subtype (9.1%), 17 as ADHD-combined subtype (30.9%); and three as ADHD-not otherwise specified (5.5%). Furthermore, 15 children (27.3%) were taking medication for behaviour management (Ritalin, Rubifen, Concerta, and Methamphetamine). The data from the full sample was used in Part I.

Subsample. Of the 44 children who met formal criteria for ADHD, 41 families consented to and completed a clinician-rated school observation. The data from these families was used in Part II. A full comparison of the descriptive information for the full sample and subsample can be viewed in Appendix D, Table 1.

2.2. Measures

Behavioural Measures

Attention-Deficit/Hyperactivity Disorder Rating Scale-Fourth Edition (ADHD-RS-IV; DuPaul et al., 1998). The ADHD-RS-IV is a measure of ADHD symptomology derived from the DSM-IV-TR diagnostic criteria, which can be completed for the home and school environments. Eighteen symptoms of ADHD are rated by frequency on a four-point likert scale (0. never or rarely, 1. sometimes, 2. often and 3. very often). The informant, either a parent or teacher, rates the frequency of each behaviour, over the past six months within the home or school environment, respectively. The overall score out of 54 is indicative of symptom severity, with higher scores corresponding to greater severity. The score can be divided into hyperactive/impulsive and inattentive symptoms (each out of 27) such that scores within each subtype can be obtained. In accordance with the DSM-IV-TR (APA, 2000) criteria, scores on the ADHD-RS-IV were considered clinically elevated if six or more symptoms were endorsed (rated as a 2. often or 3. very often) in either or both of the symptom domains.

A review of the reliability of the ADHD-RS-IV showed that this rating scale demonstrated strong test-retest reliability (0.78 to 0.86 for home, and 0.88 to 0.90 for school) and internal consistency (0.86 to 0.92; Collett, Ohan, & Myers, 2003). Similar internal consistencies were replicated by Dopfner et al. (2006) with Cronbach's alpha values of 0.81 for inattentive symptoms, 0.87 for hyperactive-impulsive symptoms, and 0.88 for ADHD-RS-IV total score. Examinations of the validity of the ADHD-RS-IV suggest that it displays strong convergent validity with other measures of disruptive behaviour (e.g. Strengths and Difficulties Questionnaire-Hyperactivity Scale, Dopfner et al., 2006; Child Behaviour Checklist, DuPaul et al., 1998) and direct observations of children's behaviour (DuPaul et al., 1998). The discriminant validity of the ADHD-RS-

IV is well established, with the measure successfully discriminating between children with ADHD and non-clinical and clinical control samples (e.g. children with other emotional and global functioning difficulties; Dopfner et al., 1998) and between the subtypes of ADHD (Collett et al., 2003). The sensitivity of the ADHD-RS-IV has been shown to range between 0.83 and 0.84 at home and 0.63 and 0.72 at school, and the specificity was 0.49 for home and 0.86 for school, providing some support for the diagnostic validity of the ADHD-RS-IV (Collett et al., 2003).

Behavioural Assessment System for Children, Second Edition (BASC-2; Reynolds & Kamphaus, 2004). The BASC-2 is a comprehensive measure of both adaptive skills and clinical behaviours displayed by individuals in the home and school environments, as rated by parents and teachers, respectively. Each item was rated on a four-point likert scale (ranging from 0. never to 3. always). For children/adolescents aged six to 21 years, the item scores collectively yield information about fourteen domains of functioning on the parent rating scale (BASC-2-PRS), and fifteen domains of functioning on the teacher rating scale (BASC-2-TRS). Only the Hyperactivity and Attention Problems composite domains were of interest in this study. T-scores and percentiles allowed for interpretation of the composite scores obtained relative to the normative sample (4650 US children for BASC-2-PRS and 4800 US children for the BASC-2-TRS, matched to census data).

The BASC-2 has been described as a reliable and valid instrument for assessing disorders of childhood (Tan, 2007). Estimates of the reliability of the BASC-2 provide information about the test-retest reliability, internal consistency and interrater reliability. For the BASC-2-TRS, internal consistency was found to be in excess of 0.90, test-retest reliabilities between mid 0.80s to low 0.90s and a median inter-rater reliability of 0.56 (Tan, 2007). It was noted that these values varied widely across domains (Tan, 2007).

For the BASC-2-PRS, internal consistency estimates ranged from 0.83 to 0.87, test-retest estimates in the low 0.90s and a median inter-rater reliability of 0.69 (Tan, 2007). The validity of the BASC-2 was also examined in this review. Factor analysis revealed high loadings on the composite domains and the contributing subscales, supporting the construct validity of the BASC-2 (Tan, 2007). Evidence for the concurrent validity of the BASC-2 appears variable; however, moderate correlations have been shown with the Children's Depression Inventory, the Minnesota Multiphasic Personality Inventory, and the Connors Rating Scales (Tan, 2007). Both the discriminant and diagnostic validity were well supported for assessing ADHD (Tan, 2007).

Behavioural Observation of Students in Schools (BOSS; Shapiro, 2004). The BOSS is a clinician-rated systematic direct observation system designed specifically for use in a classroom setting. It utilises a momentary time sampling procedure to code academic engagement or non-engagement over a defined time period. Academic engagement behaviours are defined as those in which the individual is on-task (Shapiro, 2004), and can be further delineated as the categories of active or passive engagement behaviours. Academic non-engagement is characterised by off-task behaviours (Shapiro, 2004). Three categories of off-task behaviour were coded: off-task motor, which represented motor activity not associated with the academic task; off-task verbal, which represented any audible verbalisations not associated with the academic task; and off-task passive, which represented any behaviour that was passive but persisted for more than three seconds (e.g. staring out the window, looking around the room). The BOSS uses a partial interval method, where the target child's behaviour was rated every 15 seconds on all of the five categories of behaviour. Every fifth interval the behaviour of a typically developing peer is coded (the comparison child) rather than the target child. This allows for a nomothetic assessment approach, where the data of the typically

developing child serves as the norm to which comparisons with the target child are made to determine the atypicality of the target child's behaviour within the specific environment. Raw scores of behaviours in each category are converted into percentages of the time observed, and can be interpreted relative to the comparison child and/or summed for academic engagement and non-engagement. A high score on the non-engagement domain is indicative of more severe off-task behaviour.

In a review of observational schemes, the BOSS was highly recommended for observing children with ADHD and other disruptive behaviour disorders (Volpe et al., 2005). It was reasoned that the nomothetic approach gives the clinician greater understanding of the influence of the specific environment in determining whether the behaviours are atypical (Rapport, 2005). The psychometric properties of direct observation tools are not well researched; however Volpe et al. (2005) have provided some support for the psychometric properties of the BOSS. The inter-observer reliability was considered to be very high, with agreement rates ranging between 0.90 and 1.0, which was especially important for the present study as there were multiple observers. Evidence for treatment sensitivity, suggested that the BOSS was able to successfully discriminate between children with disruptive behaviour problems and their typically developing peers (Volpe et al., 2005). Specific to ADHD, DuPaul et al. (2004) provided support for the discriminant validity of the BOSS, with effect sizes between 0.53 and 1.28 shown in discriminating children with ADHD and from their typically developing peers.

Children's Problems Checklist (CPC). The CPC is an eight item checklist designed as a brief screening tool for assessing impairment in young children with ADHD (Healey, Miller, Castelli, Marks, & Halperin, 2008). The parent and teacher versions of the CPC assessed behavioural disruption, peer and adult social relationships,

self-esteem, organisation, task completion, and occurrence of accidents (Healey et al., 2008). Parents and teachers rated whether each of the eight behaviours was considered problematic for their child, and if so, to define the severity of the problem (1. mild, 2. moderate or 3. severe). The total score gave an indication of the level of impairment that the child was experiencing as a result of their ADHD symptoms, with higher scores indicative of greater impairment.

Kiddie-Sads-Present and Lifetime Version (K-SADS-PL; Kaufman, Birmaher, Brent, Rao & Ryan, 1996). The K-SADS-PL is a comprehensive semi-structured diagnostic interview based on the DSM-IV-TR diagnostic criteria for disorders of childhood. Those sections of the K-SADS-PL used in the present study included: the school adaptation and social relations form, and the ADHD screener and supplement. Across each scale, individual items were rated by a specifically trained researcher on a four-point likert scale (0. no information present; 1. behaviour not present; 2. sub-threshold; and 3. threshold) based on parent-reported frequency, intensity, and impairment associated with each symptom. The research supervisor, a PhD-level Clinical Psychologist, went through the ratings with the researcher. The teacher ratings, impairment ratings, and (when available) the results of the clinician-rated school observation were taken into account when determining the summary score for each symptom. The summary scores were totalled to determine whether or not the diagnostic criteria were met. For children that received a diagnosis of ADHD, subtypes were also assigned based on the number of symptoms endorsed in each domain. Multiple informants reports of symptoms were combined in accordance with the DSM-IV field trials (using the OR rule, i.e. number of symptoms regardless of informant; Lahey et al., 1994).

Empirical research examining the psychometric properties of the K-SADS-PL is relatively scarce. Initial reliability and validity assessments were conducted by Kaufman et al. (1997). In this study, the K-SADS-PL demonstrated test-retest reliability (0.63), inter-rater reliability (0.93-1.00) and showed good concurrent validity with the Connors Rating Scale, ADHD subtest. More recently, the reliability and validity of the K-SADS-PL was tested on a sample of Korean children. In this study, Kim et al. (2004) showed agreement rates for the DSM-IV-TR diagnosis of ADHD between a group of psychiatrists and the K-SADS-PL gave a kappa value of 0.69. The diagnostic validity was also supported with a sensitivity of 0.77 and a specificity of 0.95 (Kim et al., 2004). In terms of reliability, kappa values for the inter-rater reliability (0.42) and test-retest reliabilities (0.76) fell within the fair and excellent ranges respectively (Kim et al., 2004). For concurrent validity, scores for behaviour and attentional problems assigned using the K-SADS-PL showed significant positive correlations with scores on the Child Behaviour Checklist (Kim et al., 2004).

Cognitive Measures

Wechsler Intelligence Scale for Children, Fourth Edition (WISC-IV, Australian Adaptation; Wechsler, 2003). The WISC-IV is comprised of ten subtests which provide information about four domains or indices of functioning; verbal comprehension, perceptual reasoning, working memory and processing speed. When combined, these domains give an indication of a child's general level of cognitive functioning (Full Scale Intelligence Quotient, FSIQ), relative to comparable age peers from the normative sample of Australian/American children. In the present study, the FSIQ values were used as a measure of the child's overall intellectual functioning.

In a summary report completed by Pearson Assessments, publishers of the WISC-IV, the authors cited evidence for its reliability and validity (Psychological

Corporation, 2003). In terms of reliability, internal consistency, as measured using the split-half method, ranged from 0.88 to 0.97 for composite scores and FSIQ, the test-retest reliability was moderate to high across age groups (some practise effects were documented), and the four-factor structure was supported using confirmatory and exploratory factor analysis. For validity, WISC-IV scores were strongly correlated with performance on nine other childhood assessment measures (e.g. WISC-III, ABAS-II, WIAT-II, and Children's Memory Scale etc; for a complete summary see WISC-IV Technical Report 2; Psychological Corporation, 2003). Taken together these findings are supportive of the psychometric properties of the WISC-IV. However, no independent reviews of the psychometric properties of the WISC-IV were available to substantiate these findings.

2.3. Procedure

Researcher Training. Prior to participant recruitment, the researchers, all of whom were students completing a postgraduate diploma in clinical psychology, were required to demonstrate standardised administration with all test measures, to ensure competency. Each researcher was assessed administering the WISC-IV and K-SADS-PL diagnostic interview and the BOSS school observation, by a PhD-level registered Clinical Psychologist. For the BOSS, acceptable inter-observer agreement was required prior to conducting the school observations. To establish the level of inter-observer agreement, unweighted kappa statistics (Cohen, 1960) were calculated over a 30-minute observation (120 intervals, 6 categories) between the primary researcher and the two secondary researchers. Kappa values of 0.90 and 0.84 were reported. Interpreted in accordance with Viera and Garrett (2005), these values fall within the range of *almost perfect* agreement.

Initial Contact with Participants. Initial contact differed depending on the method of recruitment. Those children and families who were recruited from the University research database were contacted by telephone. Researchers informed the family about the study, outlined involvement, and invited the family to participate. Those families referred from Paediatrics or Child and Family Mental Health Services were given the contact details of the researchers involved in the study by their Paediatrician or other health professionals. It was left at the family's discretion to contact the researchers. Once families had registered to participate they were sent an information pack.

Information packs contained participant information and consent forms, a behavioural observation consent form, and parent rating scales (ADHD-RS-IV home version, BASC-2 parent version, and Children's Problems Checklist parent version). Copies of the parent and child information sheets and consent forms are provided in Appendices A and B respectively. Once the formal consent forms were completed, parents were requested to fill out the parent rating scales, as per the instructions on the top of each rating scale. If a child had been prescribed medication, parents were asked to rate their child off medication. Once completed, the families were asked to return the consent form and parent rating scales, in the envelope provided, to the Department of Psychology, University of Otago.

