

Running Head: MATERNAL FACTORS AND CHILD ADAPTIVE FUNCTIONING

THE EFFECTS OF MATERNAL FACTORS ON CHILD FUNCTIONING ABOVE AND  
BEYOND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER SYMPTOMOLOGY

Natasha Roughan

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### **Abstract**

Current literature has identified that Attention-Deficit/Hyperactivity Disorder (ADHD) symptom severity does not account for all of the variance in child adaptive functioning. Identifying factors that account for variance in child functioning, above and beyond symptom severity, will provide potential additional treatment targets for childhood ADHD. The present study aimed firstly to examine the relations between ADHD symptom severity, child adaptive functioning, and maternal factors (parenting-related stress, personality, and coping). Secondly, we investigated whether child ADHD symptom severity and dimensions of maternal personality and coping accounted for unique variance in parenting-related stress. Lastly, we examined whether parenting-related stress, and the interaction between parenting-related stress and ADHD symptom severity, accounted for unique variance in child functioning, above and beyond child ADHD symptom severity. Participants were 103 children (59 male, 44 female; 35 diagnosed with ADHD, 68 typically developing) aged 6 to 12 years old ( $M = 8.74$   $SD = 1.87$ ), and their caregivers (91.3% female). Measures of ADHD symptom severity, adaptive functioning, parenting-related stress, personality, and coping were obtained using standardised questionnaires. Bivariate correlations revealed various relations among ADHD symptom severity, adaptive functioning and maternal factors. Hierarchical Linear Regression analyses revealed that maternal neuroticism, agreeableness and extraversion all accounted for unique variance in parenting-related stress, above and beyond ADHD symptom severity. Moreover, parenting-related stress accounted for unique variance in child adaptive functioning, above and beyond ADHD symptom severity, however no moderating effect was found. These findings are discussed in regards to their practical implications in the treatment of childhood ADHD.

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## THE EFFECTS OF MATERNAL FACTORS ON CHILD FUNCTIONING ABOVE AND BEYOND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER SYMPTOMOLOGY

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder that is characterised by pervasive and impairing symptoms of inattention and/or hyperactivity/impulsivity (American Psychiatric Association [APA], 2013). Inattentive symptoms include having difficulty sustaining attention and being easily distracted, whereas hyperactive/impulsive symptoms include constantly running and climbing and being unable to sit still or wait their turn. Based on the characteristics of these symptoms there are three ADHD subtypes: ADHD Inattentive (ADHD-I), ADHD Hyperactive-Impulsive (ADHD-H), and ADHD Combined (ADHD-C). For an individual to meet the diagnostic criteria for ADHD-I subtype, the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V; APA, 2013) requires six or more inattentive symptoms, and less than six hyperactive/impulsive symptoms to be present, whereas the opposite is true for a diagnosis of ADHD-H. For a diagnosis of ADHD-C, a total of six or more inattentive symptoms, and six or more hyperactive/impulsive symptoms, need to be present. Furthermore, for a diagnosis of any subtype of ADHD the symptoms must be present for at least six months, with several symptoms both displayed before the age of twelve years and present in two or more settings (APA, 2013). The DSM-V also requires that the symptoms impair the individual in their social, academic or occupational functioning, but does not provide a description of what characterises significant impairment.

**Prevalence.** ADHD is one of the most common childhood psychiatric disorders. The worldwide prevalence is estimated to be approximately 2.5% in adults (APA, 2013) and is twice as common in children at approximately 5% (APA, 2013; Polanczyk, De Lima, Horta, Biederman, & Rodhe, 2007). Among New Zealand children the prevalence of ADHD is similar. For example, 6.7% of children in the Dunedin Multidisciplinary Health and

Development Study met the criteria for an ADHD diagnosis (Anderson, Williams, McGee, & Silva, 1987). Of note, this sample is not fully representative of the New Zealand population due to under representation of Māori and Pacific children, as well as those from larger urban areas, which suggests this estimate is likely an underrepresentation of the true prevalence. In regard to gender differences, ADHD is more common in males than females, with male-to-female ratios being 1.6:1 in adults and 2:1 in children (APA, 2013). Despite this, the gender gap in ADHD diagnoses has reduced overtime. For example, the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV; APA, 1994) identified male to female ratios that ranged from 3:1 in epidemiological samples and 9:1 in clinical samples. This reduction comes from the understanding that ADHD presents differently in girls (Gershon, 2002), who are more likely than boys to present with primarily inattentive symptoms (APA, 2013).

**Comorbidity.** ADHD is frequently comorbid with a number of psychiatric disorders. Oppositional defiant disorder (ODD) and conduct disorder (CD) are the diagnoses which are most commonly comorbid with ADHD, with approximately 27% of children with ADHD also meeting the criteria for ODD and/or CD (Larson, Russ, Kahn, & Halfon, 2011). In addition, learning disabilities such as dyslexia (Casey, Rourke, & Dotto, 1996), and internalising disorders such as major depressive disorder (14%) and anxiety disorders (18%; Larson, Russ, Kahn, & Halfon, 2011), are also common in children with ADHD. ADHD also co-occurs with tic disorders, autism spectrum disorder (ASD) and obsessive-compulsive disorder (APA, 2013). There is also an increased incidence of substance use disorders in adolescents and adults with ADHD and comorbid CD or antisocial personality disorder (Mannuzza, Klein, Bessler, Malloy, & LaPadula, 1998). The likelihood of whether ADHD will be comorbid with other disorders is correlated with the severity of ADHD symptoms, suggesting comorbidity is more common in the ADHD combined type (Connor et al., 2003). For example,

approximately half of those with combined presentation ADHD meet the criteria for ODD, compared to only a quarter of those with predominantly inattentive ADHD (APA, 2013).

Furthermore, approximately one quarter of those with combined presentation ADHD also meet the criteria for CD (APA, 2013).

**Aetiology.** The exact aetiology of ADHD is unknown but the literature suggests there are likely a number of causal pathways involving both genetic and environmental factors that interact to form behaviours representative of ADHD, as supported by the heterogeneity of the disorder (Campbell, 2000; Faraone & Biederman, 1998; Rutter & Sroufe, 2000; Taylor, 1999). In terms of genetic influences, children who develop ADHD may have a genetic predisposition to the disorder (Gillis, Gilger, Pennington, & DeFries, 1992; Goodman & Stevenson, 1989; Milberger, Biederman, Faraone, Guite, & Tsuang, 1997). As suggested by twin and adoption studies ADHD is highly familial, with heritability estimates ranging from 75% to 91% (Thapar, O'donovan, & Owen, 2005). Despite this, approximately 50% of children diagnosed with ADHD do not display any genetic abnormality (Swanson et al., 1998) and monozygotic concordance rates do not reach 100% (Faraone & Biederman, 2000; Kuntsi & Stevenson, 2000). Therefore, it is unsurprising that factors in the child's environment such as heightened parenting stress, disordered parent-child relationships, parenting style and parental psychopathology, have also been associated with ADHD (Gau & Chang, 2013; Johnston & Mash, 2001). Adopting a developmental psychopathology framework, it is likely that multiple risk and protective factors, including genetics but also family environment, interact in the development of children with ADHD (Johnston & Mash, 2001).

### **ADHD and Child Adaptive Functioning**

As stated earlier, for a diagnosis of ADHD to be given the DSM-V requires that the individual experiences significant impairment from the various symptoms they have, but no

definition of impairment is given (APA, 2013). Chronis and colleagues (2003) define impairment as having decreased functioning in at least one area. Individuals with ADHD often experience impairment in adaptive functioning across a number of areas. Adaptive functioning refers to one's performance of behaviours critical for everyday life such as communication, socialisation, self-care, and independence (Ashwood et al., 2015). The adaptive functioning of children with ADHD is said to be lower than expected based on their IQ scores (Roizen, Blondis, Irwin, & Stein, 1994).

In regards to overall adaptive functioning, in a sample of 68 children, Jarratt, Riccio, and Siekierski (2005) identified that children with a diagnosis of ADHD were rated lower by parents and teachers on the adaptive skills composite of the Behaviour Assessment System for Children (BASC; Reynolds & Kamphaus, 1992), compared to typically developing children. The adaptive skills composite is comprised of scales that assess adaptability, social skills, leadership, and study skills. Similarly, Crocker, Vaurio, Riley, and Mattson (2009) examined the adaptive functioning of children with and without ADHD using the Vineland Adaptive Behaviour Scales (VABS; Sparrow et al., 1984), a semi-structured interview for caregivers that assesses communication, daily living skills, and socialisation. Crocker and colleagues identified that children with ADHD had poorer adaptive functioning than controls in all three areas assessed by the VABS. Other studies that utilised the VABS in ADHD samples also indicate that children with ADHD have poorer communication, daily living skills and socialisation, than typically developing children (C. Clark, Prior, & Kinsella, 2002; Stein, Szumowski, Blondis, & Roizen, 1995). Furthermore, individuals with ADHD have poorer communication than those with ODD, CD (C. Clark et al., 2002) and ASD (Happé, Booth, Charlton, & Hughes, 2006).

The poor adaptive functioning of children with ADHD is evident across a range of domains including low educational performance, social skills deficits, low self-esteem, and

heightened delinquent behaviour (Chronis et al., 2003; Ingram, Hechtman, & Morgenstern, 1999). In the domain of education, children with ADHD are more likely than typically developing children to experience poor school performance, low academic achievement, repetition of school years, and an increased likelihood of not completing high school (Biederman, 2005; LeFever, Villers, Morrow, & Vaughn, 2002; Loe & Feldman, 2007). Furthermore, the academic performance of university students with ADHD is typically worse than that of their non-ADHD peers (Frazier, Youngstrom, Glutting, & Watkins, 2007). In a similar vein, adults with ADHD are more likely than adults without ADHD to perform poorly in their occupation and experience higher rates of unemployment (Kessler et al., 2006).

Children with ADHD also have difficulties with social competence and emotional regulation (Uekermann et al., 2010). They tend to have difficulties in recognising others' emotions (Kats-Gold, Besser, & Priel, 2007; Yuill & Lyon, 2007), and regulating their own emotions (Walcott & Landau, 2004; Wehmeier, Schacht, & Barkley, 2010; Wheeler Maedgen & Carlson, 2000). For example, children diagnosed with ADHD can be unrestrictive, disruptive, and overbearing (Frankel & Feinberg, 2002; Frederick & Olmi, 1994; Whalen & Henker, 1985). Given their difficulty both regulating and recognising emotions, it is unsurprising that children with ADHD can also have difficulty functioning socially. For example, children with ADHD have been identified as more likely to be rejected by their peers (Hoza, 2007; Hoza et al., 2005) and experience poor peer relationships and low self-esteem (Biederman, 2005).