The parent information pack also included a teacher information pack for the parent to pass on to the child's teacher. The teacher information pack included: information about the study, a copy of the parent signed consent form for the teacher, a return envelope, and the teacher rating scales (ADHD-RS-IV school form, BASC-2 teacher version, and the Children's Problems Checklist teacher version). Included in the information sheet were instructions for completing the rating scales, and guidelines for

rating the child off medication. Teachers were requested to complete all forms and return them to the Department of Psychology, University of Otago in the envelope provided.

After sending out the information packs, the researchers made a follow up phone call to each family to ensure that they had received the package and to answer any questions concerning the study or rating scales. At this time, an appointment was also scheduled for the child's cognitive assessment and the K-SADs diagnostic interview with the parents. During the appointment, which lasted for three hours, the child completed the WISC-IV assessment among other tasks (only the WISC-IV data was used in the present study). At the same time, the parent was interviewed on the relevant sections of the K-SADs (the school adaptation and social relations form and ADHD screener and supplement) and on additional sections that were relevant to the larger study (Oppositional Defiant Disorder and Conduct Disorder screeners and supplements). After the interview the parent completed a number of additional questionnaires (not included in the present study). Following their appointment, parents received a \$40 petrol voucher and children received a \$10 toy or movie voucher in recognition of the time spent and travel costs involved in participating in the study.

School Observation. If consent for a school observation was granted, a different researcher, who had not had any contact with the family nor been involved with the abovementioned assessment appointment, contacted the child's school. This was so that the child would not know the person nor be aware that their behaviour was being observed. The researcher first contacted the principal to discuss the study and how best to contact the child's teacher, and to gain permission to enter the school. The child's teacher was then contacted to request permission to visit the classroom and complete a 30 minute school observation during an academic subject, at a time that best suited the

teacher. Each teacher was informed that the child was unaware that he/she was being observed, and to protect the privacy of the child, the teacher was asked to introduce the researcher as a student from the University of Otago who was there to observe the class.

Immediately prior to the observation, the researcher met with the teacher to identify the target child and a typically developing peer for the comparison analyses. During the observation, the researcher sat in an unobtrusive position within the classroom that allowed them to see and hear the identified children. Each observation was conducted in accordance with the BOSS guidelines (Shapiro, 2004), where the behaviour of the target child was coded every fifteen seconds, and, at every fifth interval, the behaviour of the peer was also coded. The observation was followed up, either directly after the observation or with a phone call to the teacher, to discuss the typicality of the classroom environment and the behaviour of the child and peer during the observation. If particularly atypical, the researcher requested to conduct another observation and this data was then used.

Ethical Approval. The present study was reviewed and accepted by the Lower South Regional Ethics Committee and the University of Otago Human Ethics Board, as part of an ongoing wider study. Duplicates of the ethical approval letters are included in Appendix C.

2.4. Data Analysis

The present study used a within subjects correlational design. T-tests were used to compare ratings from the different informants. Pearson product moment correlations were used to establish the relations between parent and teacher ratings and, in the subsample, the relations between both informants' reports and the clinician-rated school observation data. Kappa statistics were used to determine the magnitude of agreement

between informants. Several additional analyses involved replication of the correlational data with: (1) a subsample of children who were not taking medication; (2) the samples split into higher and lower child IQ groups; and (3) using an alternative measure of ADHD symptomology (the BASC-2).

3. RESULTS

The present study included analyses using the full sample of children and a subsample of children for whom a clinician-rated school observation was completed. Considering this, the results are presented in two parts: Part I includes those analyses completed using the full sample ($n = 55$) and Part II includes those analyses using the subsample ($n = 41$).

PART I – Full Sample

3.1. Pattern of Parent and Teacher Rated Symptoms of ADHD

In order to assess the relation between the reporting of ADHD symptoms by parents and teachers, t-tests were conducted and an analysis of the distribution of diagnostic classifications based on different informants' reports was carried out.

3.1.1. Descriptives

Paired samples t-tests were used to assess the differences between parent and teacher ratings of children's ADHD symptoms. As displayed in Table 2, parents rated significantly more total symptoms than teachers ($t(54) = 2.66, p < .01$). To further delineate the patterns of reporting by informants, t-tests were conducted for the core symptom domains (hyperactive/impulsive and inattentive) and for the individual symptoms, of which the results are also presented in Table 2. For hyperactive/impulsive symptoms, parents rated significantly more symptoms than teachers ($t(54) = 3.07, p < .01$). There was no significant difference between parent and teacher ratings of inattentive symptoms. However, the difference was approaching significance and the pattern is suggestive of teachers reporting fewer symptoms than parents. Of the individual symptoms, significant differences were found between parent and teacher ratings for five of the nine hyperactive/impulsive symptoms and five of the nine

inattentive symptoms. For all observed differences, parents rated symptoms significantly higher than teachers. Overall, there appears to be a trend towards parents rating children as more symptomatic than teachers.

Table 2.

Full Sample - Paired-samples t-tests comparing parent and teacher reports of children's ADHD symptoms, based on ADHD-RS-IV symptom ratings

	Parent Ratings Mean (SD)	Teacher Ratings Mean (SD)	<i>t</i> (54)	<i>P</i>
<i>Total Symptom Scores</i>	33.60 (12.32)	28.11 (12.72)	2.66	.010*
<i>Symptom Domain Scores</i>				
Hyperactive/Impulsive symptoms	15.75 (7.16)	12.51 (7.54)	3.07	.003**
Inattentive symptoms	17.85 (6.24)	15.60 (6.72)	1.92	.060
<i>Individual Symptom Scores</i>				
<i>Hyperactive/impulsive symptoms</i>				
Fidgets	2.09 (.928)	1.93 (1.034)	0.894	.375
Leaves seat	1.56 (1.050)	1.49 (1.120)	0.531	.598
Runs /climbs	1.35 (1.092)	0.80 (1.078)	3.464	.001**
Play quietly	1.49 (1.034)	1.27 (1.062)	1.318	.193
On the go	1.75 (1.109)	1.11 (1.212)	3.641	.001**
Talks excessively	1.95 (1.044)	1.49 (1.052)	3.155	.003**
Blurts out	1.55 (1.119)	1.35 (1.126)	1.108	.273
Taking turns	1.87 (1.055)	1.44 (1.050)	2.634	.011*
Interrupts	2.15 (.911)	1.64 (1.060)	2.962	.005**
<i>Inattentive symptoms</i>				
Careless mistakes	.193 (.858)	1.96 (.881)	-2.860	.776
Sustained attention	1.89 (.956)	2.11 (.896)	-1.352	.182
Doesn't listen	1.89 (.854)	1.44 (.938)	2.709	.009**
Instructions	2.04 (.816)	1.78 (.896)	1.608	.114
Organising	1.89 (.975)	1.75 (.865)	0.832	.409
Avoids tasks	2.02 (1.063)	1.55 (1.102)	2.720	.009**
Loses things	1.82 (.983)	1.40 (1.029)	2.384	.021*
Distracted	2.47 (.716)	2.16 (.834)	2.077	.043*
Forgetful	1.91 (1.023)	1.45 (1.015)	2.304	.025*

3.1.2. Distribution of subtype classifications across informants

To illustrate the implications of multiple informant reporting, diagnostic classifications were assigned solely on the parent and/or teacher rated symptom frequencies on the ADHD-RS-IV. This analysis is depicted in Table 3. It is important to

note that these classifications are not reflective of the diagnoses that would be assigned through a more comprehensive diagnostic assessment.

Diagnostic classifications were assigned in a number of stages. Firstly, parent and teacher ratings were considered in isolation. Secondly, to distinguish those children where only one informant rated them as symptomatic, the ‘only’ categories were calculated. Finally, to test methods of establishing cross-situationality, diagnostic classifications were assigned using three different rules for combining parent and teacher ratings: (1) OR rule, $\geq$ six symptoms regardless of informant; (2) AND rule, $\geq$ six symptoms by *both* informants (i.e. both parents and teachers are required to rate the child as displaying six or more symptoms); and (3) AND duplicated rule, $\geq$ six duplicated symptoms. Duplicated symptoms are those symptoms that *both* informants endorse (i.e. parent and teacher must both rate a symptom for it to be endorsed). It should be noted that the inclusion criteria for the study’s full sample dictated that a child must be rated as symptomatic ($\geq$ six symptoms endorsed within a subtype) by at least one informant, rather than requiring the child to meet full criteria for ADHD.

Of the 55 participating children, three were rated by parents as hyperactive/impulsive and four by teachers. Of these seven children, one child was rated by parent only and two children were rated by teacher only. When combining informant ratings, three children were rated by parents and teachers as collectively displaying six or more hyperactive/impulsive symptoms (OR rule), four as symptomatic by both informants (AND rule), and four children when informants were required to endorse the same symptoms (AND duplicated rule).

Of the 55 participating children, ten were rated by parents as inattentive and twelve were rated by teachers as inattentive. Of these 22 children, seven were rated as displaying six or more inattentive symptoms by parent only and four by teacher only.

When combining informant ratings, 16 children were rated by parents and teachers as collectively displaying six or more inattentive symptoms (OR rule), eight as symptomatic by both informants (AND rule), and seven children when informants were required to endorse the same symptoms (AND duplicated rule).

For combined subtype, characterised by six or more symptoms in both domains, 26 children were rated by parents and 15 children were rated by teachers. Of these 41 children, 15 were rated by parent only, four by teacher only, and 11 by both parent and teacher. When combining informant ratings, 28 children were rated by parents and teachers as collectively displaying six or more hyperactive/impulsive and inattentive symptoms (OR rule), 11 as symptomatic by both informants (AND rule), and eight children when duplicated symptoms were required (AND duplicated rule).

Overall, more children reached symptom threshold based on parent report than teacher report. However, on closer examination, it appears that this effect is predominant for the combined subtype, and children were more likely to be rated by teachers as falling within the hyperactive/impulsive and inattentive subtypes. Moreover, in many cases the symptoms reported were not corroborated by the other informant, as illustrated by the ‘only’ categories. Finally, for combining parent and teacher ratings, the proportion of children falling into each diagnostic category varied as a result of the rule chosen. Again, this is especially evident for determining if children fall within the combined subtype and to a lesser degree, the inattentive subtype. There was a general trend towards less children meeting criteria for each diagnostic category as the stringency of the combinational rule increased (i.e. OR rule to AND rule to AND duplicated rule). One exception to this was children classified as hyperactive/impulsive subtype using the OR rule, which was fewer than children classified using either of the AND rules.

Table 3.

Full Sample - Distribution of diagnostic classifications based on parent, teacher and different combinational rules for ratings of ADHD symptoms

ADHD diagnosis	Informant and/or combinational rule for determining diagnostic classification						
	Parent (≥ 6 parent)	Teacher (≥ 6 teacher)	Parent only (parent ≥ 6 , teacher < 6)	Teacher only (teacher ≥ 6 , parent < 6)	OR rule ($6 \geq$ total, from either informant)	AND rule ($6 \geq$ from both)	AND duplicated rule ($6 \geq$ from both)
H/I Subtype	3	4	1	2	3	4	4
I Subtype	10	12	7	4	16	8	7
C Subtype	26	15	15	4	28	11	8
Total	39	31	23	10	47	23	19

Note: H/I – hyperactive/impulsive subtype, I – inattentive subtype, C – combined subtype

3.2. Parent and Teacher Agreement when Rating the Symptoms of ADHD

The relations and level of agreement between parents and teachers were analysed for: (1) total number of symptoms endorsed; (2) total number of hyperactive/impulsive and inattentive symptoms endorsed; and (3) on an individual symptom level, using Pearson product moment correlations and kappa statistics. Kappa statistics were interpreted as representing *less than chance* for values < 0 , *slight agreement* for values 0.01 to 0.20, *fair agreement* for values 0.21 to 0.40, *moderate agreement* for values 0.41 to 0.60, *substantial agreement* for values 0.61 to 0.80, and *almost perfect agreement* for values 0.81 to 0.99 (Viera & Garrett, 2005).

3.2.1. Parent and teacher agreement for total, hyperactive/impulsive, and inattentive symptom scores

As displayed in Table 4, there was a significant positive correlation between the total number of symptoms endorsed by parents and teachers ($r = 0.251, p < .05$). This suggests that as the number of parent-rated symptoms increases, so too does the number of teacher-rated symptoms. The kappa statistic of 0.292 was indicative of *fair agreement* between parent and teacher ratings. Similarly, for hyperactive/impulsive symptoms there was also a significant positive correlation between parent and teacher ratings ($r = 0.435, p < .01$). This suggests that higher parent-rated hyperactivity/impulsivity was associated with higher teacher scores within the same domain. The kappa statistic of 0.356 was also indicative of *fair agreement*. In contrast, the correlation between parent-rated and teacher-rated inattention was not significant ($r = 0.099, p = .236$). A kappa statistic of 0.096 fell within the range of *slight agreement*. Considering this pattern of findings, it is likely that the parent-teacher concordance for hyperactive/impulsive symptoms is driving overall agreement (i.e. for total symptoms), rather than inattentive symptoms.

Table 4.

Full Sample - Correlations between parent and teacher ratings of hyperactive/impulsive, inattentive and total symptoms on the ADHD-RS-IV

	ADHD-RS Parent H/I Symptoms	ADHD-RS Teacher H/I Symptoms	ADHD-RS Parent I Symptoms	ADHD-RS Teacher I Symptoms	ADHD-RS Parent Total Symptoms	ADHD-RS Teacher Total Symptoms
ADHD-RS Parent Hyperactive/Impulsive (H/I) Symptoms	1	0.435**	0.689**	0.151	0.930**	0.337**
ADHD-RS Teacher Hyperactive/Impulsive (H/I) Symptoms	0.435**	1	0.094	0.591**	0.300*	0.905**
ADHD-RS Parent Inattentive (I) Symptoms	0.689**	0.094	1	0.099	0.907**	0.108
ADHD-RS Teacher Inattentive (I) Symptoms	0.151	0.591**	0.099	1	0.138	0.878**
ADHD-RS Parent Total Symptoms	0.930**	0.300*	0.907**	0.138	1	0.251*
ADHD-RS Teacher Total Symptoms	0.337**	0.905**	0.108	0.878**	0.251*	1

* Correlation is significant at the 0.05 level (1-tailed)

** Correlation is significant at the 0.01 level (1-tailed)

3.2.2. Parent and teacher agreement at an individual symptom level

To assess the magnitude of the relationship between parent and teacher ratings of individual ADHD symptoms, Pearson product moment correlations and kappa statistics were calculated. As depicted in Table 5 for hyperactive/impulsive symptoms and Table 6 for inattentive symptoms, significant positive correlations were found for six hyperactive/impulsive symptoms (3. runs/climbs, 4. difficulties playing quietly, 5. on the go, 6. talks excessively, 7. blurts out, and 8. difficulties taking turns) and two inattentive symptoms (1. careless mistakes and 6. avoids tasks). These findings indicate that for certain symptoms, parent and teacher ratings were found to be associated; whereas, for others they were not. Parent-teacher agreement fell within the *fair agreement* range for three hyperactive/impulsive symptoms, *slight agreement* range for five symptoms, and one symptom fell within the *less than chance* range. Agreement for all inattentive symptoms fell within the *slight agreement* or *less than chance* ranges. Thus, despite there being a relationship between parent and teacher ratings, the strength of the relationship varied across the symptoms rated. Overall, it appears that parent-teacher agreement is stronger for hyperactive/impulsive rather than inattentive symptoms.

Table 5.

Full Sample - Correlations between parent and teacher ratings of hyperactive-impulsive symptoms on the ADHD-RS-IV

Parent Ratings	Teacher Ratings								
	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Fidgets	0.046								
2. Leaves seat		0.563**							
3. Runs /climbs			0.421**						
4. Play quietly				0.314**					
5. On the go					0.379**				
6. Talks excessively						0.480**			
7. Blurts out							0.289*		
8. Taking turns								0.318**	
9. Interrupts									0.171

* Correlation is significant at the 0.05 level (1-tailed)

** Correlation is significant at the 0.01 level (1-tailed)

Table 6.

Full Sample - Correlations between parent and teacher ratings of inattentive symptoms on the ADHD-RS-IV

Parent Ratings	Teacher Ratings								
	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Careless mistakes	0.413**								
2. Sustained attention		0.166							
3. Doesn't listen			0.037						
4. Instructions				0.062					
5. Organising					0.010				
6. Avoids tasks						0.292*			
7. Loses things							0.165		
8. Distracted								-0.008	
9. Forgetful									-0.031

* Correlation is significant at the 0.05 level (1-tailed)

** Correlation is significant at the 0.01 level (1-tailed)

3.3. Additional Analyses for the Full Sample

A number of supplementary analyses were completed to examine the effects of medication, child IQ, and an alternative rating scale on the relations between parent and teacher ratings using the full sample. The results of which are briefly discussed below.

3.3.1. Controlling for medication status

Considering the evidenced behavioural changes of children taking stimulant medication (Faraone & Buitelaar, 2010), the relations between parent and teacher ratings were rerun in a subsample of children who were not taking medication for ADHD ($n = 40$; see Appendix E, Table 10). The majority of findings remained consistent with the abovementioned analyses. However, while the direction of the correlation stayed the same, the relation between parent and teacher ratings of total symptoms was no longer significant, which is likely due to reduced sample size.

3.3.2. The effects of child IQ on agreement

Given the recently documented effects of child IQ on informant agreement, the abovementioned analyses were rerun with the sample divided into two groups based on the child's IQ ($IQ < 85$ ($n = 20$; $M = 77.35$, $SD = 7.25$) and $IQ \geq 85$ ($n = 35$; $M = 96.31$, $SD = 8.87$)). The results of these analyses are depicted in Tables 11 and 12 of Appendix E. For those children with IQ scores at or above 85, parent-teacher agreement on total symptoms was not significant, and is indicative of no relationship between informants' reports. For hyperactive/impulsive symptoms, parent-teacher agreement was significant; whereas, for inattentive symptoms, parent and teacher ratings were not significantly correlated. These findings were consistent with the full sample. For those children with IQ scores below 85, correlations between parent-rated and teacher-rated total symptoms and hyperactive/impulsive symptoms remained significant. The correlation between parent and

teacher rated inattention remained non-significant. Overall, these results suggest that parent-teacher agreement is higher for children with IQ scores that fall more than one standard deviation below the mean (i.e., below 85).

3.3.3. Symptom ratings using BASC-2

Given that clinicians use a variety of assessment measures to assess ADHD, the abovementioned primary analyses were replicated with the BASC-2, another commonly used measure of child psychosocial functioning (see Appendix E, Table 13). The majority of the analyses using the BASC-2 data showed patterns analogous to those using the ADHD-RS-IV. However, a significant positive correlation was found between parent-rated and teacher-rated attention problems ($r = 0.252, p < .05$), whereas no significant correlation was found using the ADHD-RS-IV ($r = 0.099, p = .236$). This suggests stronger parent-teacher agreement on inattentive symptoms using the BASC-2.

PART II – Subsample

3.4. Parent, Teacher and Clinician Agreement, using Observations of Children's Behaviour in the Classroom

The following analyses were conducted with the subsample ($n = 41$) of children who received a diagnosis of ADHD using the KSADs summary score and therefore for whom a school observation was completed. To investigate the possible mechanisms underlying differences in parent and teacher symptom ratings, Pearson product moment correlations were calculated between parent and teacher ratings on the ADHD-RS-IV and clinician-rated school observations using the Behavioural Observation System for Schools (BOSS). The results are presented in Table 7 for total ADHD symptoms, Table 8 for hyperactive/impulsive symptoms, and Table 9 for inattentive symptoms.

3.4.1. Total symptoms of ADHD

Consistent with the results of the full sample, a significant positive correlation was found between parent and teacher overall ratings within this subsample (see Table 7). There was a significant positive correlation between teacher-rated total symptoms and BOSS-total off-task behaviour. This is indicative of concordance between the teacher ratings and the school observation, where high teacher ratings are associated with increased clinician observed off-task behaviour in the classroom. Comparatively, there was no significant correlation between parent ratings of total ADHD symptoms and the school observation.

Table 7.

Subsample - Correlations among informants' ratings of children's total ADHD symptoms, based on parent and teacher ADHD-RS-IV symptom ratings, and clinician rated total off-task behaviour on the BOSS (i.e., motor, verbal, and passive off task behaviour)

	ADHD-RS - Parent Total Symptoms	ADHD-RS - Teacher Total Symptoms	BOSS - Clinician Total Rating
ADHD-RS - Parent, Total Symptoms	1	0.366**	0.072
ADHD-RS - Teacher, Total Symptoms	0.366**	1	0.264*
BOSS - Clinician, Total Rating	0.072	0.264*	1

* Correlation is significant at the 0.05 level (1-tailed)

** Correlation is significant at the 0.01 level (1-tailed)

3.4.2. Hyperactive/impulsive symptom ratings

As illustrated in Table 8, there were significant positive correlations between both parent and teacher ratings of hyperactive/impulsive symptoms and the BOSS-hyperactive/impulsive score. This suggests that higher ratings, both by parent and teacher, were associated with increased clinician observed off-task behaviour that was indicative of hyperactivity/impulsivity in the classroom.

Table 8.

Subsample - Correlations among informant reports of children's hyperactive/impulsive symptoms, based on ADHD-RS-IV symptom ratings

	ADHD-RS - Parent H/I Symptoms	ADHD-RS - Teacher H/I Symptoms	BOSS - Clinician H/I Rating
ADHD-RS - Parent, H/I Symptoms	1	0.571**	0.309*
ADHD-RS - Teacher, H/I Symptoms	0.571**	1	0.353*
BOSS - Clinician H/I Rating	0.309*	0.353*	1

* Correlation is significant at the 0.05 level (1-tailed)

** Correlation is significant at the 0.01 level (1-tailed)

Note: H/I – Hyperactive/Impulsive

3.4.3. Inattentive symptom ratings

As shown in Table 9, no significant correlations were found between parent, teacher, and the clinician-rated BOSS-inattentive scores, indicating high variability among the raters.

Table 9.

Subsample - Correlations among informant reports of inattentive symptoms, based on ADHD-RS-IV symptom ratings

	ADHD-RS - Parent I Symptoms	ADHD-RS - Teacher I Symptoms	BOSS - Clinician I Rating
ADHD-RS - Parent, I Symptoms	1	0.145	-0.079
ADHD-RS - Teacher, I Symptoms	0.145	1	0.077
BOSS - Clinician I Rating	-0.079	0.077	1

* Correlation is significant at the 0.05 level (1-tailed)

** Correlation is significant at the 0.01 level (1-tailed)

Note: I – Inattentive

3.5. Additional Analyses for the Subsample

3.5.1. Medication status

As with the full sample, the analyses conducted in Part II were replicated in a subsample of children who were not taking medication for ADHD (refer to Appendix F, Table 14). In contrast to the abovementioned analyses, for those children not taking medication, there were no significant correlations between parent or teacher total symptoms and BOSS-total, or teacher-rated hyperactivity/impulsive symptoms and BOSS-hyperactive/impulsive. Again, given that the patterns remained the same, this may be due to reduced sample size. Interestingly, parent-rated hyperactivity/impulsive symptoms remained correlated with BOSS-hyperactive/impulsive.

3.5.2. The effects of IQ on agreement

As with the full sample, the analyses conducted for the subsample in Part II were reproduced for the two IQ groups (IQ < 85 ($n = 14$, $M = 76.79$, $SD = 7.84$) and IQ ≥ 85 ($n = 27$, $M = 95.52$, $SD = 70.41$)). The findings are presented in Appendix F, Tables 15 and 16. Parent total scores were not significantly correlated with BOSS-total for either IQ group. However, the magnitude of the relationship was stronger for those children with IQ scores of 85 or above, and this was approaching significance ($r = 0.294$, $p = .069$, relative to the subsample where $r = 0.072$, $p = .327$). Teacher total scores were not significantly correlated with BOSS off-task total scores for either IQ group. However, for children with IQ scores at or above 85 the magnitude of the relationship was similar, and for children with IQ scores below 85, the magnitude increased ($r = 0.340$, $p = .117$, relative to the subsample where $r = 0.264$, $p = .048$). Therefore, the reduced sample size may have impacted on the significance of these findings.

Consistent with the full sample results, significant positive correlations between parent and teacher ratings of hyperactive/impulsive symptoms were found for both IQ

groups. Likewise, correlations for inattentive symptoms across both IQ groups remained non-significant. For children with IQ scores below 85, a significant positive correlation was found between BOSS-hyperactive/impulsive and teacher-rated hyperactivity/impulsivity, which was consistent with the subsample. In contrast, the correlation between parent-rated hyperactivity/impulsivity and BOSS-hyperactive/impulsive was not significant. Given the difference in the magnitude of the correlations ($r = 0.051, p = .432$ compared with $r = 0.309, p = .025$ for the subsample), this is not likely due to reduced sample size. Despite remaining non-significant, the magnitude of the relationship between parent-rated inattention and BOSS-inattention was markedly different ($r = -0.329, p = .125$ relative to $r = -0.079, p = .312$). For children with IQ of 85 or above, the correlation between parent-rated hyperactivity/impulsivity and BOSS-hyperactive/impulsive was also not significant. Again this was unlikely to be due to sample size, considering the difference in the magnitude of correlations ($r = -0.088, p = .332$, compared with $r = 0.309, p = .025$ for the subsample).