Although two thirds of children with ADHD continue to exhibit ADHD symptoms after childhood (Carr, 2015), impairment in adaptive functioning persists into adulthood, after symptoms subside (Barkley et al., 2006; Biederman, Mick, & Faraone, 2000; Duric & Elgen, 2011; Lilienfeld & Waldman, 1990). For example, functional impairment experienced by

children with ADHD is correlated with heightened delinquency and psychopathology in later life (Mannuzza & Klein, 2000; Nigg et al., 2006; Parker & Asher, 1987).

### **Symptomology versus Impairment in Adaptive Functioning.** ADHD

symptomology and impaired adaptive functioning are typically correlated in that the more severe an individual's ADHD symptoms are the poorer their functioning (Barkley et al., 2006). Despite this, the DSM-V criteria for ADHD recognise symptomology and impairment as two separate constructs. A diagnosis of ADHD requires "clear evidence that the symptoms interfere with, or reduce the quality of, social, academic or occupational functioning" (APA, 2013). Barkley and colleagues (2006) differentiate between symptomology and impairment by defining symptomology as the behaviours expressed by an individual that are reflective of the disorder, such as inattention, impulsiveness and distractibility, whereas impairment is the consequences that arise because of these behaviours.

There is substantial literature available that highlights the distinctness of ADHD symptomology and functional impairment (Barkley et al., 2006; Biederman et al., 2000; Gordon et al., 2006; Healey, Miller, Castelli, Marks, & Halperin, 2008; Polanczyk et al., 2007). For example, one meta-analysis highlights that the presence of the impairment criterion has a noticeable impact on the prevalence of ADHD (Willcutt et al., 2012). Similarly, in a systematic review by Polanczyk and colleagues (2007) the inclusion of an impairment definition as a diagnostic criteria was significantly associated with ADHD prevalence rates. Studies without a definition of impairment had significantly larger prevalence rates than those that included a definition of impairment. Another review similarly highlighted that ignoring the impairment criteria results in higher prevalence rates and more false positive diagnoses (Faraone, Sergeant, Gillberg, & Biederman, 2003).

Further supporting the idea that impairment and symptomology are separate but related constructs, Biederman et al. (2000) recorded ADHD symptoms at 5 times across 4

years, in a sample of 128 males. The authors found that although symptoms of inattention, hyperactivity and impulsivity remitted for 60% of the sample at age 20, the majority of the participants continued to experience significant impairment in adaptive functioning. Looking retrospectively at the relationship between childhood ADHD symptomology and impairment, Barkley et al. (2006) found that the correlations between symptomology and impairment varied from .61 to .88. This suggests that ADHD symptoms alone do not explain all of the impairment experienced in ADHD. The distinctness of symptomology and impairment has also been demonstrated among preschool children. Healey et al. (2008) identified that the proportion of an ADHD preschool population that met the criteria for both symptomology and impairment varied greatly, depending on the rigidity of the impairment criteria. When using more lenient criteria (Children's Problem Checklist [CPC; Healey et al., 2008] parent and teacher  $\geq$  75th percentile) 54% of the sample met both impairment and symptomology criteria, compared to only 23% when using the more stringent criteria (CPC parent and teacher  $\geq$  90th percentile). This suggests that the DSM-V requires a definition of what characterises significant impairment to avoid under or over diagnosing ADHD. In a similar vein, Gordon et al. (2006) used 41 indices of impairment and functioning in a large sample of 2,900 children and adults. Gordon and colleagues found that ADHD symptoms did not predict over 25% of the variance in functioning and on average the correlation between symptomology and impairment explained less than 10% of the variance (Gordon et al., 2006). Overall this literature highlights that symptomology and impairment are separate constructs, suggesting that a child may exhibit many ADHD symptoms without experiencing significant impairment in adaptive functioning, or alternatively a child may have few ADHD symptoms, but experience severe functional impairment.

**ADHD and Medication.** At present, it is more common for children with ADHD to be treated with medication (82.6%), than behaviour therapy (44%; Visser et al., 2005). At a

workshop on ADHD in 2010, Hinshaw et al. (2011) had representatives from a range of countries answer various questions about ADHD in survey format. Hinshaw and colleagues identified that in the majority of nations, at least half of all people with a diagnosis of ADHD, but especially children and adolescents, are treated with medication. Psychostimulants (i.e. methylphenidate and dexamphetamine) are the most commonly prescribed ADHD medication (84.8%; Visser et al., 2015). Positively, 70% to 80% of children who are prescribed psychostimulants experience an improvement in ADHD symptomology (Ministry of Health, 2001). The New Zealand Ministry of Health (2001) guidelines on ADHD treatment state that medication is superior to behavioural treatments. Despite this, behavioural therapies are implemented in New Zealand if parents choose not to medicate their children, or if children are unable to tolerate medication (Ministry of Health, 2001). Contradictory to the Ministry of Health guidelines, the 2018 National Institute for Health Care and Excellence (NICE) guidelines highlight that psychosocial interventions, such as classroom behavioural interventions, parent training and group parent education programmes, should be the first-line of treatment for children and preschoolers with ADHD (Kendall, Taylor, Perez, & Taylor, 2008; NICE, 2018). The NICE guidelines also emphasise that medication should only be offered to children aged five and over if their symptoms continue to cause impairment after environmental modifications have been implemented. Despite these recommendations, psychosocial interventions are more costly than medication in terms of availability, resources and parental effort (Ministry of Health, 2001).

Although the use of medication for treating ADHD has sufficient support, ADHD symptoms are typically the primary outcome when testing the effectiveness of treatments (Molina et al., 2009). Given the distinctness of functional impairment and symptomology, it is important that impairment is also used as an outcome measure (Molina et al., 2009). For example, although medication has been shown to reduce inattention and hyperactivity, many

children continue to experience impaired adaptive functioning in areas such as making and keeping friends and academic performance (Gualtieri & Johnson, 2008; Loe & Feldman, 2007; Rapport, Denney, DuPaul, & Gardner, 1994). Additionally, members of the general public as well as some health professionals and educators have indicated they are dubious about using medication to treat ADHD in children (Mueller, Fuermaier, Koerts, & Tucha, 2012). Much of this scepticism comes from the possible side effects associated with ADHD medications, which include decreased appetite and growth (Zachor, Roberts, Hodgens, Isaacs, & Merrick, 2006), as well as headaches, stomach aches, irritability and changes in sleep (Wolraich, McGuinn, & Doffing, 2007). Furthermore, a number of children with ADHD have reported experiencing personality changes when taking medication, including not feeling like oneself and being less social (Davis-Berman & Pestello, 2010; Harpur, Thompson, Daley, Abikoff, & Sonuga-Barke, 2008). These side effects may increase impairment in adaptive functioning in children with ADHD (Mueller et al., 2012).

Taken together, medication aims to reduce symptomology rather than functional impairment, medication is associated with side effects and scepticism, and recent guidelines suggest psychosocial interventions as the first-line treatment for childhood ADHD (NICE, 2018). The above findings suggest it is important that factors affecting child functioning, above and beyond ADHD symptomology, are identified so that they can be targeted in psychosocial interventions for childhood ADHD.

### **Parental Characteristics**

It is likely that many individual child factors as well as wider environmental factors, such as the home and school, affect the functioning of children with ADHD, as they do with any child. According to Bronfenbrenner (1986), parental characteristics have an important role in the wider ecology of children, therefore, it is necessary that parental characteristics are explored when considering the development of child psychopathology, including ADHD.

Previous research has identified that parental characteristics are associated with variance in the symptomology and functioning of children with ADHD (Johnston & Mash, 2001; Pressman et al., 2006). Furthermore, interventions that target parental characteristics in parents whose children have ADHD have been associated with a number of positive outcomes for both children and parents (Gerdes, Haack, & Schneider, 2012; Treacy, Tripp, & Baird, 2005; Van der Oord, Bögels, & Peijnenburg, 2012). Psychological treatments that target parental characteristics, through the likes of parent training, have been identified as more successful than child focused interventions at reducing ADHD symptomology and functional impairment (Sonuga-Barke et al., 2013). Parent or family based interventions are also easier to implement (Kaslow, Broth, Smith, & Collins, 2012; Sanders, 1999), and have been successfully employed in group settings (i.e. Positive Parenting Programme; Hoath & Sanders, 2002). It is therefore necessary to further investigate how parental characteristics influence impairment in child functioning, to determine treatment approaches for childhood ADHD other than medication. Previous research has identified that parenting-related stress, parent personality, and parent coping all play a unique role in child functioning, above and beyond ADHD symptom severity.

**Parenting-Related Stress.** Stress can be defined as a state of mental or emotional tension that results from circumstances that are perceived to be demanding (Abidin, 1995; Belsky, 1984). Parenting-related stress refers to the stress, or aversive emotions, that are related to the demands of parenting (Deater - Deckard, 1998). Risk factors for high parenting-related stress include poor social support, low income, and marital conflict (Armstrong, Fraser, Dadds, & Morris, 1999; Farel & Hooper, 1998; Hahn & DiPietro, 2001; Smith, Oliver, & Innocenti, 2001). Previous studies have highlighted that both child and parental factors account for unique variance in parenting-related stress (Anastopoulos, Guevremont, Shelton, & DuPaul, 1992; Harrison & Sofronoff, 2002). For example, parental neuroticism (Conard &

Matthews, 2008; Schneider, 2004; Suls, 2001) and parental use of maladaptive coping strategies (Hastings et al., 2005; Podolski & Nigg, 2001; Solem, Christophersen, & Martinussen, 2011) have been associated with increased parenting-related stress. Furthermore, research has identified that parents of children with neurodevelopmental disorders, such as ADHD, experience more parenting-related stress than parents of typically developing children (Dumas, Wolf, Fisman, & Culligan, 1991; Estes et al., 2009; Theule, Wiener, Tannock, & Jenkins, 2013). ADHD symptomology negatively affects the child's interactions with others. For example, when interacting with their parents children with ADHD tend to be less obedient, more off-task, and require more assistance and attention than typically developing children (Barkley, 2013). These behaviours create considerable stress for parents (Fischer, 1990), particularly mothers (Östberg, 1998; Yeh, 2002), who are more likely to interact with children at times when negative behaviours may be displayed (Lifford, Harold, & Thapar, 2008).