3.5.3. Symptom ratings using BASC-2

When the BASC-2 was substituted in the subsample analyses, the same pattern was observed as with the ADHD-RS-IV. Of note, the correlation between parent-rated and teacher-rated inattentive symptoms was not significant. However, considering the similar magnitudes of the correlations between the subsample ($r = 0.246, p = .060$) and full sample ($r = 0.252, p = .032$), this may be accounted for by reduced sample size. See Appendix F, Table 17 for a copy of the full results.

4. DISCUSSION

The present study sought to broaden the understanding of the patterns of agreement between different informants' ratings of children's symptoms of ADHD. In endeavouring to achieve this, three specific aims were addressed using a number of methods of analysis. The findings are discussed below.

4.1. Pattern of Parent-rated and Teacher-rated Symptoms of ADHD

The first aim of the present study sought to describe the patterns of reporting ADHD symptoms by parents and teachers of NZ children, through comparison of the frequencies of symptoms reported and the distribution of diagnostic classifications across informants. It was hypothesised that variability across informants would be evident; however, given the inconsistencies across previous research studies, the magnitude and directionality were considered exploratory hypotheses. Paired samples t-tests and an analysis of the distribution of diagnostic classifications based on individual and combined informant reports were used to address this aim.

Significant differences were found between parent and teacher ratings of total symptoms of ADHD, hyperactive/impulsive symptoms, and for 10 of the 18 individual symptoms. Across all observed differences, parents rated children as more symptomatic than teachers. This finding is consistent with recent research (Gomez, 2007; Malhi et al., 2008, Murray et al., 2007; Rettew et al., 2011; Sollie et al., 2012). One possible explanation for this pattern may be referral bias. Previous research has shown that clinical referrals are more frequently sought by parents than teachers (Antrop et al., 2000). Mash and Hunsley (2005) stated that parents are typically more invested in their child's long-term outcomes and subsequently may seek assessment as means to achieve access to interventions, funding and support services which might improve their outcomes (Mash & Hunsley, 2005). Sayal and

Goodman (2009) found that parental investment in the referral led to increased ratings during the assessment. In light of this, and considering that the present study's sample was predominantly recruited via clinical referral, the finding that parents rated higher than teachers is unsurprising.

Regarding the distribution of diagnostic classifications, the frequencies of children meeting criteria varied markedly across the different informants and combinational rules. Overall, the proportion of children meeting symptom criteria was highest for combined subtype, followed by inattentive subtype, and finally for hyperactive/impulsive subtype. This pattern is evidenced in previous research (Biederman et al., 1997; Lahey et al., 2005). Additionally, more children met symptom threshold for the disorder based on parent report, rather than teacher report, which is congruent with the differences in the magnitude of ratings.

At a subtype level, parents rated significantly more children as combined subtype than teachers. In contrast, more children met criteria for the inattentive or hyperactive/impulsive subtypes based on teacher report. These findings are similar to those found by Sollie et al. (2012) and Youngstrom et al. (2000) where, in clinically-referred samples, children were more likely rated as combined subtype by parents and inattentive subtype by teachers. One study by Loeber, Green and Lahey (1990) suggested that teachers were better at assigning subtype categorisations, as their classifications were more likely to be consistent with the clinician-assigned subtype. However, this assumes that clinician assigned diagnoses are accurate. It is conceivable that teachers, as a result of their training, may be better able to impartially reflect on the nature of the challenging behaviour and they have more opportunities in structured environments to do so. However, more recent research has not reflected this. Rather the integration of multiple perspectives to inform subtype diagnoses is supported (Mitsis et al., 2000; Murray et al., 2007).

A substantial proportion of children were rated as symptomatic by one informant but not the other. This is also consistent with previous research (Rettew et al., 2011; Sayal & Goodman, 2009; Valo & Tannock, 2010). One reason for this may be that some children display home-specific or school-specific behavioural problems (Rettew et al., 2011). Alternatively, this may be indicative of lack of agreement between parents' and teachers' ratings of ADHD symptoms. This will be explored more fully in the following section. If the former explanation was accurate, multiple informant reports would be necessary to eliminate cross-situational difficulties. In the case of informant discrepancy, the existent evidence base supports the incremental validity of obtaining multiple informant reports to gain a holistic conceptualisation of the child's difficulties, for informing diagnosis, and for determining intervention targets, goals and components (Amador-Campos et al., 2006; Barkley, 2003; Frazier & Youngstrom, 2006; Sayal & Taylor, 2005).

In investigating methods of establishing cross-situationality, three combinational rules (OR rule, AND rule, AND duplicated rule) were used to collate parent and teacher ratings, with considerable effects on the distribution of diagnostic classifications. As hypothesised, based on the work of Valo and Tannock (2010), fewer children fell into each diagnostic category as the stringency of the combinational rule increased. This was especially evident for determining if children fell within the combined subtype and to a lesser degree, the inattentive subtype. One exception to this trend was that fewer children were classified as hyperactive/impulsive subtype using the most lenient OR rule than the more stringent approaches (i.e. AND rule, AND duplicated rule). A possible explanation for this may be that the leniency of the OR rule resulted in a redistribution of children into the combined subtype. Lahey et al. (1994) and Valo and Tannock (2010) documented redundancy of both the hyperactive/impulsive and inattentive subtypes when the OR rule was used. However, in the present study, when the OR rule was applied, the proportion of both combined and inattentive

subtype increased, whereas, fewer children were classified as hyperactive/impulsive. Bauermeister, Alegria, Bird, Rubio-Stipec and Canino (1992) showed that children classified as either subtype of ADHD were likely to display some symptoms outside their subtype domain (e.g. a child classified as hyperactive/impulsive symptoms may show sub-threshold (i.e. < 6) inattentive symptoms). Interestingly, Bauermeister et al. (1992) showed, through use of cluster analysis, that children classified as inattentive subtype had relatively fewer sub-threshold symptoms within the other domain than those children classified as hyperactive/impulsive subtype. Considering this in relation to the present study, it may be that children classified as inattentive subtype were less likely to be reclassified as combined subtype when a more lenient combinational approach was used, because they had fewer sub-threshold hyperactive/impulsive symptoms. Whereas, children classified as hyperactive/impulsive subtype may be more likely to be reclassified as combined subtype using a more lenient combinational rule (i.e. OR rule), due to the increased likelihood of sub-threshold inattentive symptoms.

Considering these findings, the choice of combinational rule is largely determinant of the diagnosis assigned to the child. In choosing a combinational method, clinicians must be aware that each method has its criticisms. Dirks et al. (2012) stated that the OR rule does not distinguish between informants and disregards the level of agreement between raters. Given the need to understand a child's difficulties in different settings (e.g. for identifying appropriate intervention targets; Rettew et al., 2011) and the importance of agreement for children's outcomes (e.g. for increased investment in intervention and consistency of approach; De Los Reyes & Kazdin, 2005), failing to distinguish between informants, or disregarding the level of agreement between informants, is problematic. Furthermore, in view of the implications of a child being misdiagnosed (e.g. stigmatisation), the potential for children to be falsely identified as having ADHD must be considered. Critiques of the AND

rule include that it emphasises the convergence of information and does not distinguish between the patterns of informant reports (e.g. a child with nine symptoms rated by parent and six by teacher is seen as equal to a child whose parent and teacher report nine each; Dirks et al., 2012; De Los Reyes et al., 2011). Dirks et al. (2012) suggested that some form of severity index may surmount this limitation; however, this is yet to be empirically devised or tested. Finally, the AND-duplicated rule has been criticised for its harsh criteria, in that children who show significant symptoms and associated impairment, may be denied access to intervention, support services and funding, which may potentially remediate the effects of the disorder (Ryden et al., 2009).

Overall, the findings of the present study highlight the importance of informant choice and methods of combining information. No one combinational approach is universally applied, nor are any of the approaches without their criticisms. Hence clinicians, at present, must weigh up the costs and benefits of the choice of informant(s) and rely on their clinical judgement to determine what is best for the child.

4.2. Parent and Teacher Agreement when Rating the Symptoms of ADHD

The second aim was to replicate and extend previous research regarding the relations between parent and teacher ratings of ADHD symptoms in a sample of NZ children. Correlations and kappa statistics were used to assess the magnitude of relations and level of agreement between parent and teacher ratings for overall symptoms, the two core symptom domains, and across the individual symptoms.

Based on a considerable evidence base, it was hypothesised that parent and teacher agreement would fall within the low to moderate range across all assessed levels. In the present study, a significant positive correlation between parent and teacher total scores suggested that increased parent ratings were associated with increased teacher ratings of child

ADHD symptomology. As hypothesised, the magnitude of the relationship fell within the moderate range and the kappa statistic was indicative of *fair agreement*. While parent-teacher agreement was slightly higher than some previous research (Mitsis et al., 2000, Malhi et al., 2008), it was, however, consistent with the more recent work of Sollie et al. (2012). Several studies have suggested that parent-teacher agreement is higher for clinically-referred children (Amador-Campos et al., 2006; Biederman et al., 1993; Stefantos & Baron, 2007). Again, given that the majority of children in the present study were clinically-referred, this may explain the slightly increased concordance across informants. In contrast, others have documented lower levels of agreement for clinically-referred children (Antrop et al., 2002; Mitsis et al., 2000; Wolraich et al., 2004). This purports an alternative explanation for why agreement between NZ parents and teachers is slightly higher than previous research, the majority of which was completed in the USA. Some possible explanations might include: a national focus on early intervention (Research New Zealand, 2007); smaller school and classroom sizes, which potentially facilitate increased communication between parents and teachers; more information available for parents (e.g. Group Special Education public workshops) promoting increased awareness of the disorder and its features, and consequently increased concordance in terms of expectations of children's behaviour and interpretations of the diagnostic criteria. Overall, it appears that moderate agreement for parent-teacher ratings of ADHD total symptoms displayed by NZ children is similar, if not slightly higher, to that reported in other countries. Although positive for assessment of ADHD in NZ, discrepancy between parents and teachers persists. To better understand this, parent-teacher agreement was further investigated for the core symptom domains and for individual symptoms.

For hyperactive/impulsive symptoms, agreement fell within the moderate range. The magnitude of correlations was slightly higher than that of previous research. To illustrate, in the subsample, the level of parent-teacher agreement for hyperactive/impulsive symptoms

was $r = 0.57$ which is higher than the range of 0.22 to 0.44 reported previously (Gomez, 2007; Malhi et al., 2008; Mitsis et al., 2000; Rettew et al., 2011; Sayal & Goodman, 2009; Wolraich et al., 2004). In contrast, agreement for inattentive symptoms was poorer than documented by previous research. To demonstrate, parent-teacher agreement for inattentive symptoms in the subsample was $r = 0.14$, which was lower than the range of 0.23 to 0.62 reported in previous studies (Sayal & Goodman, 2009; Mitsis et al., 2000; Gomez, 2007; Malhi et al., 2008; Van der Oord., 2006; Efstratopoulou et al., 2012). Taken together, the findings of the present study suggest that multiple informants show higher agreement when rating hyperactive/impulsive rather than inattentive symptoms. Furthermore, agreement for hyperactive/impulsive symptoms is likely to be driving the overall level of agreement (i.e. for total symptoms). Several studies have documented this pattern (Mitsis et al., 2000; Sayal & Goodman, 2009). However, in these studies, the levels of agreement did not differ so markedly across the core symptom domains. The majority of previous research has documented moderate correlations for the two core symptom domains (Gomez, 2007; Malhi et al., 2008; Mitsis et al., 2000; Rettew et al., 2011; Sayal & Goodman, 2009; Wolraich et al., 2004). The present study found that hyperactive/impulsive symptoms were rated more concordantly than inattentive symptoms, which could be explained by the nature of the symptoms being reported. Hyperactive/impulsive symptoms are by nature overt and disruptive, and are consequently easily observable (McConaughy et al., 2010). In contrast, inattentive symptoms, although debilitating, may be less easily observed. For example, consider Child A who repeatedly leaves his or her seat compared to Child B who tunes out when the teacher is talking to the class. It is conceivable that the Child A's disruptive behaviour may be more likely to be noticed than Child B passively not attending. This may be especially true in busy environments (e.g. the classroom or in a busy household), where factors including the classroom size, teacher capability and experience, or the multitude of

factors taxing parents' attention at home, may play a role in determining whether or not the informant notices more subtle behaviours. However, if this explanation were fully accounting for these findings, we might have expected the findings of Mitsis et al. (2000) and Sayal and Goodman (2009) to have reflected this with larger differences in the magnitude of agreement across the core symptom domains.

Related to inattentive symptoms, one possible explanation stems from conceptualisations of inattention as a subtype of ADHD or, alternatively, as a distinct disorder. There is a body of literature which suggests that the inattention displayed by children with only inattentive symptoms is typified by 'sluggish cognitive tempo' (SCT; e.g. drowsiness and lethargy). Whereas, inattention displayed by children with co-occurring hyperactive/impulsive symptoms is characterised by distractibility and impulsiveness (see Milich, Balentine, & Lynam, 2001 for a review). Some authors have suggested that these may represent distinct disorders (Lahey et al., 1988; Bauermeister et al., 1992). The importance of this for understanding poor parent-teacher agreement lies in the assessment approach adopted. Lahey et al. (1988) proposed that inattention with high SCT may be best conceptualised as an internalising disorder. Evidence-based practise guidelines suggest that, given the nature of internalising symptoms, child self-report be included in the assessment (Mash & Hunsley, 2005; Ollendick & King, 1994). In the present study, child self-reported symptoms were not assessed due to the literature suggesting the limitations of child self-report for behavioural problems (Cantwell et al., 1997; Emeh & Mikami, 2012; Owens et al., 2007). However, if inattentive symptoms were conceptualised as internalising, this might necessitate the use of self-report information, and research should focus on determining the reliability and validity of such reports in aiding diagnosis. Hence, the lack of agreement between informants may partially be a result of neither informant accurately capturing the child's experienced symptoms. Alternative explanations may reside in differences in the

mechanisms engendering informant discrepancies. The third aim sought to elucidate this, the findings of which will be considered later in the discussion.

Parent-teacher agreement was also assessed for specific symptoms. The results suggested that magnitude of agreement varied across the specific symptoms; however, there was an overall trend towards increased concordance for hyperactive/impulsive symptoms, relative to inattentive symptoms. Across all symptoms, the level of agreement ranged from non-significant to moderate, with moderate agreement found for only several of the hyperactive/impulsive symptoms. These findings are consistent with previous research, both for the broader category of child externalising behaviours (Youngstrom et al., 2000) and for ADHD specifically (Antrop et al., 2000; Nijis et al., 2004; Gomez, 2007). Together, the results of the present study, in combination with previous research, support that agreement is particularly variable when assessing specific symptom profiles. Once more, this might be linked to the degree of observability of certain behaviours.

To summarise, the results of the present study show that in NZ, parent-teacher agreement on children's total ADHD symptoms is similar, if not slightly higher, than previous research primarily carried out in the USA. However, when the core symptom domains and individual symptoms are differentiated, differences in the level of agreement became apparent. Overall, hyperactive/impulsive symptoms were rated more concordantly than inattentive symptoms. It is likely that the level of agreement for hyperactive/impulsive symptoms was driving agreement on total symptoms. The following section sought to further explain why these findings may be evident.

4.3. Parent, Teacher, and Clinician Agreement using Observations of Children's Behaviour in the Classroom

In a subsample of children for whom a clinician-rated school observation was also completed, the final aim of the present study was to examine the factors engendering lack of agreement between informants. More specifically, whether *situational specificity* or *source biases* could account for the observed discrepancies. To establish the patterns of agreement, reports from multiple informants (parents, teachers, and a clinician-rated school observation) were correlated. Given that the school observation was conducted in the classroom setting, it was hypothesised that teacher ratings and school observation would be more strongly correlated than either parent-teacher ratings or parent ratings-school observation. This finding would be suggestive of *situational specificity* of children's behaviour, in accounting for discrepancy between parent and teacher reports. If, however, the correlation between teacher and observation was not stronger than the correlation between parent ratings-school observation, it was hypothesised that *source bias* may be influencing the discrepant reports between parents and teachers.

As was observed in the full sample, moderate agreement was found between parent and teacher ratings in the subsample. Teacher ratings were found to correlate positively with total off-task behaviour rated during the school observation, whereas parent ratings were not significantly correlated with the school observation. Although this may appear suggestive of situational changes in children's behaviour, the level of parent-teacher agreement must be considered when interpreting this. Contrary to expectations, the relations between parent and teacher ratings were stronger than that of either informant with the school observation. The reason for this is not clear, but might be related to limitations of the clinician-rated school observation. Despite the literature supporting the use of the BOSS, it is not without its criticisms. Firstly, the BOSS utilises a momentary time sampling procedure across a 30-

minute time period. As such, observers code a 'snapshot' of the child's behaviour in a singular context. Wheeler et al. (2009) criticised this approach, in that the selection of behaviour observed may not be representative of the full magnitude or nature of the child's symptomology. Secondly, although previously validated in samples of children with ADHD (Kofler et al., 2008; Volpe et al., 2005), the BOSS does not target the specific symptoms of ADHD, rather off-task motor, verbal, and passive behaviours are coded. It may be that these categories do not reflect the full spectrum of symptoms within each core symptom domain. However, at present, there is no known alternative observation coding scheme which assesses ADHD symptoms specifically. Thirdly, regardless of the strong inter-rater reliability found when training the researchers to use the BOSS, there may have been variability across the multiple observers when rating children in the classroom. Finally, despite attempts to reduce the effects of novelty (e.g. observing from an unobtrusive position, checking the typicality of children's behaviour with the teacher), we cannot rule out behavioural reactivity. That is, the presence of an observer in the classroom may have altered the target and comparison children's behaviour during the observation (Antrop et al., 2000). It is important to consider this potential bias for both the target and comparison child, as the nomothetic approach employed considers the target child's behaviour relative to the 'normative' standard (i.e., the behaviour of the teacher-selected comparison child). Given that both children with and without ADHD tend to display fewer symptoms in novel situations (APA, 2000), it is possible that the results of the clinician-rated school observation underestimated the nature or extent of target child's symptomology. Similarly, for hyperactive/impulsive symptoms, parent-teacher agreement was stronger than the relations between the school observation and either informant. The relation between teacher ratings and the school observation was slightly stronger than that between the parent ratings and the school observation. However, considering both the strength of parent-teacher agreement and the very small difference

between parent and teacher relations with the clinician-rated school observation, caution needs to be applied in concluding support for either of the hypothesised explanatory mechanisms. Rather, in interpreting these findings, the remaining discrepancy may be attributed to the abovementioned methodological limitations of the observation, or alternatively may be accounted for by a combination of these limitations with *situational specificity* or *source bias*. It is beyond the scope of this thesis to delineate this.

For inattentive symptoms, no significant correlations were found between any of the informants. This result was not anticipated given the substantial evidence base suggesting low to moderate agreement for inattentive symptoms across informants (Efstratopoulou et al., 2012; Gomez, 2007; Malhi et al., 2008; Mitsis et al., 2000; Rettew et al., 2011; Sayal & Goodman, 2009; Van der Oord et al., 2006; Wolraich et al., 2004). Furthermore, considering the entirety of the results found in the present study, informant agreement on inattentive symptoms was poor across all informants and all levels of assessment. Given that parent-teacher agreement was poor, the lack of agreement for inattentive symptoms cannot be fully accounted for by the methodological limitations associated with the clinician-rated school observation. Therefore alternative explanations for these findings must be considered.

The first possible explanation links to the earlier discussion regarding inattentive symptoms as internalising in nature, and therefore less observable. Consequently, the appropriateness of the assessment was questioned (e.g. the use of alternative means of assessment such as self-report measures for inattentive symptoms, rather than a clinician-rated school observation). On the other hand it is possible that informants' ratings of inattentive symptoms were more affected by source biases than ratings of hyperactive/impulsive symptoms. For example, informants may be more likely to differ in their expectations and interpretative frame of reference for inattentive symptoms (e.g. teachers trained to notice a child's participation in learning, whereas parents may not interpret

subtle inattentive behaviours as problematic). There is no evidence to suggest this; rather this mechanism cannot be excluded. Likewise, it may be that inattentive symptoms are more heavily influenced by contextual factors (e.g. differences in task demands, level of structure in the environment, instructional level, duration of sustained attention required), than hyperactive/impulsive symptoms. Again, there is no evidence that suggests that this, in isolation, is accounting for the observed results.

Previous research has shown that several factors influence parent-teacher agreement which must also be considered. Medication has been hypothesised to influence agreement in a number of ways, including: differences in sensitivity to medication effects on children's behaviour (Fischer & Newby, 1991), children are frequently medicated at school, but not at home (Antrop et al., 2002), and finally, teachers may not know the child off-medication, yet they are asked to rate the child as off-medication on the rating scales. To determine if medication may account for the findings of the present study, the analyses were rerun in a subsample of children who were not taking medication for ADHD. Overall, the findings were similar to those found when all children were included, suggesting that medication did not alter parent-teacher agreement in the present study. However, several correlations did not achieve significance, which is most likely due to the reduction in sample size, rather than the effects of medication. One exception to this might be parent ratings of hyperactive/impulsive symptoms, which remained significantly correlated with the BOSS-hyperactive/impulsive. Although this pattern is suggestive of *source biases*, the abovementioned limitations purport the need for caution in concluding this.

Children's IQ has also been suggested to influence parent-teacher agreement (Sollie et al., 2012), thus the analyses were rerun with the sample split into two groups based on children's IQ scores. A number of differences were noted between the two groups and the larger samples (i.e. full sample and subsample). Of these, several were likely due to

decreased sample size. However, some exceptions need to be noted. Firstly, there is some evidence to suggest that parent-teacher agreement is higher when rating the total symptoms displayed by children with IQ scores below 85. Sollie et al. (2012) found the same effect for total symptom ratings, and concluded that this may be accounted for by differences in children's capacity to compensate for their experienced symptoms. That is, children with higher IQ scores may be better able to conceal their symptoms, particularly inattentive symptoms in the home environment (e.g. intentional avoidance of tasks requiring sustained attention), resulting in greater discrepancy across home and school ratings (Sollie et al., 2012). Whereas, children with lower IQ scores may be less able to do so and consequently symptoms are more observable across environments and informants (Sollie et al., 2012). For children in both groups, teacher rated hyperactive/impulsive symptoms were correlated with BOSS-hyperactive/impulsive, whereas parent ratings were not. Again, parent-teacher agreement was higher than that with the clinician-rated school observation. Therefore, these findings may be accounted for by methodological limitations, *situational specificity* and/or *source biases*, yet the extent to which each contributes is unknown.

Finally, although use of the ADHD-RS-IV is relatively ubiquitous, clinicians may use other measures to assess ADHD symptomology. To determine if the choice of measure affected the patterns of agreement, the analyses were rerun using the BASC-2, a commonly used measure of child psychosocial functioning, with age and gender-based norms available. BASC-2 hyperactivity and attention problems t-scores were used as substitutes for the ADHD-RS-IV scores in these analyses. Generally, the results remained unchanged. One exception was a significant positive correlation between parent-rated and teacher-rated attention problems found using the BASC-2. As seen in previous research, increased specificity of the assessment tends to result in lower agreement scores between informants (Youngstrom et al., 2000). Applying this rationale in reverse, it is unsurprising that the

BASC-2, a broad screening measure which does not cover all of those symptoms listed in the DSM-IV-TR (APA, 2000), results in stronger agreement between informants. This pattern was only evident for inattentive symptoms, suggesting that for the more observable hyperactive/impulsive behaviours having a larger range of more specific target behaviours, as provided by the ADHD-RS-IV, facilitates improved agreement across informants.

Overall, these results do not provide support for a singular mechanism in accounting for informant discrepancies in the assessment of ADHD. In terms of the hypotheses regarding *situational specificity* of children's behaviour or *source biases*, there is insufficient evidence to support either hypothesis in isolation. There are some inconsistencies, which are suggestive of methodological limitations. However, this does not fully account for the findings. Therefore, it is likely that *situational specificity*, *sources biases*, or a combination of both are contributing to the lack of agreement across informants. Finally, neither medication nor the alternative rating scale (BASC-2) appeared to alter the results. However, agreement was found to be slightly higher when parents and teachers were rating children with lower IQ scores.

4.4. Limitations and Improvements

A number of limitations need to be considered when interpreting the results of the present study. Firstly, despite attempts to minimise method variance (e.g. use of validated measures, consistency of instruments used for parent and teacher ratings to achieve similar item coverage, detailed instructions for rating scale completion, standardised administration of the BOSS and WISC-IV, checking the typicality of the observation environment), this cannot be ruled out as a possible explanation for the findings. In particular, some issues that remain include that children were observed across different academic subjects (e.g., maths, writing, reading) in different composition classrooms, and may have differed in their level of

interest in the task. Furthermore, a study published earlier this year illustrated that parent-teacher concordance differs depending on which parent rated the child (Sollie et al., 2012). In the present study, an over-whelming majority (80%) of parent rating scales were completed by the mothers of the children. Future research may seek to gain ratings from both parents or significant others wherever possible. Moreover, alternative family compositions (e.g. single-parent families, same-sex parents/guardians) should also be considered in future research and in the development of best practice guidelines.