Various studies suggest that parents of children with ADHD experience greater parenting-related stress than parents of children without ADHD (i.e. Gupta, 2007; Johnston & Mash, 2001; Theule et al., 2013). For example, a review by Morgan, Robinson, and Aldridge (2002) identified that parents of children with externalising difficulties, including ADHD, experience significantly more parenting-related stress than children without externalising difficulties. Similarly, a review by Johnston and Mash (2001) highlighted that parents of children who have ADHD report more parenting-related stress than parents of children who do not have ADHD. Furthermore, the authors state that this association is evident across child ages, differing degrees of ADHD symptomology, both female and male children, and typically across both mothers and fathers. Other studies have identified a small difference between the parenting-related stress of mothers and fathers, in that mothers find their children with ADHD to be slightly more stressful than fathers (Baker, 1994; Morgan et al., 2002). A

meta-analysis of 44 studies that assessed the relation between parenting-related stress and ADHD in children, highlighted that parents whose children have ADHD experience significantly more stress than parents whose children do not have ADHD (Theule et al., 2013). Furthermore, Theule and colleagues found little difference in the degree of stress experienced by mothers and fathers, and that both inattentive and hyperactive-impulsive symptoms were predictive of parenting-related stress. In contrast, Graziano, McNamara, Geffken, and Reid (2011) identified that only the severity of children's hyperactive-impulsive symptoms, not inattentive symptoms, were associated with parenting stress (Graziano et al., 2011). Anastopoulos, Guevremont, Shelton, and DuPaul (1992) assessed significant predictors of parenting-related stress in a sample of 104 children with ADHD and their mothers. In line with other research, their results highlighted that the severity of children's ADHD symptoms is a significant predictor of maternal parenting-related stress. Some studies have highlighted that parents of children with ADHD experience no more stress than parents of children with learning difficulties, ASD, developmental delays and internalising disorders (Theule et al., 2013). Other studies suggest that parents of children with ADHD experience greater stress than parents of typically developing children, parents of children who have HIV or asthma, as well as parents of children with developmental difficulties (Gupta, 2007). Overall the available literature highlights that parents of children with ADHD experience significantly greater parenting-related stress than parents whose children do not have ADHD.

In addition to ADHD being associated with increased parenting-related stress, there is evidence which suggests increased parenting-related stress is also associated with decreased adaptive functioning in children. Parenting-related stress strains the psychological resources of parents and may directly, or indirectly, impact on parent-child relationships (Hillson & Kuiper, 1994). Children whose parents experience high levels of stress, are more likely than children whose parents experience lower levels of stress, to have a number of difficulties.

These include a poor child-parent relationship, insecure/ambivalent parent-child attachment and difficulties with language, cognition, emotional regulation and social competence (Lifford et al., 2008; Östberg & Hagekull, 2000; Scher & Mayseless, 2000; Shields, Cicchetti, & Ryan, 1994). In a sample of 94 children aged 3 to 5 years, with and without ADHD, DuPaul, McGoey, Eckert, and VanBrakle (2001) identified that parents whose children had ADHD experienced more stress and greater use of maladaptive coping strategies than parents whose children did not have ADHD. In addition to this, DuPaul and colleagues also highlighted that children with ADHD displayed greater noncompliant and inappropriate behaviour, greater negative social behaviour, and poorer academic functioning, in comparison to children who did not have ADHD. Similarly, Ayoub, Vallotton, and Mastergeorge (2011) identified that both higher general stress and higher parenting-related stress are associated with poor language and self-regulation skills in children. Furthermore, parenting-related stress was found to be more directly associated with child development, whereas the relationship between general stress and child development was mediated through parent-child interaction. Positively, participating in an Early Head Start intervention was shown to lessen the effects of parenting-related stress on child development (Ayoub et al., 2011). Taken together, these findings highlight that increased parenting-related stress is associated with decreased adaptive functioning in children.

Overall, available literature emphasises that ADHD symptomology is a risk factor for increased parenting-related stress and greater parental stress is associated with poorer child adaptive functioning.

**Parent Personality.** Specific parental personality traits, particularly neuroticism, have been associated with increased parenting-related stress, which will likely impact child functioning above and beyond ADHD symptom severity (Conard & Matthews, 2008; Schneider, 2004; Suls, 2001). Personality traits can be defined as an individual's patterns of

thoughts, feelings, and behaviours (McCrae & Costa, 1990; Wiggins, 1996), that remain stable over time (Terracciano, Costa, & McCrae, 2006). According to the literature the most supported view of personality is a five-trait structure, known as the Big Five, or the Five Factor Model (DeYoung, Quilty, & Peterson, 2007; John & Srivastava, 1999; McCrae & Costa, 1999). The Five Factor Model provides a broad, non-pathological formulation of regular traits (Nigg & Hinshaw, 1998): extraversion (or positive affectivity), agreeableness (versus antagonism), conscientiousness (or constraint), neuroticism (versus emotional stability) and openness to experience (or intellect/culture; McCrae & Costa, 1990). A number of factor analyses support this model, which has been replicated across a large number of diverse samples.

Personality characteristics influence the lives and behaviour of individuals in countless ways (Caspi & Shiner, 2006; Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007). Available literature suggests that parental personality style can influence child functioning for better or for worse (i.e. Nigg & Hinshaw, 1998; Oliver, Guerin, & Coffman, 2009; Prinzie et al., 2004, 2005). In terms of having a positive influence on child functioning, parental openness to experience (Metsäpelto & Pulkkinen, 2003), agreeableness (Belsky, Crnic, & Gable, 1995) and conscientiousness (L. A. Clark, Kochanska, & Ready, 2000; Losoya, Callor, Rowe, & Goldsmith, 1997) have been positively associated with supportive parenting practices and therefore better child functioning. A longitudinal study of 111 adolescents and their mothers and fathers found that conscientiousness among parents was related to ease in parental limit setting, which facilitated behavioural adjustment among adolescents (Oliver et al., 2009). Similarly, high levels of conscientiousness and extraversion in parents determined fewer child behaviour difficulties (Nigg & Hinshaw, 1998; Prinzie et al., 2005). There is some controversy as to whether certain traits improve or hinder child functioning. For example, in fathers the trait of openness to experience has been positively correlated with

antisocial behaviour among primary school aged children (Nigg & Hinshaw, 1998). In contrast, other studies have found parental openness to experience to have a beneficial influence on children (Metsäpelto & Pulkkinen, 2003). For the trait of agreeableness, one study found a positive relationship between maternal agreeableness and externalising problems in children (Prinz et al., 2004), whereas another study found that maternal agreeableness was negatively correlated with ADHD in children (Nigg & Hinshaw, 1998). Similarly, it has been suggested that parental extraversion and child conduct problems are related (Belsky et al., 1995), but extraversion has also been positively associated with supportive and nurturing parenting practices (Metsäpelto & Pulkkinen, 2003). Despite this controversy, for the most part research suggests parental conscientiousness, extraversion, agreeableness and openness to experience are associated with positive child functioning.

Despite the various associations between the Big Five personality traits and child functioning, parent personality literature places most emphasis on the negative relation between parental neuroticism and child functioning (Bates, Bayles, Bennett, Ridge, & Brown, 1991; Borduin, Henggeler, & Pruitt, 1985). Neuroticism refers to being susceptible to negative emotions such as fear, anger, sadness, guilt and embarrassment (Costa & McCrae, 1992b). The heritability of neurotic traits is approximately 50% (Eysenck, 1990) and neuroticism is stable throughout adulthood (Kendler, Neale, Kessler, Heath, & Eaves, 1993; McCrae & Costa, 1990). Of the Big Five personality traits neuroticism is likely to have the greatest impact on child functioning because it implies that parents will experience greater stress and have difficulty coping with this stress (Costa & McCrae, 1992b). Indeed, parent personality traits are correlated with parental coping styles. For example, parents who are high in neuroticism are more likely to use maladaptive coping strategies, such as passive emotion-focused strategies, avoidance, interpersonal withdrawal and self-blame (Lee-Bagley, Preece, & DeLongis, 2005). In contrast, parents high in the other four of the Big

Five personality traits have for the most part been shown to use more adaptive coping strategies, such as active coping and support seeking (DeLongis & Holtzman, 2005; Lee-Baggley et al., 2005).

High parental neuroticism is associated with poor psychosocial functioning, negative parenting and stressful life events, which impacts on the family environment and consequently increases the likelihood of children developing psychosocial difficulties (Ellenbogen & Hodgins, 2004). For example, using clinician ratings as well as parent and teacher Child Behaviour Checklist (CBCL; Achenbach & Edelbrock, 1991) ratings, Ellenbogen and Hodgins (2004) found that high parental neuroticism was related to internalising and externalising difficulties among children. For example, children whose parents were high in neuroticism were more likely to experience somatic complaints, anxiety, depression, withdrawal, aggression, social problems and attention difficulties. Similarly, high neuroticism in mothers has been associated with defiant and angry behaviour in toddlers (Kochanska, Clark, & Goldman, 1997), externalising problems in 8 year old boys (Bates et al., 1991), and signs of antisocial behaviour among boys aged 6 to 12 years, some of whom had ADHD (Nigg & Hinshaw, 1998). Nigg and Hinshaw (1998) also found that boys diagnosed with ADHD and ODD/CD were more likely to have fathers with high neuroticism and low agreeableness. Furthermore, in a sample of 500 Belgian school children Prinzie et al. (2004, 2005) identified a negative relation between emotional stability (similar to neuroticism) and children's externalising problems. Overall, high neuroticism in parents is consistently related with childhood psychosocial difficulties, particularly behavioural difficulties. Thus, the literature suggests that parental neuroticism influences child functioning.

Neuroticism is also a risk factor for parenting-related stress, which will likely influence child functioning above and beyond ADHD symptom severity. Individuals high in

neuroticism report higher levels of cognitive, physiological, and emotional stress (Conard & Matthews, 2008; Ebstrup, Eplov, Pisinger, & Jørgensen, 2011). Research suggests that neuroticism creates a psychological inclination to over-consolidate threat related stimuli and construe neutral situations as threatening (Craske, 1999; Zautra, Affleck, Tennen, Reich, & Davis, 2005).

A number of studies have found that individuals who are high in neuroticism are more sensitive to the negative effects of stress, compared to those who are low in neuroticism (i.e. Bolger & Schilling, 1991; Ormel & Wohlfarth, 1991; Van Os & Jones, 1999). For example, in a longitudinal study Kendler and colleagues (2004) identified that neuroticism moderates the effects of stress exposure. Similarly, Bolger and Schilling (1991) had 339 participants complete daily reports of minor stressful events and mood for 6 weeks. The author's findings highlight that participants high in neuroticism were more likely to report stressful events and feeling stressed by these, compared to those low in neuroticism. Bolger and Schilling's findings were also replicated by Bolger and Zuckerman (1995) in a sample of 94 students. Similarly, in a general population sample (n=296), Ormel and Wohlfarth (1991) found that neuroticism had a direct effect on psychological distress, despite their measure of neuroticism being completed 7 years earlier. Moreover, the effect of neuroticism on psychological distress was stronger than the effect of both long-term difficulties and life situation change, suggesting neuroticism may influence stress more than environmental characteristics. In a sample of 30 dual earner families Wang, Repetti, and Campos (2011) found that fathers who were higher on the neuroticism trait were more likely to be affected by work related stress at home. In a prospective study of a British birth cohort, stressful life events had a greater impact on the mental health of participants who were higher in the trait of neuroticism (Van Os & Jones, 1999). A number of other studies have emphasised that neurotic individuals are more sensitive to the effects of stress, which increases their vulnerability to depression

(Kendler, Karkowski, & Prescott, 1999; Kendler et al., 2004; Kendler et al., 1995; Kessler, 1997; Ormel, Oldehinkel, & Brilman, 2001; Pereira-Morales, Adan, & Forero, 2017).