Secondly, several caveats arose regarding the clinician-rated school observation. As has been previously discussed, some potential criticisms may relate to the sampling procedure, behavioural reactivity as a result of novelty, observer biases or the lack of specificity for ADHD symptoms. Empirical research supported the psychometric properties and use of the BOSS with children with ADHD; however, it is possible that the choice of a momentary time sampling procedure over a 30 minute period in a single context may have resulted in an inaccurate representation of the child's symptomology. Furthermore, the novelty of an observer in the classroom may have elicited behavioural reactivity from the target child, the comparison child (e.g. in using the nomothetic assessment approach), the teacher, or resulted generally in a change to the classroom milieu. All of which may have influenced the scores attained for the observation. In order to overcome these, future research might seek to conduct multiple observations in a range of academic and social contexts. Not only might this result in a more representative sample of behaviour, this may also reduce novelty effects (e.g. habituation to the presence of the observer). The conclusions that can be drawn from the present study are also limited by clinician-rated observations only being completed in the classroom setting. Future research may observe the child in both the home and school settings; and possibly in the playground at school. Alternatively, it has been suggested that parents and teachers should rate videotaped samples of children's behaviour,

to achieve situational correspondence (Van der Oord et al., 2006; Richters, 1992). Another possible limitation relates to biases of the observer rating the child. To minimise this, the structured coding scheme with strict guidelines for rating behaviours was used, observers were required to be assessed using the scheme by a registered Clinical Psychologist, and satisfactory inter-observer agreement was required prior to the observers conducting observations. Moreover, the observers were blind to the difficulties experienced by the child (e.g. interview and rating scale data was not seen by observers prior to the observation). However, given that all children were suspected of having ADHD, we cannot rule out that observers had preconceived ideas which influenced their ratings. Lastly, the BOSS was not specifically designed for assessment of ADHD. Therefore it is possible that the observation scheme did not reflect the full spectrum of ADHD symptoms, as defined by the diagnostic criteria and rated by parents and teachers. At the time of the study's commencement, no such observation coding schemes were available. Future research might seek to develop observation coding schemes directly for the assessment of ADHD.

Thirdly, the generalisability of the results may be limited by the nature of the sample and, for clinical practice, by the type of assessment conducted. The sample included children from a broad age range (6-12 years) and the majority were males (80%). Furthermore, predominantly NZ European families participated. Considering this, it may be that the results of this study do not apply to those samples with a different gender, age, or ethnic composition. Moreover, due to the sample size ($n = 55$), it was not possible to delineate age and gender specific effects. Nor could socio-economic status and ethnicity be differentiated. Given that some studies have documented the effects of age, gender, and ethnicity on informant ratings (DuPaul et al., 1998; Gomez et al., 1999), future research should endeavour to replicate these findings with a larger sample in which these can be investigated.

In relation to clinical practice, the generalisability of this study may be limited in several ways. The study used the ADHD-RS-IV to assess symptoms of ADHD. In practice, there are a range of available scales, which although similar, are not identical to the ADHD-RS-IV. The similar results attained using the BASC-2 are positive; however, it cannot be assumed that these findings generalise to other rating scales. Moreover, clinicians commonly use clinical interviews to assess children's functioning (Gomez, 2007). While rating scales have been shown to approximate information provided during clinical interviews with reasonable accuracy (Wender, 2004), interview and rating scale information are typically combined. In the present study only parents were interviewed and the information was not included in the agreement analyses. Future research should endeavour to interview both parents and teachers to gain a holistic representation of the child's difficulties, and assess the level of concordance between parent and teacher interview information. Furthermore, this study investigated multiple informant agreement only for symptom ratings, and not for impairment. It was assumed that cross-situational symptoms would result in pervasive impairment; however, this was not addressed specifically. These limitations should be addressed in future research to improve the transferability of findings into clinical practice.

4.5. Implications and Future Research

Notwithstanding the foregoing limitations, the results of the present study contribute to the evidence base in a number of ways, with important implications for clinical practice and for future research.

As with other countries, discrepancies between NZ parents and teachers remain problematic for clinicians seeking to determine if a child fulfils the cross-situationality diagnostic criterion for ADHD. In the absence of guidelines or uniformity across clinical practice, clinicians are reliant on clinical judgement. As displayed in the present study, the

decision of who to ask and how to combine multiple informant information has the potential to dramatically alter the diagnosis assigned to the child. To illustrate the possible implications of this, a child for whom the clinician decides to consult only one informant or alternatively, uses a stringent approach in determining cross-situationality, may potentially be ineligible to receive interventions, educational and behavioural support services, and funding which may remediate the effects of the disorder (Mash & Hunsley, 2005). Consequently, they are at increased risk of experiencing co-morbid conditions, academic and later occupational underachievement, and delinquency (MOH, 2001; Ryden et al., 2009). Moreover, an inappropriate subtype diagnosis may result in inappropriate intervention, as the subtype diagnosis aids determination of intervention goals, planning and implementation (Masseti et al., 2008; Stefanos & Garrett, 2007).

Before concluding the necessity of a more flexible approach to ensure all children who need support receive it, the specificity of the assessment must be considered. Misdiagnosis holds significant implications for children, for example, stigmatisation by peers and other adults. To illustrate using a positive example, in their seminal study, Rosenthal and Jacobsen (1966) displayed the effects of teachers' positive expectations on children's later intellectual functioning. A selection of children were randomly labelled as 'academic spurters' (i.e. likely to show 'unusual' intellectual gain) to their teachers. Those children who teachers expected to show intellectual gains (e.g. 'academic spurters') showed greater gains in IQ points on tests of intellectual functioning eight months later, relative to children in the control group (not assigned a label). The authors concluded that teachers' expectations of children's behaviour/performance, as determined by the assigned label, translated into teacher behaviour which elicited the expected behaviour/performance from the child (e.g. for 'academic spurters' greater gains in intellectual functioning; Rosenthal & Jacobsen, 1966). Considering this in reverse, diagnosis, which inherently imparts negative expectations

regarding the child's functioning, carries the possibility of disadvantaging the child. Furthermore, given the limitations on the resources available, clinicians must consider how best to utilise such resources to make a difference for the majority of children and families. Together, these findings strengthen the argument for evidence-based guidelines to manage multiple informant information. A standardised approach for combining information will ensure that all children are judged against the same criteria, and those who are most in need gain access to the resources that are available. In developing such guidelines, there should be an emphasis on improving the sensitivity and specificity of the assessment and balancing related pragmatic limitations (e.g. parsimony of the assessment versus the intensiveness required to reduce risk of misdiagnosis; Mash & Barkley, 2007). Equally important is that those children presenting with inconsistent reports from multiple informants should not be overlooked merely because informants do not agree (Rettew et al., 2011).

In addition to the over-arching implications, the results of the present study identify some specific issues relating to the assessment of ADHD. Of particular importance is the difference in level of informant agreement for hyperactive/impulsive and inattentive symptoms, from which a number of implications arise. Firstly, considering moderate agreement across all informants for hyperactive/impulsive symptoms, it may be that direct observations provide an avenue for validating informant reports. Ideally, observations in both the home and school environment might best provide a holistic conceptualisation of the child's difficulties. However, limitations regarding time, cost, and ability of clinicians to visit multiple settings must be considered. It may be that, in the presence of informant discrepancies, observational strategies are used corroborate or refute informants' reports of hyperactive/impulsive symptoms.

The same implications cannot be suggested for inattentive symptoms, given the lack of agreement across all informants. Hence, the ensuing implication stems from

conceptualisations of inattentive symptoms as internalising. Should this perspective receive further empirical support, the current evidence-based approach of obtaining parent and teacher information about the child may not be sufficient. As mentioned previously, assessment of internalising disorders typically requires children to rate their own symptoms and difficulties (Ollendick & King, 1994). Previous research in children with ADHD has found that positive self-illusory biases are prevalent (Owens et al., 2007). However, a singular study conducted by Owens and Hoza (2003) found that, when reporting on their own behaviour, only children with hyperactive/impulsive features displayed positive illusory biases, whereas those children with inattentive features were no different to children without ADHD. There have been no known attempts to replicate this finding. Considering this, it may be that children with inattentive features are able to report their own symptoms with reasonable accuracy. Should this finding be replicated, clinicians might consider interviewing the child or asking the child to rate their inattentive behaviours.

The nature of inattentive symptoms was also proposed as a potential reason for the lack of agreement between all informants. It appears that both parent and teacher ratings and the clinician-rated school observation are potentially not accurately capturing inattentive symptoms. This purports the need for a more objective measure of inattention. There are a range of laboratory based tests available, marketed for use in the assessment of ADHD. For example, the Conners Continuous Performance Task (CCPT; Conners, 1994) and the Test of Variables of Attention (TOVA; Dupuy & Greenberg, 1993). In isolation, these tests have received criticism in the assessment of ADHD, including: inconsistent research regarding the ability of these tests to discriminate between children with and without ADHD, especially when discriminating between children with ADHD from those with other childhood psychopathologies (Nichols & Waschbusch, 2004), failure to discriminate between the subtypes of ADHD, and debate regarding the constructs being measured (Bauermeister et al.,

2005). However, objective tests of attention may have a role as part of the assessment battery where informant discrepancies arise. That is, together with the information provided by parents and teachers, a child's performance on a test of attention may help to clarify the diagnostic decision. Again, parsimony of the assessment process should be considered, and these adjunctive measures may only be necessary if there is a lack of concordance between informants' ratings.

For both hyperactive/impulsive and inattentive symptoms, there was insufficient evidence to either support or to rule out the explanatory mechanisms that we sought to test. Therefore, it is possible that contextual and/or informant influences may be partially accounting for the observed levels of agreement. Clinicians should be aware of possible influences on agreement, and make efforts to ensure the credibility of informants' reports. For example, McConaughy et al. (2010) suggested screening informants for depression and stress. However, given the myriad of possible contextual changes and source biases, and the lack of research to determine the probability of each factor, screening for all possible confounds seems to be an impracticable endeavour. Nonetheless researchers should strive to systematically assess all possible confounds, or seek to identify those factors that are most influential in creating discrepancy, in an attempt to work out how to best improve clinical practice and aid the development of best practice guidelines so uniformity in assessment is achieved. At present, clinicians should aim to, at the very least, acknowledge these possible confounding factors (e.g. in their report writing). Wheeler et al. (2009) emphasised that teachers may also benefit from information regarding source and contextual effects on ratings of children's behaviour. This might facilitate awareness and encourage reflective practice which may potentially ameliorate some of the effects of these influences. For example, if the teacher is aware that he/she is stressed, or if the classroom is atypical (e.g. a student teacher is teaching), the teacher may postpone rating the child to another time. Such information could

be incorporated into teacher training and professional development programmes. However, in doing so, it would be important to stress that discrepancies may be meaningful (e.g. reflect situation-specific behaviour) and clinicians should be wary of performance biases (e.g. the informants rating the child based on how they believe the other informant will rate the child, rather than providing a true representation of the child's behaviour; Angold et al., 1987, De Los Reyes & Kazdin, 2005).

Finally, a current topical issue which relates to this thesis is the proposal that the NZ Government consider introducing a performance pay system for teachers. The practicalities of implementing such a system are, at this stage, unclear and highly controversial (NZ Education Review, 2012). There has been some suggestion that teachers might receive financial incentives contingent on gains in their students' achievement (New Zealand Government, 2010; NZ Educational Institute, 2009). It is conceivable that this may have considerable implications for parent-teacher agreement. For example, incentivising achievement may result in teachers seeking more support for children with challenging behaviours (NZ Education Review, 2012), such as ADHD; therefore, as a means to securing this, teachers might rate children as increasingly symptomatic. Should this proposal eventuate, the results of the present study should be replicated to determine the implications for parent-teacher agreement.

4.6. Conclusion

The present study sought to investigate parent-teacher agreement and the mechanisms engendering discrepancies between multiple informants. The results indicated, firstly, that parent-teacher agreement was slightly higher than that of previous studies; however, it remained within the moderate range. Secondly, that the level of agreement differs across the domains of symptoms being rated. Hyperactive/impulsive symptoms were rated more

concordantly by multiple informants than inattentive symptoms. This trend was observed across the levels of assessment (i.e. core domains and individual symptoms). Finally, investigation of potential mechanisms for the discrepancies between parents and teachers in rating ADHD symptoms were inconclusive, and it appears that a combination of factors may have resulted in the observed discrepancies. Given that choice of informant and method for combining multiple informant information had significant implications for children's diagnosis, a number of implications for clinical practice in the assessment of ADHD and future research were discussed. This study highlighted the ongoing need for researchers to address this issue and for clinicians to think carefully about how informant discrepancies can affect their diagnostic decisions and the impact that this can have on a child's holistic development over time.

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Appendix A: Information Forms

Information form for Parents

EMOTIONAL PROCESSES AND SOCIAL FUNCTIONING OF CHILDREN WITH ADHD

INFORMATION SHEET FOR PARENTS/GUARDIANS

You are being invited to take part in our study comparing the emotional and social abilities of children with Attention-deficit/Hyperactivity Disorder (ADHD) with those of children without the disorder. Please read this information sheet carefully before deciding whether or not to participate. If you have any questions at all we will be happy to discuss the study further with you. You are also encouraged to use whānau support or a friend to help asking questions or discussing the study further.