In regards to parenting-related stress in particular, in a sample of 79 first-time parents and their children, Casalin, Tang, Vliegen, and Luyten (2014) found that factors of neuroticism (i.e. self-criticism and dependency) were associated with parenting stress. Furthermore, Casalin and colleagues identified that parenting-related stress when children were infants, predicted parenting self-criticism one year later. Similarly, in a longitudinal study of 248 mothers and fathers, Rantanen, Tillemann, Metsäpelto, Kokko, and Pulkkinen (2015) found that parental neuroticism at age 33 years positively predicted parenting stress at age 42 years. In contrast, parents with high levels of extraversion, agreeableness, conscientiousness, and openness have for the most part been negatively associated with parenting stress (Hutteman et al., 2014; Mulsow, Caldera, Pursley, Reifman, & Huston, 2002; Plotkin, Brice, & Reesman, 2013; Vermaes, Janssens, Mullaart, Vinck, & Gerris, 2008). Overall, the reviewed literature suggests that the personality trait of neuroticism is associated with increased parenting-related stress and decreased child adaptive functioning.

**Parental Coping.** Parental coping also impacts on the degree of parenting-related stress experienced, which will likely impact on the adaptive functioning of children above and beyond ADHD symptom severity. Coping refers to using cognitive, emotive and behavioural strategies to manage situations that are perceived to be stressful (Durukan et al., 2008). Like personality traits, coping styles are thought to be stable over time and situations (Carver, 1997). Various coping styles have been identified including avoidant styles, problem styles, seeking social support, substance use and emotional coping, such as expressing emotion, regulating emotions and positive reframing (Carver, 1997). Typically more psychosocial difficulties are associated with the use of certain emotional (i.e. expressing and regulating emotions) and avoidant type coping strategies (Holahan, Moos, & Schaefer, 1996). Less

psychosocial difficulties are associated with the use of other emotional strategies (i.e. positive reframing), problem focused coping and seeking social support (Carver, 1997).

The available literature suggests that poor parental coping has a negative impact on child adaptive functioning. For example, using emotion-focused coping strategies had a negative impact on the functioning of children, due to lack of parental emotional support, organisation, predictability and consistency (Ellenbogen & Hodgins, 2004). In regards to substance use as a means of parental coping, literature highlights that parental substance use is associated with poor parenting practices and lack of nurturing environment, and therefore impacts on the entire family (Barnard & McKeganey, 2004; Lander, Howsare, & Byrne, 2013). Furthermore, children whose parents use substances are more likely to experience poor outcomes such as problematic behaviours, poor adjustment, less social behaviours and greater difficulties with hyperactivity, inattention, impulsivity and aggression (Barnard & McKeganey, 2004; Lander et al., 2013; Ornoy, Michailevskaya, Lukashov, Bar-Hamburger, & Harel, 1996). Similarly, Lee (2003) found that when mothers used maladaptive coping techniques, such as avoidance, their children were more likely to have behavioural problems. Positive associations between parental coping style and child functioning have been identified. For example, in a sample of children with and without ADHD and their parents, the coping style of positive reframing was associated with less parental distress and better child behaviour (Podolski & Nigg, 2001). Furthermore, children achieve better verbal scores and math scores when their mothers have good emotional modulation (Skowron, 2005).

Adequate parental coping is crucial for healthy emotion socialisation and emotion regulation in children, which are components of child adaptive functioning (Zeman, Cassano, Perry-Parrish, & Stegall, 2006). For example, children who can regulate their emotions tend to elicit more positive attention, show competence in cognitive and socio-emotional domains and have more positive relationships (Alvord & Grados, 2005). Theories suggest that when

parents use maladaptive coping strategies their children may learn, through modelling, to suppress their negative emotions, increasing the child's negative emotionality and anxiety (Buck, 1984). Overall, this initiates a cycle of more intense and dysregulated negative emotions (Buck, 1984; Eisenberg, Spinrad, & Eggum, 2010), which may increase the likelihood of children engaging in maladaptive coping and displaying dysfunctional behavioural responses (Fabes, Leonard, Kupanoff, & Martin, 2001). This is problematic given maladaptive coping among children has been associated with an increased risk of developing psychological difficulties (Shipman & Zeman, 2001; Suveg, Zeman, Flannery-Schroeder, & Cassano, 2005), including depression and anxiety (Zeman, Shipman, & Suveg, 2002).

Available literature also suggests that parental coping influences parenting-related stress, which likely impacts on child adaptive functioning above and beyond ADHD symptom severity. Lazarus and Folkman's (1984) Transactional Model of Stress and Coping is a framework which states that the degree of stress experienced depends on one's appraisal of the situation and ability to cope with stress when demands exceed resources. An individual's experience of stress is related to how they interpret the stressful event and whether coping strategies are available and can be employed effectively to manage the stress (Mak & Ho, 2007; Peterson, Hennon, & Knox, 2005). Research has identified that parental coping affects the degree of parenting-related stress that mothers and fathers experience (i.e. Hastings & Johnson, 2001; Hastings et al., 2005). For example, Hastings et al. (2005) identified that avoidant coping is correlated with a high degree of stress and mental health difficulties in parents of children with ASD. Furthermore, mothers who use substances as a means of coping are more likely to experience higher levels of parenting-related stress than mothers who do not use substances as a way of coping (Kelley, 1998; Nair, Schuler, Black, Kettinger, & Harrington, 2003). Moreover, in a sample of 147 Malaysian mothers of children with Down syndrome, Norizan and Shamsuddin (2010) identified that lack of acceptance of having a

child with difficulties predicts the degree of parenting stress experienced, above and beyond children's behavioural difficulties. In contrast, Hastings and Johnson (2001) explored the predictors of stress in a sample of 141 primary caregivers of children with ASD participating in a behavioural intervention (Hastings & Johnson, 2001). The authors identified that adaptive coping strategies (i.e. reframing and acquiring social support), as measured by the Family Crisis Orientated Personal Evaluation Scales (F-COPES; McCubbin, Olson, & Larsen, 1991), were associated with decreased parenting-related stress (Hastings & Johnson, 2001). Other studies have also found that the use of positive coping techniques is related to reduced stress in parents whose children have disabilities (Jones & Passey, 2004).

In regard to parents of children with ADHD, many studies have highlighted that this population is more likely to use maladaptive coping strategies and experience greater parenting-related stress (Jones & Passey, 2004; Kadesjö, Stenlund, Wels, Gillberg, & Hägglöf, 2002; Podolski & Nigg, 2001). For example, studies have identified mothers of children who have ADHD are more likely to use indirect coping strategies, such as avoidance and seeking support (Bailey, Barton, & Vignola, 1999). Furthermore, Kadesjö and colleagues (2002) found that mothers of children with ADHD experienced higher stress and had more difficulties with coping and accepting their child, compared to mothers of children without ADHD. Moreover, Solem et al. (2011) investigated whether children's behavioural difficulties and parental coping predict parenting-related stress in a sample of 192 boys aged 6 to 13 years, with and without behavioural problems (including ADHD). The authors found that boys' behavioural problems predict 57% of the variance in parenting-related stress and that avoidant coping strategies are correlated with greater parenting stress. Social supports have also been identified as important coping mechanisms (Hauser - Cram, Warfield, Shonkoff, & Krauss, 2001). Unfortunately, families of children with ADHD have been shown to have lower levels of social support from family and friends, compared to families of

children without ADHD (Lange et al. 2005). Positively, greater use of positive reframing has been identified as being correlated with less parenting stress in parents of children with ADHD (Podolski & Nigg, 2001). Similarly, Jones and Passey (2004) assessed predictors of parenting-related stress in a sample of 48 British parents whose children had developmental disabilities and behavioural difficulties including ADHD, learning disabilities, ASD and Down syndrome. Results suggested that family coping style is a key predictor of parenting-related stress, in that families who employ active coping strategies (i.e. optimism, focus on family integration and co-operation) reported less stress.

Overall, the reviewed literature suggests that parental maladaptive coping strategies are associated with increased parenting-related stress, which is associated with decreased child adaptive functioning.

### **Present Study**

As highlighted in the reviewed literature, both child ADHD symptomology and maternal characteristics have an effect on the adaptive functioning of children. The present study will firstly examine the relations between ADHD symptom severity, child adaptive functioning, maternal parenting-related stress, maternal personality and maternal coping. Secondly, we will look at whether dimensions of maternal personality and maternal coping are significantly associated with parenting-related stress, above and beyond child ADHD symptom severity. We will then examine whether parenting-related stress, as well as the interaction between parenting-related stress and ADHD symptom severity, account for unique variance in child adaptive functioning, above and beyond child ADHD symptom severity. A visual representation of the model that was tested in the present study is depicted in Figure 1 below.

It is hypothesised that adaptive functioning will be lower in children who experience greater ADHD symptomology and whose mothers experience greater parenting-related stress, report less favourable personality traits (i.e. neuroticism) and exhibit greater use of maladaptive coping styles (i.e. avoidance and substance use). Secondly, we expect that dimensions of maternal personality and coping will account for unique variance in maternal parenting-related stress, above and beyond child ADHD symptom severity. More specifically, it is hypothesised that greater maternal neuroticism and greater use of maladaptive coping styles will be related to greater parenting-related stress, above and beyond child ADHD symptomology. Finally, it is hypothesised that parenting-related stress will account for unique variance in child adaptive functioning, above and beyond ADHD symptom severity. Specifically, we expect that greater maternal parenting-related stress, and the interaction of parenting-related stress with child ADHD symptom severity, will be predictive of poorer child adaptive functioning.

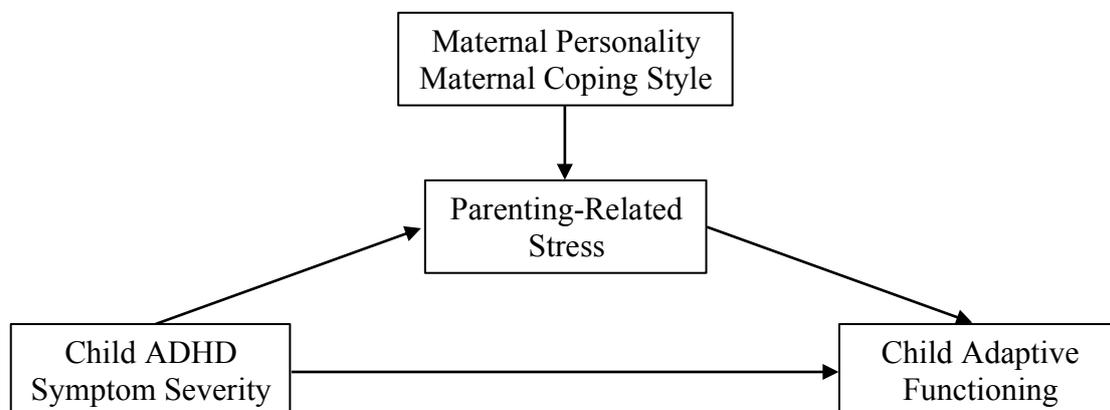


Figure 1. Visual representation of the model that was tested in the present study.