I. Nature and Purpose of the Project:

This project is being undertaken as part of the requirements for a PhD. The aim of this research is to gain an understanding of the difficulties that children with ADHD experience with regard to processing, understanding, and responding to different types of emotional and social cues, and how these differ from children without ADHD. These abilities are important for optimal social interactions. Therefore, by identifying areas of difficulty we may be able to target these in the future to assist children with ADHD in their social functioning.

II. Participants Being Sought: Emotional processing will be examined in 6-12 year-old children who either meet diagnostic criteria for a diagnosis of ADHD or who do not show any elevations in hyperactivity/impulsivity and inattention.

III. Explanation of Procedures: The first stage of this project will involve you completing some standard questionnaires regarding your child's behaviour. These will be sent to you in a package with return envelopes. You will also be asked to sign a form that gives permission for your child's teacher to complete similar questionnaires about your child. You will need to give this form, along with the teacher's questionnaires, to your child's teacher. The teacher will be asked to mail their completed questionnaires along with the signed permission form back to the researchers. Once we have received the questionnaires from both you and your child's teacher we will let you know whether or not your child meets the entry criteria for the study.

If you meet criteria for the study we will invite you to attend an appointment, with your child, at our research clinic. The appointment will last about 3 hours. During this time we will conduct an interview with you. The purpose of this interview will be for us to gain a better understanding of your child's behavior and development. You do not have to answer all the questions, and you may stop the interview at any time.

During the appointment your child will complete a range of tasks. These tasks will involve a cognitive assessment, answering questions about emotional expressions and social situations, watching short cartoon film clips and answering related questions, and playing a computer. While they watch the film clips and play the computer game measures of their heart rate, facial movement, and perspiration will be taken.

If your child is taking stimulant medication for ADHD, you will be asked not to give them their medication for 24 hours before you bring him/her to the university. This is standard practice in research with children who have ADHD as the medication affects their performance on some of the tasks. If you have any questions or concerns about this process we are happy to discuss it with you.

IV. Potential Discomfort and Risks:

Your child may experience some discomfort from the application of devices that measure physiological responses (e.g., heart rate). They may experience a tingling sensation from an alcohol wipe (much like hand sanitiser) used to clean the skin where these devices are placed. A band holds the device in place and so your child may experience some pressure from this band.

Your child may experience feelings of joy, sadness, fear, and exclusion while engaging in some of the tasks. However, it is unlikely that these feelings will be long lasting as your child will be fully debriefed at the end of each task.

V. Costs/Reimbursements:

There is no cost in participating in this study. To thank you for your time and travel costs your child will receive a \$10 gift voucher, and you will receive a \$40 petrol voucher.

At your request, we can provide you with either verbal or written feedback regarding the outcome of your child's behavioural and cognitive assessments

VI. Withdrawal from the Project:

Participation in this study is completely voluntary. You or your child may withdraw from participation in the project at any time (either before, during, or after the laboratory session) and without any penalty or discrimination.

Your child has the right to consent to participate in research when they are capable of understanding what the study involves and the risks. If your child is unable to fully understand, their assent must be obtained. Your child's refusal to participate will be respected.

VII. Use of Data Collected

The data that we collect will be used solely for the purposes of this study. The original responses (e.g., to questionnaires) will be stored in a locked filing cabinet in a security protected building within the Psychology Department of the University of Otago. The data collected for this study will be entered into a securely stored, password-protected computer, with no identifiable information, such as names and addresses, entered. The only people with access to the data will be the PhD candidate (Burt Hatch) and his supervisors (Dr. Dione Healey and Associate Professor Ted Ruffman).

Reasonable precautions will be taken to protect and destroy data gathered by email (e.g., identifiable information will not be sent by email). However, the security of electronically transmitted information cannot be guaranteed. Caution is advised in the electronic transmission (e.g., emailing) of sensitive material. In accordance with the Health Information Privacy Code, information about the health of an identifiable child is to be retained for 10 years from the time the child is 16.

The results of the project may be published and will be available in the University of Otago's Library (Dunedin, New Zealand). All publications from the study will only report group means. No material that could personally identify you will be used in any reports on this study. As with much research in this area there may be a delay between when information is collected and published. Should you wish, we could provide you with publications from this research once available. Alternatively we could discuss the outcomes with you on an individual basis by appointment.

VIII. Who to Call if you have any Questions: If you have any questions about our project, either now or in the future, please feel free to contact either:-

Burt Hatch (PhD candidate)
Department of Psychology
University Telephone Number: 479 4165

Dr. Dione Healey, (supervisor)
Principal Investigator and Registered Clinical Psychologist
Department of Psychology
University Telephone Number: 479 7620

Associate Prof. Ted Ruffman (supervisor)
Department of Psychology
University Telephone Number: 479 7670

If you have any queries or concerns about your rights as a participant in this study you may wish to contact a Health and Disability Services Consumer Advocate,
Telephone: (03) 479 0265 or
Freephone 0800 37 77 66 or
Freefax 0800 2787 7678 (0800 2 SUPPORT)
or email advocacy@hdc.org.nz

If there is a specific Maori issue/concern please contact Linda Grennell at 0800 377 766

This study has received ethical approval from the Lower South Ethics Committee.

Appendix A: Information Forms

Information form for Child Participants

EMOTIONAL PROCESSES AND SOCIAL FUNCTIONING OF CHILDREN

INFORMATION SHEET FOR CHILD PARTICIPANTS

Why are we doing this study? This study is looking at how different people understand and respond to emotions. We want to find out more about this so that we can better help people if they are having problems.

What will happen during the study? We will start by doing a whole range of tasks, kind of like things you do at school. After that you will be asked to tell us what you think about different emotional facial expressions. Then you will be asked to comment on the different ways people get along in clips from a TV show. Another task will ask you how you feel after playing a ball game on a computer. The last one will ask you how you feel after watching parts of different movies.

While you are watching some of the movies and playing the computer game we will also be measuring how your heart beats, how the skin on your fingers sweats, and how some of the muscles on your face move using special equipment.

Are there good things and bad things about the study?

Some bad things are that you might feel a little sad, scared, or left out - but we do not think you will feel this way for long and we will talk to you about these feelings and make sure you are feeling ok when you leave.

The good part is that you will hopefully have fun playing our games and you will get a prize at the end. The information we collect will also help us to find out how we could help other people in the future.

Who will know about what I did in the study? No-one will know what you did or how you did in the study. We keep this information secret.

Can I decide if I want to be in the study? If you do not want to be part of this study that is O.K. No-one will be upset or disappointed. If you say yes now but change your mind, you can say no later and that will be O.K.

Who do I talk to if I have any questions?

You can ask us any questions if you do not understand what you have read or heard. We will help you understand. You can call Burt on 479 4165 if you want to talk to the researcher about the study at any time.

Appendix B: Consent Forms

Consent form for Parents/Guardians

EMOTIONAL PROCESSES AND SOCIAL FUNCTIONING OF CHILDREN WITH ADHD CONSENT FORM FOR PARENTS/GUARDIANS

I have read the Information Sheet concerning this project and any questions I had have been answered. I understand that I am free to request further information at any time and I know that:

1. If I have not already, I may use whānau support or a friend to help me ask questions and understand the study.
2. Participation in the project is entirely voluntary. My child and I are free to withdraw from the project at any time without any disadvantage
3. I understand that participation in this study is confidential and that no material that could identify me or my child will be used in any reports on this study. All personal identifying information collected will be destroyed at the conclusion of the project; except, where this concerns information about the health of an identifiable child, this information will be retained for 10 years from the time the child is 16 in accordance with the Otago District Health Board.
4. My child may experience some slight physical discomfort (e.g., tingling) as well as brief feelings of joy, sadness, fear, or exclusion during the tasks. However, he/she will be debriefed immediately after the task; and therefore these feelings are not likely to be lasting.
5. I understand that the investigation will be stopped if it at any point it appears to be harmful to my child.
6. As a token of thanks my child will receive a \$10 certificate and I will receive a \$20 petrol voucher
7. The results of the project may be published and will be available in the University of Otago Library (Dunedin, New Zealand) but only group averages will be reported. No identifying information will appear in any publications.

I agree for my child to take part in this project.

.....
(Signature of parent/guardian)

.....
(Today's date)

.....
(Name of child)

Appendix B: Consent Forms

Parent Consent for Teacher Rating Scales

**EMOTIONAL PROCESSES AND SOCIAL FUNCTIONING OF CHILDREN
WITH ADHD****PARENT'S TEACHER –CONSENT FORM**

I _____ provide consent for my child's teacher to complete three questionnaires: the **Children's Problem Checklist**, the **BASC-2 Teacher Rating Scales**, and the **ADHD-RS: School Version** regarding my child's behavior at school. These forms can be sent directly to the researcher (Burt Hatch) in the enclosed envelope.

Name of school

In respect of _____, _____.

Child's name

Date of Birth

Signature of parent

Date

Appendix B: Consent Forms

Parent Consent for School Observation

**EMOTIONAL PROCESSES AND SOCIAL FUNCTIONING OF CHILDREN
WITH ADHD****PARENT'S TEACHER –CONSENT FORM**

I _____ provide consent for a researcher on this study to
arrange a time with my child's teacher to go and observe my child's behaviour at school.

Name of teacher

Name of school

In respect of _____
Child's name

Date of Birth

Signature of parent

Date

Appendix B: Consent Forms

Consent/Assent form for Child Participants

EMOTIONAL PROCESSES AND SOCIAL FUNCTIONING OF CHILDREN

ASSENT/CONSENT FORM FOR CHILD PARTICIPANTS

I have read (or someone has read to me) what I will be doing in this study and I understand:

1. What I will be doing in the study
2. That I can ask my parent(s)/person who looks after me, or the people doing the study, any questions I like about what I am doing.
3. That I may feel a little tingling or squeezing feeling from some of the equipment used and some of the tasks could make me feel left-out, scared, sad, or happy.
4. That I do not have to do this if I don't want to and if I decide that I do not want to keep going with any of the tasks it is fine for me to stop.
5. That the researchers will not talk to anybody except for my parents or person who looks after me about what I did today.
6. That what the researcher finds out from this work will be published but my name will be kept secret so no one will know that I was in this study.

I was present when.....read this form and gave his/her verbal assent.....

Name of person who obtained assent

.....

Date

.....

Signature

.....

.....

Child participant's mark/signature

Date

Appendix C: Ethical Approval

Ethical Approval for Referrals from the Southern District Health Board



Lower South Regional Ethics Committee

Ministry of Health
229 Moray Place
PO Box 5849
Dunedin
Phone (03) 474 8562
Fax (03) 474 8090
Email: lowersouth_ethicscommittee@moh.govt.nz

14 April 2010

Dr Dione Healey
Department of Psychology
University of Otago
PO Box 56
Dunedin

Cc Dr Ted Ruffman, Dept Psychology
Mr Burt Hatch, Dept Psychology

Dear Dr Healey

Ethics ref: LRS/10/02/007
Study title: Emotional processing and social functioning of children with attention-deficit/hyperactivity disorder (ADHD)
Investigators: Mr Burt Hatch, Dr Dione Healey, Dr Ted Ruffman
Locality: Development Across the Lifespan Laboratory, ODHB

Amendments

1. The inclusion of two Masters students to the research team
2. Amending the value of petrol vouchers to \$40

Thank you for submitting the above amendment, which were considered by the Chairperson of the Lower South Regional Ethics Committee under delegated authority and **approved**.

The Committee requests the following:

1. Please forward to the Committee copies of the Masters students' curricula vitae
2. The name of the Committee in page 13a and 18A should be the 'Lower South Regional Ethics Committee'. Please amend.

Please quote the above ethics committee reference number in all correspondence.

Yours sincerely

Anna Paris
Lower South Regional Ethics Committee Administrator
dd (03) 474 8562
fax (03) 474 8090
Email: anna_paris@moh.govt.nz

Appendix C: Ethical Approval

Ethical Approval for Children Recruited from ADHD Research centre Database



Lower South Regional Ethics Committee

Ministry of Health

229 Moray Place

PO Box 5849

Dunedin

Phone (03) 474 8562

Fax (03) 474 8090

Email: lowersouth_ethicscommittee@moh.govt.nz

14 April 2010

Dr Dione Healey
Department of Psychology
University of Otago
PO Box 56
Dunedin

Cc Dr Ted Ruffman, Dept Psychology
Mr Burt Hatch, Dept Psychology

Dear Dr Healey

Ethics ref: LRS/10/02/008

Study title: Emotional processing and social functioning of children with attention-deficit/hyperactivity disorder (ADHD)

Investigators: Dr Dione Healey, Dr Ted Ruffman, Mr Burt Hatch

Localities: Development Across the Lifespan Laboratory, ADHD Research Clinic-

Amendments

1. The inclusion of two Masters students to the research team
2. Amending the value of petrol vouchers to \$40

Thank you for submitting the above amendment, which were considered by the Chairperson of the Lower South Regional Ethics Committee under delegated authority and **approved**.