## Method

### Participants

Participants in the present study were recruited in a number of ways. One method of recruitment was through two pre-existing databases, one of which was a University of Otago Psychology Department database comprising of families who took part in previous ADHD

related studies and agreed to be contacted concerning future studies. The second database consisted of Dunedin children who were invited to join at birth via their parents, and whose parents consented to be contacted to participate in subsequent studies run within the department of psychology. In addition to sourcing participants from these two databases, participants were also recruited via clinical referrals from the Sothern District Health Board's Paediatrics outpatient service and Child and Family Mental Health Service, in Dunedin, New Zealand. Children within the target age range were also recruited through word of mouth and notices posted online via Facebook.

Following recruitment, a registered clinical psychologist determined whether a diagnosis of ADHD was warranted by assigning summary ratings on the Kiddie-Schedule for Affective Disorders and Schizophrenia-Present and Lifetime Version (K-SADS-PL; Kaufman, Brimaher, Brent, Rao, & Ryan, 1996) for each ADHD symptom. Further explanation of what these K-SADS-PL summary ratings considered is detailed below. Participants who met diagnostic criteria for any of the ADHD subtypes were included in the ADHD group, while the remaining participants were included in the typically developing group. Participants were excluded if they had a diagnosis of ASD, uncorrected vision or hearing problems, a history of serious head injury, serious medical or neurological conditions (cerebral palsy or epilepsy), if English was not their first language, if their IQ score was below 80, or if they had serious psychopathologies (i.e. psychosis) that would prevent an accurate ADHD diagnosis. Based on these criteria 14 children were excluded because of low IQ. The final eligible sample of participants in the present study were 103 children (59 male, 44 female) aged 6 to 12 years old ( $M = 8.74$   $SD = 1.87$ ), and their parents or guardians. Of these participants 35 were diagnosed with ADHD, and 68 were classified as typically developing. Within the ADHD group, 15 participants were diagnosed as predominantly inattentive, 12 as predominantly hyperactive/impulsive, and 8 as combined subtype. For the

purposes of the present study, the ADHD and control groups were included as one group within our dimensional data analytic methods.

A demographic form was utilised to obtain parental or guardian income, ethnicity and education level. Of the sample of caregivers, mothers (87.4%) and female carers (3.9%; grandmothers, foster mothers, elder sisters) made up 91.3% while fathers made up 8.7%. As the majority of the caregiving sample was made up of mothers and female carers, and there were too few fathers to analyse mothers and fathers separately, the present study focused on maternal characteristics. Mothers were aged 24 to 67 years old ( $M = 38.43$ ;  $SD = 6.97$ ), and were predominantly New Zealand European (84.5%), with the remainder of mothers being of Māori (1.9%), Chinese (2.9%), or “other” (10.7%) ethnicity. With regard to family income, parents rated this on a scale of 1 (no income) to 14 (\$150,000 or more). Based on this, the mean income score for the sample was 8.11 ( $SD = 3.49$ ) for mothers and 10.86 ( $SD = 2.34$ ) for fathers, indicating an average income of between \$70,000 and \$85,000 for families. Education was rated on a scale from 1 (no high school qualifications) to 9 (postgraduate degree). The mean education rating for caregivers in this sample was 6.18 ( $SD = 2.83$ ), indicating some tertiary training.

## Measures

**Kiddie-Schedule for Affective Disorders and Schizophrenia-Present and Lifetime Version.** The Kiddie-Schedule for Affective Disorders and Schizophrenia-Present and Lifetime Version (K-SADS-PL; Kaufman, Brimaher, Brent, Rao, & Ryan, 1996) is a comprehensive, semi-structured, diagnostic interview based on DSM-IV criteria. Specific sections of the K-SADS-PL were used in the present study, including the school adaptation and social relations portion of the unstructured introductory interview, the ADHD screen and supplement, the ODD screen and supplement, and the CD screen. A student within the University of Otago Clinical Psychology Programme administered the relevant sections of the

K-SADS-PL to parents and noted the responses. Each question was scored on a 4-point Likert scale (0 = no information present, 1 = behaviour not present, 2 = sub-threshold, and 3 = threshold), contingent on parent-reported frequency, intensity and impairment.

A diagnosis of ADHD was determined by a registered clinical psychologist, by assigning summary ratings on the K-SADS-PL scale for each symptom. Summary ratings took into account parent responses to each K-SADS-PL symptom item, observations of the child's behaviour both when attending the research centre and at school, and parent and teacher responses on respective items from the Attention-Deficit/Hyperactivity Disorder Rating Scales-Fourth Edition (ADHD-RS-IV; DuPaul, Power, Anastopoulos & Reid, 1998) and the Behaviour Assessment System for Children, Third Edition (BASC-3; Reynolds & Kamphaus, 2015).

The K-SADS-PL has demonstrated adequate test-retest reliability (.63) as well as excellent inter-rater reliability (93% to 100%). Furthermore, the K-SADS-PL has good concurrent, predictive, and construct validity (Ambrosini, 2000; Kaufman et al., 1996). The K-SADS-PL has also showed good convergent validity through being significantly correlated with the CBCL, a measure that assesses internalising and externalising problems in children through obtaining information from children, parents and teachers (Kim et al., 2004).

**Behaviour Assessment System for Children, Third Edition.** The BASC-3 is a multidimensional measure, which assesses a wide range of adaptive, behavioural, and emotional problems in children and young adults (Reynolds & Kamphaus, 2015). The present study used the BASC-3 Parent Rating Scales (PRS) and Teacher Rating Scales (TRS) for primary school aged children (aged 6 years to 11 years 11 months), which respectively consist of 4 and 5 composite scales and 14 and 15 primary scales. Informant's responded to each question using a 4-point Likert scale (N = Never, S = Sometimes, O = Often and A = Almost Always). A raw score is derived for each composite and primary scale and is then transformed

into a *T*-score (0-120). On the externalising, internalising and behavioural scales, higher scores indicate more significant difficulties, whereas on the adaptive scales, lower scores indicate more significant difficulties.

In the present study, the BASC-3 Adaptive Skills composite score was used as our global measure of child functioning. The Adaptive Skills composite scale measures constructs that are often considered behavioural strengths, and is made up of scales for adaptability, functional communication, leadership, social skills, activities of daily living (PRS only) and study skills (TRS only). Adaptability assesses the skill of being able to easily adjust to changes in ones environment. The functional communication scale measures a young persons capacity to convey ideas and converse in a manner which others can understand. The leadership scale evaluates abilities related to functioning with others and completing academic, social, or community goals. The social skills scale assesses the degree to which a young person effectively communicates with peers and adults across settings. The activities of daily living scale measures skills related to performing simple, everyday tasks to an adequate standard. Lastly, study skills pertain to abilities associated with good academic performance (i.e. organisation). High scores on the adaptive scales represent positive or desirable characteristics and low scores represent possible problem areas. Adaptive scale scores ranging from 31 through 40 are considered at-risk and scores 30 or below are considered clinically significant (Reynolds & Kamphaus, 2015).

Data for the BASC-3 general norms was obtained from a representative sample of children across the United States. The BASC-3 scales and composites have been identified to have high internal consistency and test-retest reliability, with most alpha coefficients exceeding 0.80 on both the TRS and PRS (Altmann, Reynolds, Kamphaus, & Vannest, 2017). The inter-rater reliability of the BASC-3 is less satisfactory for some scales, with coefficients ranging from .32 to .78 on the TRS scales and composites and .47 to .75 on the PRS scales

and composites (Reynolds & Kamphaus, 2015). Furthermore, the BASC-3 TRS and PRS were both highly correlated with other measures of childhood behaviour including the Achenbach System of Empirically Based Assessment (ASEBA; Achenbach, 2013), Autism Spectrum Rating Scales (ASRS; Goldstein & Naglieri, 2010), Delis-Rating of Executive Function (D-REF; Delis, 2012) and the Conners-3 (Conners, 2008), indicating good convergent validity (Reynolds & Kamphaus, 2015).

Given the high inter-correlations among the BASC-3 PRS and TRS Adaptive Skills Scale, a Principal Component Analysis with Varimax rotation was conducted to determine whether the PRS Adaptive Skills Scale and the TRS Adaptive Skills Scale would load onto a single factor and could be combined. The results of this analysis are presented in a table in Appendix A. The analysis revealed a single factor, which was labelled Adaptive Skills and used as our measure of adaptive functioning in our analyses.

**Parenting Stress Index - Short Form.** The Parenting Stress Index – Short Form (PSI-SF; Abidin, 1990) is a self-report measure that is designed to assess the stress experienced by the respondent in regard to their role of parenting the target child. In the present study, parents responded to the questionnaires 36 items regarding their perceptions of the child, their interactions with the child, and their own present quality of life, using a 5-point Likert scale ranging from 1 (Strongly Agree) to 5 (Strongly Disagree). The PSI-SF is made up of three subscales including parental distress, parent-child dysfunctional interaction, and difficult child. The measure also contains a defensive responding subscale, with scores under 10 suggesting the parent may be trying to portray him or herself favourably, rather than responding accurately, and thus their responses may be invalid. Adding the three core subscales generates a Total Stress score, with higher scores reflecting greater stress in relation to parenting the target child. Only the PSI-SF Total Stress scores were used in the present study.

In terms of the psychometric properties of the PSI-SF, good internal consistency has been identified with alpha coefficients ranging from 0.80 to 0.91 for each subscale (Abidin, 1995). Haskett, Ahern, Ward, and Allaire (2006) also identified the PSI-SF to have good internal consistency, ranging from .74 to .88 across subscales. Similarly, Roggman, Moe, Hart, and Forthun (1994) reported alpha coefficients of .78 to .90 when using the PSI-SF in a sample of 103 Head Start mothers and fathers. Sufficient test-retest reliability has also been reported with coefficients ranging from 0.68 to 0.85 (Abidin, 1995). The convergent, discriminant and predictive validity of the PSI-SF have also been identified as sufficient (Bigras, Lafreniere & Dumas, 1996; Haskett, Ahern, Ward & Allaire, 2006).

**NEO Five-Factor Inventory.** The NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992a, 1992b) is a shortened form of the Revised NEO Personality Inventory (NEO-PI-R, Costa & McCrae, 1992b). The NEO-FFI is a self-report questionnaire intended to measure the Big Five personality domains of openness, conscientiousness, extroversion, agreeableness, and neuroticism. According to the widely accepted Big Five model of personality, the majority of individual differences in personality characteristics among adults can be explained in terms of these five independent higher order personality traits (Costa & McCrae, 1992a; Goldberg, 1990). Openness reflects intellectual curiosity, openness to feelings and flexibility of behaviour, thoughts and attitudes. Conscientiousness measures the extent to which an individual is well organised, uses planned approaches and is diligent. Extraversion is a measure of traits such as sociability, activity, and the tendency to experience positive emotions. Agreeableness measures social behaviour, with individuals high in agreeableness being sympathetic, trusting, emotionally supportive and cooperative, while individuals low in agreeableness are said to be hostile and indifferent to others. Finally, Neuroticism is the tendency to experience emotional lability and psychological distress or negative emotions, such as anxiety, depression, and anger. In the present study parents rated

60 self-descriptive statements relating to the five personality domains using a 5-point Likert scale, ranging from “strongly agree” to “strongly disagree”. Raw scores were converted into T-scores (with a mean of 50 and a standard deviation of 10) based on age and gender norms. Higher scores indicate the respondent’s personality is more likely to be reflective of that personality trait.

In regard to psychometric properties, the NEO-FFI has been shown to have moderate to very good internal consistency with the five personality domains, with coefficients ranging from 0.75 to 0.87 (Murray, Rawlings, Allen, & Trinder, 2003). Test-retest reliability over a six month period was also good for all five NEO-FFI scales (0.80 to 0.87; Murray et al., 2003). Furthermore, correlations between the NEO-FFI and the Minnesota Multiphasic Inventory, second edition (MMPI-2; Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989), as well as the Millon Multiaxial Inventory (MCMI-II; Millon, 1978), support the convergent and discriminant validity of the NEO-FFI (Costa & McCrae, 1990).

**Coping Orientation to Problems Experienced.** The Coping Orientation to Problems Experienced (COPE; Carver, Scheier, & Weintraub, 1989) is a 60-item questionnaire designed to assess the various coping strategies that individual’s may use in response to stressful situations. The COPE is made up of 15 subscales that contain four items each. These subscales include problem focused coping styles such as active coping, planning and suppression of competing activities. There are also subscales that focus on avoidant coping styles including behavioural disengagement, denial, mental disengagement and substance use. Other subscales focus on socially supported coping (i.e. emotional social support, instrumental social support and focus on and venting of emotions) and emotion-focused coping (i.e. positive reinterpretation, restraint-coping, acceptance, turning to religion and humour). In the present study parents rated their degree of use of these strategies on a 4-point Likert scale ranging from 1 (usually do not do this at all) to 4 (usually do this a lot), based on

what they generally do and feel when they experience stressful events. On each subscale, higher ratings indicate greater use of the relevant coping strategy.

The psychometric properties of the COPE are generally reported to be acceptable. Carver et al. (1989) identified the internal consistency of the COPE scales to range from .45 (mental disengagement) to .92 (turning to religion), with mental disengagement being the only scale that fell below .60. In a sample of 329 undergraduate students, Cook and Heppner (1997) also found the COPE to have adequate internal consistency (alpha coefficients ranging from .46 to .93). In regard to test-retest reliability, in a sample of 89 college students who completed the COPE on two occasions, eight weeks apart, correlations ranging from .46 to .86 were identified for the various COPE scales (Carver et al., 1989). Similarly, in a sample of 116 college students who completed the COPE twice, six weeks apart, correlations ranging from .42 to .89 were identified for the various scales (Carver et al., 1989). The correlations identified in these two samples suggest that self-reports of coping strategies measured by the COPE are relatively stable. Furthermore, Carver et al. (1989) found the COPE scales to have satisfactory convergent and discriminant validity. The COPE has also been found to have sufficient reliability for use in adolescent, adult and parent populations (Durukan et al., 2008; Litman & Lunsford, 2009; McKee, Harvey, Danforth, Ulaszek, & Friedman, 2004; Phelps & Jarvis, 1994).

Given the high inter-correlations among the composites of the COPE, a Principal Component Factor Analysis, with Varimax rotation was conducted to assess the relations among the 15 COPE domains. The results of this analysis are presented in a table in Appendix A. Results yielded a five-factor solution. Positive reinterpretation and growth, suppression of competing activities, and planning loaded strongly onto one factor that was labelled, Active Coping. Focus on and venting of emotions, use of instrumental social support, and use of emotional social support loaded strongly onto one factor that was labelled Emotion-Focused

Coping. Mental disengagement, humour, restraint, and acceptance loaded strongly onto one factor that was labelled Distraction. Denial, religious coping and behavioural disengagement loaded strongly onto one factor that was labelled Avoidance. Lastly, Substance Use comprised the remaining factor and was labelled accordingly. These five factors were used in our analyses.

### **Procedures**

The present study was based on data collected as part of a wider study. Parents of suitable children were contacted to organise a time where they could come in to the research centre with their child. During this initial contact, children were also screened for exclusion criteria and parents were given a verbal description of what the study involved. Following this, parents were sent information sheets regarding the study (Appendix B). When families arrived, the caregiver and the child were given an explanation of what they were going to do with the researchers and consent forms were signed (Appendix B). Researchers clarified to child participants that their participation was voluntary and that they may stop at any time without getting into trouble. Following this, children were administered a number of tasks relevant to the wider study. At the same time, but in another room, parents completed a number of measures including those used in the current study (i.e. a demographic questionnaire, K-SADS-PL, BASC-3, NEO-FFI, PSI-SF and COPE). In appreciation of their participation parents received a \$40 fuel voucher, and children received a \$20 toy voucher. The larger study, which the current study is a part of, was reviewed and approved by the University of Otago Ethics Committee and the Lower South Regional Ethics Committee. A copy of the ethics approval letter is provided in Appendix C.

My role in the data collection for the present study has included conducting K-SADS-PL interviews with parents, conducting classroom observations of children, scoring and entering questionnaire data that was collected from parents and teachers, as well as

participating in various lab meetings, including those where the Children's Global Assessment Scale (CGAS; Shaffer et al., 1983) ratings were provided by lab members following case presentations.

### **Data Analysis**

Firstly, bivariate correlational analyses were conducted to examine the associations among (1) ADHD symptom severity and child adaptive functioning, (2) ADHD symptom severity and dimensions of maternal functioning (maternal personality, parenting-related stress and maternal coping), and (3) child adaptive functioning and dimensions of maternal functioning.

Secondly, Hierarchical Linear Regression analyses were carried out to examine whether maternal personality and coping styles accounted for unique variance in parenting-related stress, above and beyond the impact of child ADHD symptom severity. Next, we examined whether parenting-related stress accounted for unique variance in child adaptive functioning, above and beyond the impact of ADHD symptom severity. Finally, to identify whether the effect of ADHD symptom severity on child adaptive functioning changed depending on the level of parenting-related stress, an interaction term was included to examine whether stress moderated the relation between ADHD symptom severity and child adaptive functioning.

## **Results**

### **Correlations**

Correlations between ADHD Inattentive, Hyperactive, and Total Symptom Severity, and Adaptive Skills are depicted in Table 1. All three subtypes of ADHD symptom severity were statistically significantly ( $p \leq .05$ ) negatively correlated with Adaptive Skills, indicating that greater ADHD symptom severity was associated with lower adaptive functioning in children.

Table 1

*Correlations between ADHD Symptom Severity and Adaptive Skills*

ADHD Symptom Severity	Adaptive Skills
ADHD Inattentive Symptom Severity	-.685**
ADHD Hyperactive Symptom Severity	-.480**
ADHD Total Symptom Severity	-.634**

\*\* $p < .01$

Table 2 portrays correlations between maternal personality, maternal parenting-related stress and maternal coping, and child ADHD Inattentive, Hyperactive and Total Symptom Severity, and child Adaptive Skills. In regard to maternal personality variables, Neuroticism was significantly positively correlated with all dimensions of ADHD Symptom Severity, and significantly negatively correlated with Adaptive Skills. This indicates that greater maternal neuroticism was related to greater ADHD symptom severity and lower adaptive functioning in children. In contrast, Agreeableness was significantly negatively correlated with all dimensions of ADHD Symptom Severity and significantly positively correlated with Adaptive Skills, indicating that greater maternal agreeableness was associated with lower ADHD symptom severity and greater adaptive functioning in children. Similarly, Extraversion and Conscientiousness were significantly negatively correlated with dimensions of ADHD Symptom Severity. Extraversion was significantly negatively correlated with Inattentive and Total Symptoms, and Conscientiousness with Hyperactive and Total Symptoms. This indicates that higher maternal extraversion and conscientiousness were related to lower child inattentive and hyperactive ADHD symptom severity, respectively, and lower child ADHD total symptom severity. Extraversion was also significantly positively correlated with Adaptive Skills, suggesting greater maternal extraversion was associated with

better adaptive functioning in children. Openness was not significantly correlated with ADHD Symptom Severity or Adaptive Skills.

Maternal parenting-related Total Stress was significantly positively correlated with all aspects of ADHD Symptom Severity and significantly negatively correlated with Adaptive Skills. This indicates that greater parenting-related stress was associated with both greater ADHD symptoms and lower adaptive functioning in children.

In regards to maternal coping styles, Avoidance and Substance Use were significantly positively correlated with ADHD Hyperactive Symptoms and ADHD Inattentive Symptoms, respectively. This suggests that greater substance use and avoidant coping styles were associated with greater hyperactive and inattentive ADHD symptoms in children, respectively. Furthermore, Substance Use was significantly negatively correlated with Adaptive Skills, indicating that greater maternal substance use, as a means of coping, was associated with lower adaptive functioning in children. Active Coping, Emotion-Focused Coping and Distraction were not significantly correlated with ADHD Symptom Severity or Adaptive Skills.

Table 2

*Correlations of Maternal Personality, Maternal Parenting-Related Stress and Maternal Coping with ADHD Symptom Severity and Adaptive Skills*

Maternal Variables	ADHD-I Symptom Severity	ADHD-H Symptom Severity	ADHD Total Symptom Severity	Adaptive Skills
<b>Personality</b>				
Neuroticism	.398**	.317**	.389**	-.350**
Extraversion	-.261**	-.127	-.210*	.250**
Openness	-.071	-.037	-.058	.016
Agreeableness	-.169**	-.175*	-.187*	.276**
Conscientiousness	-.133	-.180*	-.171*	.123
<b>Stress</b>				
Total Stress	.524**	.460**	.536**	-.542**
<b>Coping</b>				
Active	-.061	-.064	-.068	.139
Emotion-focused	-.012	.028	.009	.032
Distraction	.117	.151	.147	-.043
Avoidance	.111	.173*	.156	-.150
Substance Use	.171*	-.011	.085	-.176*

\* $p < .05$ ; \*\* $p < .01$

Table 3 depicts correlations among maternal personality, maternal parenting-related stress and maternal coping. In regards to maternal personality and parenting-related stress, Neuroticism was significantly positively correlated with Total Stress, whereas Extraversion, Openness, Agreeableness and Conscientiousness, were all significantly negatively correlated with Total Stress. These correlations indicate that higher maternal neuroticism was associated

with more parenting-related stress, whereas higher ratings of extraversion, openness, agreeableness and conscientiousness, were associated with lower parenting-related stress.