The Committee requests the following:

1. Please forward to the Committee copies of the Masters students' curricula vitae
2. The name of the Committee in page 13a and 18A should be the 'Lower South Regional Ethics Committee'. Please amend.

Please quote the above ethics committee reference number in all correspondence.

Yours sincerely

Anna Paris
Lower South Regional Ethics Committee Administrator
dd (03) 474 8562
fax (03) 474 8090
Email: anna_paris@moh.govt.nz

Appendix D: Descriptive Variables for the Full Sample and Subsample

Table 1.

Comparison of the descriptive variables across the full sample and the subsample

Descriptive Variable	Full Sample (n = 55)	Subsample (n = 41)
	Mean (SD)	Mean (SD)
Child Age	104.33 (23.67)	102.76 (22.96)
Child IQ	89.42 (12.36)	89.12 (11.68)
Mother Age	39.29 (7.16)	38.93 (7.58)
Mother Education Level	4.56 (2.24)	4.61 (2.26)
Mother Income Level	4.84 (3.35)	4.73 (3.45)
Father Age	42.02 (4.45)	41.49 (7.95)
Father Education Level	4.07 (2.43)	4 (2.36)
Father Income Level	8.19 (3.26)	8.42 (2.61)
	Frequency (% of sample)	Frequency (% of sample)
Child Gender		
Male	44 (80)	33 (80.5)
Female	11 (20)	8 (19.5)
Mother Ethnic		
NZ European (NZE)	43 (78.2)	32 (78)
Māori	3 (5.5)	1 (2.4)
NZE / Māori	4 (7.3)	4 (9.8)
British	2 (3.6)	1 (2.4)
Australian	1 (1.8)	1 (2.4)
Chinese	1 (1.8)	1 (2.4)
Not specified	1 (1.8)	1 (2.4)
Father Ethnic		
NZ European (NZE)	41 (74.5)	30 (73.2)
Māori	0	0
NZE / Māori	1 (1.8)	1 (2.4)
Pacifika	1 (1.8)	0
British	4 (7.3)	2 (4.9)
Australian	2 (3.6)	2 (4.9)
Not specified	6 (10.9)	6 (14.6)
Foster Child/ Adopted	8 (14.5)	8 (19.5)
ADHD Diagnosis		
I	19 (34.5)	17 (41.5)
H/I	5 (9.1)	4 (9.8)
Comb	17 (30.9)	17 (41.5)
NOS	3 (5.5)	3 (7.3)
No diagnosis	11 (20.0)	0
Medication Status		
Medication	15 (27.3)	14 (34.1)
No medication	40 (72.7)	27 (65.9)

Note: I – Inattentive subtype; H/I – Hyperactive/Impulsive subtype; Comb – Combined subtype; NOS – Not otherwise specified; ODD – Oppositional Defiant Disorder
 Mother Education Level: 4.56 and 4.61 are indicative of “NZ seventh form certificate”
 Mother Income: 4.56 and 4.61 are indicative of average annual income of \$15,001 to \$20,000
 Father Education Level: 4.07 and 4 are indicative of “NZ seventh form certificate”
 Father Income 8.19 and 8.42 are indicative of average annual income of \$35,001 to \$40,000

Appendix E: Additional Analyses for the Full Sample

Table 10.

Full sample - Correlations between parent and teacher ratings of hyperactive/impulsive, inattentive and total symptoms on the ADHD-RS-IV, in a subsample of children who were not taking medication for ADHD

	ADHD-RS Parent H/I Symptoms	ADHD-RS Teacher H/I Symptoms	ADHD-RS Parent I Symptoms	ADHD-RS Teacher I Symptoms	ADHD-RS Parent Total Symptoms	ADHD-RS Teacher Total Symptoms
ADHD-RS Parent H/I Symptoms	1	0.373**	0.707**	0.051	0.934**	0.252
ADHD-RS Teacher H/I Symptoms	0.373**	1	0.063	0.539**	0.247	0.891**
ADHD-RS Parent I Symptoms	0.707**	0.063	1	0.059	0.913**	0.070
ADHD-RS Teacher I Symptoms	0.051	0.539**	0.059	1	0.059	0.863**
ADHD-RS Parent Total Symptoms	0.934**	0.247	0.913**	0.059	1	0.180
ADHD-RS Teacher Total Symptoms	0.252	0.891**	0.070	0.863**	0.180	1

* Correlation is significant at the 0.05 level (1-tailed)

**Correlation is significant at the 0.01 level (1-tailed)

Note: I – Inattentive; H/I – Hyperactive/Impulsive

Table 11.

Full sample - Correlations between parent and teacher ratings of hyperactive/impulsive, inattentive, and total symptoms on the ADHD-RS-IV, for children with IQ's of 85 or above (n= 35)

	ADHD-RS Parent H/I Symptoms	ADHD-RS Teacher H/I Symptoms	ADHD-RS Parent I Symptoms	ADHD-RS Teacher I Symptoms	ADHD-RS Parent Total Symptoms	ADHD-RS Teacher Total Symptoms
ADHD-RS Parent H/I Symptoms	1	0.382*	0.757**	0.082	0.943**	0.270
ADHD-RS Teacher H/I Symptoms	0.382*	1	0.068	0.643**	0.246	0.923**
ADHD-RS Parent I Symptoms	0.757**	0.068	1	0.085	0.932**	0.083
ADHD-RS Teacher I Symptoms	0.082	0.643**	0.085	1	0.089	0.888**
ADHD-RS Parent Total Symptoms	0.943**	0.246	0.932**	0.089	1	0.193
ADHD-RS Teacher Total Symptoms	0.270	0.923**	0.083	0.888**	0.193	1

* Correlation is significant at the 0.05 level (1-tailed)

**Correlation is significant at the 0.01 level (1-tailed)

Note: I – Inattentive; H/I – Hyperactive/Impulsive

Table 12.

Full sample - Correlations between parent and teacher ratings of hyperactive/impulsive, inattentive and total symptoms on the ADHD-RS-IV, for children with IQ's below 85 (n =20)

	ADHD-RS Parent H/I Symptoms	ADHD-RS Teacher H/I Symptoms	ADHD-RS Parent I Symptoms	ADHD-RS Teacher I Symptoms	ADHD-RS Parent Total Symptoms	ADHD-RS Teacher Total Symptoms
ADHD-RS Parent H/I Symptoms	1	0.552**	0.524**	0.306	0.899**	0.493*
ADHD-RS Teacher H/I Symptoms	0.552**	1	0.144	0.532**	0.422*	0.881**
ADHD-RS Parent I Symptoms	0.524**	0.114	1	0.164	0.844**	0.176
ADHD-RS Teacher I Symptoms	0.306	0.532**	0.164	1	0.277	0.870**
ADHD-RS Parent Total Symptoms	0.899**	0.422*	0.844**	0.277	1	0.401*
ADHD-RS Teacher Total Symptoms	0.493*	0.881**	0.176	0.870**	0.401*	1

* Correlation is significant at the 0.05 level (1-tailed)

** Correlation is significant at the 0.01 level (1-tailed)

Note: I – Inattentive; H/I – Hyperactive/Impulsive

Table 13.

Full sample - Correlations between parent and teacher ratings of hyperactive/impulsive and inattentive symptoms on the BASC-2

	BASC-2 Parent Hyperactivity	BASC-2 Teacher Hyperactivity	BASC-2 Parent Attention Problems	BASC-2 Teacher Attention Problems
BASC-2 Parent Hyperactivity	1	0.675**	0.424**	0.167
BASC-2 Teacher Hyperactivity	0.675**	1	0.314**	0.603**
BASC-2 Parent Attention Problems	0.424**	0.314**	1	0.252*
BASC-2 Teacher Attention Problems	0.167	0.603**	0.252*	1

* Correlation is significant at the 0.05 level (1-tailed)

** Correlation is significant at the 0.01 level (1-tailed)

Note: I – Inattentive; H/I – Hyperactive/Impulsive

Appendix F: Additional Analyses for the Subsample

Table 14.

Subsample - Correlation between parent and teacher ratings of hyperactive/impulsive, inattentive and total symptoms on the ADHD-RS-IV, in a subsample of children who were not taking medication for ADHD (n = 27)

	ADHD-RS Parent H/I Symptoms	ADHD-RS Teacher H/I Symptoms	BOSS Clinician H/I Rating	ADHD-RS Parent I Symptoms	ADHD-RS Teacher I Symptoms	BOSS Clinician I Rating	ADHD-RS Parent Total Symptoms	ADHD-RS Teacher Total Symptoms	BOSS Clinician Total Rating
ADHD-RS - Parent H/I Symptoms	1	0.506**	0.257						
ADHD-RS - Teacher H/I Symptoms	0.506**	1	0.291						
BOSS - Clinician H/I Rating	0.257	0.291	1						
ADHD-RS - Parent I Symptoms				1	0.132	-0.255			
ADHD-RS - Teacher I Symptoms				0.132	1	0.062			
BOSS - Clinician I Rating				-0.255	0.062	1			
ADHD-RS - Parent Total Symptoms							1	0.305	-0.020
ADHD-RS - Teacher Total Symptoms							0.305	1	0.206
BOSS - Clinician Total Rating							-0.020	0.206	1

** Correlation is significant at the 0.01 level (1-tailed)

Note: I – Inattentive; H/I – Hyperactive/Impulsive

Table 15.

Subsample - Correlations between parent and teacher ratings of hyperactive/impulsive, inattentive and total symptoms on the ADHD-RS-IV, for children with IQ's of 85 or above (n = 27)

	ADHD-RS Parent H/I Symptoms	ADHD-RS Teacher H/I Symptoms	ADHD-RS Parent I Symptoms	ADHD-RS Teacher I Symptoms	ADHD-RS Parent Total Symptoms	ADHD-RS Teacher Total Symptoms
ADHD-RS - Parent H/I Symptoms	1	0.478**				
ADHD-RS - Teacher H/I Symptoms	0.478**	1				
BOSS - Clinician H/I Rating	-0.088	0.211				
ADHD-RS - Parent I Symptoms			1	0.212		
ADHD-RS - Teacher I Symptoms			0.212	1		
BOSS - Clinician I Rating			0.044	0.213		
ADHD-RS - Parent Total Symptoms					1	0.292
ADHD-RS - Teacher Total Symptoms					0.292	1
BOSS - Clinician Total Rating					0.294	0.203

* Correlation is significant at the 0.05 level (1-tailed)

** Correlation is significant at the 0.01 level (1-tailed)

Note: I – Inattentive; H/I – Hyperactive/Impulsive

Table 16.

Subsample - Correlations between parent and teacher ratings of hyperactive/impulsive, inattentive and total symptoms on the ADHD-RS-IV, for children with IQ's below 85 (n = 14)

	ADHD-RS Parent H/I Symptoms	ADHD-RS Teacher H/I Symptoms	ADHD-RS Parent I Symptoms	ADHD-RS Teacher I Symptoms	ADHD-RS Parent Total Symptoms	ADHD-RS Teacher Total Symptoms
ADHD-RS - Parent H/I Symptoms	1	0.723**				
ADHD-RS - Teacher H/I Symptoms	0.723**	1				
BOSS - Clinician H/I Rating	0.051	0.518*				
ADHD-RS - Parent I Symptoms			1	0.037		
ADHD-RS - Teacher I Symptoms			0.037	1		
BOSS - Clinician I Rating			-0.329	-0.185		
ADHD-RS - Parent Total Symptoms					1	0.507*
ADHD-RS - Teacher Total Symptoms					0.507*	1
BOSS - Clinician Total Rating					-0.210	0.340

* Correlation is significant at the 0.05 level (1-tailed)

** Correlation is significant at the 0.01 level (1-tailed)

Note: I – Inattentive; H/I – Hyperactive/Impulsive

Table 17.

Subsample - Correlations between parent and teacher ratings of hyperactive/impulsive and inattentive symptoms on the BASC-2

	BASC-2 - Parent Hyperactivity	BASC-2 - Teacher Hyperactivity	BOSS - Clinician H/I Rating	BASC-2 - Parent Attention Problems	BASC-2 - Teacher Attention Problems	BOSS - Clinician I Rating
BASC-2 - Parent Hyperactivity	1	0.520**	0.220			
BASC-2 - Teacher Hyperactivity	0.520**	1	0.316*			
BOSS - Clinician H/I Rating	0.220	0.316*	1			
BASC-2 Parent Attention Problems				1	0.246	0.078
BASC-2 Teacher Attention Problems				0.246	1	0.031
BOSS - Clinician I Rating				0.078	0.031	1

* Correlation is significant at the 0.05 level (1-tailed)

** Correlation is significant at the 0.01 level (1-tailed)

Note: I – Inattentive; H/I – Hyperactive/Impulsive