Correlations between parenting-related stress and maternal coping indicate that parenting-related Total Stress was significantly negatively correlated with Active Coping, and significantly positively correlated with Avoidance and Substance Use. This suggests that greater maternal parenting-related stress was associated with less use of active coping and greater use of avoidance and substance use. Parenting-related Total Stress was not significantly correlated with Emotion-Focused coping or Distraction.

In regards to maternal personality and maternal coping, Neuroticism was significantly negatively correlated with Active Coping and significantly positively correlated with Emotion-Focused Coping, Avoidance and Substance Use. These correlations indicate that greater maternal neuroticism was associated with less active coping and greater emotion-focused coping, avoidance and substance use. Extraversion was only significantly positively correlated with Active Coping, indicating that greater maternal extraversion was associated with greater use of active coping. The personality trait of Openness was significantly positively correlated with Active Coping and Emotion-Focused Coping, and significantly negatively correlated with Avoidance. This suggests that greater maternal openness was associated with greater use of active coping and emotion-focused coping and less use of avoidance. Maternal Agreeableness was only significantly positively correlated with Emotion-Focused Coping, indicating that greater maternal agreeableness was associated with greater use of emotion-focused coping. Lastly, the personality trait of Conscientiousness was significantly positively associated with Active Coping but significantly negatively associated with Emotion-Focused Coping, Distraction and Substance Use. This suggests that greater maternal conscientiousness was associated with greater use of active coping and less use of emotion-focused coping, distraction based coping and substance use.

Table 3

*Correlations between Maternal Personality, Maternal Parenting-Related Stress and Maternal Coping*

	Parent Stress	Active Coping	Emotion-focused	Distraction	Avoidance	Substance Use
Neuroticism	.613**	-.360**	.254**	.024	.251**	.246**
Extraversion	-.512**	.307**	.139	.063	-.174	-.293
Openness	-.169**	.244**	.218*	.141	-.283**	.098
Agreeableness	-.388**	.149	.198*	.128	-.132	-.073
Conscientiousness	-.240**	.372**	-.210*	-.228*	-.149	-.171*
Parent Stress		-.300**	.066	.029	.309**	.218*

\* $p < .05$ ; \*\* $p < .01$

### Regression Analyses

Separate regression analyses were carried out using ADHD Inattentive Symptom Severity, ADHD Hyperactive Symptom Severity, and ADHD Total Symptom Severity as one of the independent variables. The results of these three analyses produced similar patterns of results and thus only the regression analyses for ADHD Total Symptom Severity will be presented within the main body of the thesis. The results of the regression analyses for ADHD Inattentive Symptom Severity and ADHD Hyperactive Symptom Severity are included in Appendix D.

In the first regression, which predicted parenting-related Total Stress, child ADHD Total Symptom Severity was entered into the first block, followed by maternal personality factors in the second block and maternal coping styles in the third block. As shown in the final model depicted in Table 4, child ADHD Symptom Severity and the maternal personality factors of Neuroticism, Extraversion and Agreeableness accounted for unique variance in parenting-related Total Stress, after controlling for all other variables within the model.

Table 4

*Hierarchical Linear Regression analysis examining whether Maternal Personality and Coping account for unique variance in Parenting-Related Stress, above and beyond ADHD Total Symptom Severity*

Predictor Variables	$\beta$ *	SE	Beta	t	p
<b>Child ADHD Symptom Severity</b>					
ADHD Total	.672	.151	.338	4.462	<b>.000</b>
<b>Maternal Personality</b>					
Neuroticism	.494	.244	.222	2.024	<b>.046</b>
Extraversion	-.613	.283	-.205	-2.164	<b>.033</b>
Openness	-.139	.290	-.040	-.480	.632
Agreeableness	-.662	.268	-.185	-2.471	<b>.015</b>
Conscientiousness	.193	.284	.056	.678	.500
<b>Maternal Coping</b>					
Active Coping	-2.401	1.716	-.118	-1.400	.165
Emotion-focused Coping	1.884	1.611	.092	1.170	.245
Distraction	.592	1.462	.029	.405	.686
Avoidance	2.804	1.562	.137	1.796	.076
Substance Use	1.521	1.478	.075	1.029	.306

\* *Unstandardised coefficients*

We then examined whether parenting-related stress accounted for unique variance in child adaptive functioning, above and beyond the impact of child ADHD symptom severity. Child ADHD Total Symptom Severity was entered into the first block, followed by parenting-related Total Stress in the second block. As indicated in the final model, portrayed in Table 5, ADHD Total Symptom Severity accounted for unique variance in children's Adaptive

Functioning, in that children who displayed greater ADHD symptomology experienced poorer adaptive functioning. Furthermore, parenting-related Total Stress accounted for unique variance in children's Adaptive Functioning, above and beyond the impact of ADHD Symptom Severity, such that children whose parents displayed greater parenting-related stress experienced poorer adaptive functioning.

Table 5

*Hierarchical Linear Regression analysis examining whether Parenting-Related Stress accounts for unique variance in Children's Adaptive Functioning, above and beyond ADHD Total Symptom Severity*

Predictor Variables	$\beta$ *	SE	Beta	t	p
<b>Child ADHD Symptom Severity</b>					
ADHD Total	-.047	.009	-.481	-5.513	<b>.000</b>
<b>Parenting-Related Stress</b>					
Total Stress	-.014	.004	.286	-3.273	<b>.001</b>

\* *Unstandardised coefficients*

Finally, to examine whether the effect of children's ADHD symptom severity on children's adaptive functioning changes depending on the degree of parenting-related stress, the interaction of ADHD symptom severity and parenting-related stress was included in the final regression. ADHD Total Symptom Severity was entered in the first block, followed by parenting-related Total Stress in the second block, and the interaction of ADHD Symptom Severity and parenting-related Total Stress was entered in the third block. As depicted in Table 6, the interaction term was not significant indicating that there was no moderating effect.

Table 6

*Hierarchical Linear Regression analysis examining whether Parenting-Related Stress moderates the relationship between ADHD Total Symptom Severity and Adaptive Functioning*

Predictor Variables	$\beta$ *	SE	Beta	t	p
<b>Child ADHD Symptom Severity</b>					
ADHD Total	-.039	.031	-.404	-1.259	.211
<b>Parenting-Related Stress</b>					
Total Stress	-.011	.013	-.226	-.881	.381
<b>Interaction Term</b>					
ADHD x Stress	0.000	.000	-.122	-.249	.804

\* *Unstandardised coefficients*

## Discussion

The purpose of the present study was to investigate whether maternal factors account for unique variance in the adaptive functioning of children, above and beyond child ADHD symptom severity. The present study had three sets of hypotheses, in relation to which the results are discussed below.

### Correlational Findings

The first aim of the present study was to examine the relation amongst the various study variables. Specifically, we carried out correlations that examined whether child ADHD symptom severity and adaptive functioning were related; whether specific maternal characteristics such as parenting-related stress, personality, and coping styles were related; and whether maternal characteristics were related to children's ADHD symptomology and adaptive functioning.

**Relations among Child ADHD Symptom Severity and Adaptive Skills.** In line with our first hypothesis, our results indicate that the more severe a child's ADHD symptoms

are, the lower their adaptive functioning will be. This finding is consistent with previous research, which states that the adaptive functioning of children with ADHD is typically lower than that of typically developing children (C. Clark et al., 2002; Crocker et al., 2009; Jarratt et al., 2005).

**Relations among Maternal Personality, Maternal Parenting-Related Stress and Maternal Coping, with child ADHD Symptom Severity and Adaptive Skills.** Also in line with our first hypothesis, our results indicate that children whose mothers report higher levels of neuroticism are more likely to experience greater ADHD symptom severity and lower adaptive functioning. This finding is consistent with previous research, which highlights that children of parents who are high in neuroticism are more likely to experience poor adaptive functioning and behavioural difficulties, such as ADHD (Ellenbogen & Hodgins, 2004; Nigg & Hinshaw, 1998; Prinzie et al., 2005). Our results also indicate that children whose mothers report higher levels of agreeableness, extraversion, and conscientiousness, experience less severe ADHD symptomology. Furthermore, children whose mothers are higher in agreeableness and extraversion experience greater adaptive functioning. These findings are also consistent with previous research, which for the most part states that children whose parents are high in agreeableness, extraversion and conscientiousness, experience better adaptive functioning and less pathology than children whose parents do not endorse these traits (Nigg & Hinshaw, 1998; Oliver et al., 2009; Prinzie et al., 2005). Our results indicate that openness to experience is not significantly associated with greater or lesser ADHD symptom severity or adaptive functioning in children. Previous research indicates that the effects of parental openness on child functioning are more conflicting than the effects of the other Big Five personality traits, in that some studies have identified a positive impact while others have identified a negative impact (Nigg & Hinshaw, 1998; Prinzie et al., 2004). Thus, in the present study one may hypothesise that maternal openness had a positive impact on the

functioning of some children, and a negative impact on the functioning of other children, suggesting why no significant relation was found.

Also consistent with our first hypothesis and previous research, children whose mothers experience greater parenting-related stress are more likely to experience more severe ADHD symptomology and poorer adaptive functioning (Ayoub et al., 2011; DuPaul et al., 2001; Gupta, 2007; Johnston & Mash, 2001; Theule et al., 2013).

The findings of the present study also indicate that mothers who cope via substance use and avoidance are more likely to have children with greater hyperactive and inattentive ADHD symptoms, respectively. Mothers who report that they use substances to cope are also more likely to have children with poor adaptive functioning. These findings are consistent with previous research, which states that parental use of maladaptive coping skills is associated with negative child outcomes including poor adjustment, social difficulties and greater hyperactivity, inattention, impulsivity and aggression (Barnard & McKeaney, 2004; Lee, 2003; Ornoy et al., 1996). In the present study, maternal use of active coping, emotion-focused coping and distraction were not associated with greater or lesser ADHD symptom severity or adaptive functioning in children. One explanation for this may be that mothers in the present study tended to utilise other coping strategies, such as substance use and avoidance. Alternatively, mothers in the present study may have underreported their use of adaptive coping strategies, perhaps due to having a negative perception of their own coping ability.

Taken together, children whose mothers experience high parenting-related stress, are high in the trait of neuroticism, and use maladaptive coping styles, are more likely to have more severe ADHD symptoms and lower adaptive functioning.

**Relations among Maternal Personality, Maternal Parenting-Related Stress and Maternal Coping.** The present study also looked at the relations between parenting-related

stress, maternal personality, and maternal coping. As expected, our results indicate that mothers who report greater neuroticism are more likely to experience high parenting-related stress. In contrast, mothers who report greater extraversion, openness, agreeableness and conscientiousness, are more likely to experience less parenting-related stress. These findings are consistent with previous research, which highlights that high parental neuroticism is associated with high parenting-related stress (Casalin et al., 2014; Rantanen et al., 2015), whereas the remaining Big Five personality traits are typically associated with low parenting-related stress (Hutteman et al., 2014; Mulsow et al., 2002; Plotkin et al., 2013; Vermaes et al., 2008).

The present study also indicates that mothers who experience high degrees of parenting-related stress are more likely to use less active coping, greater avoidant coping and greater substance use. These findings are consistent with the reviewed literature, which states that greater parental use of active coping is associated with lower parenting-related stress (Hastings & Johnson, 2001), whereas greater use of maladaptive coping (i.e. avoidance and substance use) is associated with increased parenting-related stress (Hastings et al., 2005; Kelley, 1998; Solem et al., 2011). Unlike previous research, the present study did not identify any significant association between maternal emotion-focused coping and distraction based coping, with maternal parenting-related stress. One reason for this may be that mothers in the present study were more likely to utilise other coping strategies such as avoidance, substance use and active coping.

The results of the present study also indicate that mothers who are high in neuroticism are less likely to utilise active coping techniques and more likely to utilise emotion-focused coping, avoidance and substance use. This is in line with Costa and McCrae's (1992b) suggestion that neuroticism not only implies that parents will experience greater stress, but also that parents will have difficulty adaptively coping with this stress. Mothers who were

high in the other four of the Big Five personality traits were, for the most part, more likely to employ adaptive coping strategies and less likely to employ maladaptive coping strategies.

These findings are in line with previous research, which suggests that mothers high in neuroticism use more maladaptive coping styles, while individuals high in the remaining Big Five personality traits use more adaptive coping techniques (DeLongis & Holtzman, 2005; Lee - Baggle et al., 2005).

Taken together, mothers are more likely to experience a high degree of parenting-related stress if they are high in the trait of neuroticism and use maladaptive coping strategies.

### **Hierarchical Linear Regression Findings**

After we determined the relations amongst ADHD symptom severity, adaptive functioning, maternal personality, maternal parenting-related stress and maternal coping, we conducted hierarchical regression analyses to examine our second and third aims. The second aim of the present study was to examine whether dimensions of maternal personality and maternal coping were associated with parenting-related stress, above and beyond ADHD symptom severity. Our third aim was to examine whether parenting-related stress, as well as the interaction between parenting-related stress and ADHD symptom severity, accounted for unique variance in child adaptive functioning, above and beyond ADHD symptom severity.

**Effects of Maternal Personality and Maternal Coping on Parenting-Related Stress.** Within the first regression analysis, child ADHD symptom severity and maternal neuroticism, agreeableness and extraversion, all accounted for additional unique variance in parenting-related stress, after controlling for ADHD symptom severity, maternal personality and maternal coping. As hypothesised and consistent with previous research, once including maternal personality and coping into the model, greater child ADHD symptomology is associated with greater maternal parenting-related stress (Johnston & Mash, 2001; Theule et al., 2013). This suggests that children with more severe ADHD symptoms are likely more

difficult to parent, consequently resulting in greater parenting-related stress (Barkley, 2013; Lifford et al., 2008). Children with ADHD likely also experience difficulties in contexts outside of the home, such as academic and social settings, which may also contribute to parenting-related stress. This indicates that it is important to offer mothers of children with ADHD adequate support in managing parenting-related stress, particularly given high parenting stress is associated with negative outcomes for parents and children (DuPaul et al., 2001; Kadesjö et al., 2002; Pereira-Morales et al., 2017).

Also in line with our second hypothesis, neuroticism explained additional unique variance in parenting-related stress, in that mothers who experience greater neuroticism are more likely to experience greater parenting-related stress. This is consistent with previous research, which states that parental characteristics, such as neuroticism, account for unique variance in parenting stress (Anastopoulos et al., 1992; Harrison & Sofronoff, 2002; Schneider, 2004). This finding may suggest that mothers high in neuroticism are more likely to interpret events as stressful, resulting in a higher degree of parenting-related stress (Costa & McCrae, 1992b). Therefore, when assessing children with ADHD, practitioners should be aware that mothers high in neuroticism are more likely to find raising their child stressful, which will likely impact on the functioning of that child. Maternal extraversion and agreeableness also accounted for unique variance in maternal parenting-related stress. However, these personality traits are associated with less maternal parenting stress. These findings suggest that mothers high in agreeableness and extraversion are likely to experience lower levels of parenting-related stress.

Inconsistent with our second hypothesis, dimensions of maternal coping did not account for unique variance in parenting-related stress once ADHD symptom severity and maternal personality were included in the model. One explanation for this may be that in the present study, ADHD symptom severity and dimensions of maternal personality accounted

for considerable degrees of parenting-related stress, so much so that maternal coping did not account for any additional unique variance. Another hypothesis is that mothers may have attempted to utilise different coping strategies at different stages of facing a stressor. For example, maternal coping closer to the time the child began displaying ADHD symptoms, or was diagnosed with ADHD, may have been more likely to account for parenting-related stress. Nevertheless, the results of the present study highlight that child ADHD symptom severity, and maternal neuroticism, agreeableness and extraversion, account for unique variance in parenting-related stress.

**Effects of Parenting-Related Stress on Children's Adaptive Functioning.** Our final hypothesis was that greater maternal parenting-related stress, and the interaction of ADHD symptom severity with maternal parenting-related stress, would account for unique variance in child adaptive functioning, above and beyond child ADHD symptom severity. In line with previous research, when controlling for parenting-related stress both ADHD symptom severity and maternal parenting-related stress accounted for unique variance in the adaptive functioning of children, in that children who display more severe ADHD symptoms experience lower adaptive functioning (C. Clark et al., 2002; Crocker et al., 2009; Jarratt et al., 2005). Also in line with previous research, children whose mothers display greater parenting-related stress experience lower adaptive functioning, above and beyond ADHD symptom severity (Ayoub et al., 2011; DuPaul et al., 2001). Inconsistent with our final hypothesis, the present study did not find the interaction of ADHD symptom severity with maternal parenting-related stress to account for unique variance, suggesting there was no moderating effect. This indicates that in the present study, parenting-related stress has the same impact on child adaptive functioning no matter how severe the child's ADHD symptomology is, and ADHD symptom severity has the same impact on child adaptive functioning no matter how much parenting-related stress mothers are experiencing.

Our findings support the idea that ADHD symptomology and adaptive functioning are related but also independent (Barkley et al., 2006; Gordon et al., 2006; Healey et al., 2008). This is important as it suggests that treatment of children with ADHD needs to focus on more than reducing ADHD symptom severity, which is typically done with medication (Ministry of Health, 2001; Molina et al., 2008). The findings of the present study suggest that factors above and beyond ADHD symptom severity, such as parenting-related stress, contribute to a child's adaptive functioning. Therefore, a component of treatment for children with ADHD should focus on reducing parenting-related stress (via a focus on parent personality), which in turn may improve the adaptive functioning of children with ADHD (Johnston & Mash, 2001; Theule et al., 2013).

Overall the findings of the present study are consistent with Bronfenbrenner's (1986) argument that parental characteristics have an important role in the functioning of children. The present study indicates that when controlling for ADHD symptom severity, maternal neuroticism is associated with higher parenting-related stress, and maternal agreeableness and extraversion are associated with lower parenting-related stress. Parenting-related stress accounts for additional unique variance in child adaptive functioning, above and beyond child ADHD symptom severity.

### **Limitations and Future Directions**

The findings of the present study are relevant for the management of ADHD in children, but as with any study, there are several limitations that should be taken into account. The generalisability of the present study's findings to children and parents uncharacteristic of the current sample cannot be guaranteed. Child participants in the present study were aged 6 to 12 years old and were predominantly of New Zealand European descent. Furthermore, in the present study only 8.7% of the caregivers were fathers, meaning there were too few to analyse mothers and fathers separately. Therefore, the findings of the present study focused

on maternal characteristics and cannot be generalised to fathers. Despite this, in many cases mothers are the dominant caregiver and are more likely to be influenced by their child's ADHD symptomology and influence the functioning of their child (Fischer, 1990; Lifford et al., 2008). For the most part, both mothers and fathers personality, parenting-related stress and coping styles have been identified to have similar effects on children (Johnston & Mash, 2001). However, some studies have identified slight differences between mothers and fathers (Baker, 1994; Morgan et al., 2002; Podolski & Nigg, 2001). Therefore, further investigation regarding the effect of maternal and paternal factors on child adaptive functioning may be necessary. Future research should also examine the effect of the combination of maternal and paternal characteristics (i.e. two neurotic and highly stressed parents versus one, or none) on child adaptive functioning. Future studies should also account for single parent families, whom may experience greater parenting-related stress.

Moreover, in the present study only one caregiver, predominantly mothers (91.3% were mothers or female carers), completed the parent assessment measures regarding the child's adaptive functioning and ADHD symptomology. This likely limits the accuracy of our data as mother's and father's perceptions of their children have been shown to vary (Gerdes, Hoza, & Pelham, 2003). Furthermore, literature regarding the evidence-based assessment of ADHD states that combining a number of assessment methods and utilising multiple informants to assess the child's behaviour across multiple settings is paramount (Barkley, 2014; Pelham, Fabiano, & Massetti, 2005). Although the present study utilised both parent and teacher ratings, future research should obtain ratings from two parents where possible, to make for a more comprehensive and reliable assessment.

Another limitation of the present study is that separate analyses were not conducted for male and female children. This was due to the loss of sample size and statistical power this would result in. Thus, it was not possible to determine if there were differences in the

pattern of findings based on child sex. Future research should examine the pattern of findings separately for each gender, particularly given ADHD has been found to present differently in girls and boys (Gershon, 2002). Furthermore, due to the relatively small sample size of the current study (n=103), analyses were conducted for children with and without ADHD as a single group. This meant that between group differences could not be analysed. Future research should aim to examine the pattern of findings in children with ADHD compared to typically developing children.

A methodological limitation of the present study is that the information regarding all constructs (i.e. ADHD symptom severity, child adaptive functioning, parenting-related stress, personality, and coping) was obtained via self-report measures. Although this method is consistent with similar previous research (i.e. Jarratt et al., 2005; Solem et al., 2011; Theule et al., 2013), self-report can be unreliable. Parents may report what they believe to be the socially desired response, rather than an accurate report of the measured construct. This could have led to underreporting of child ADHD symptom severity, child impairment in adaptive functioning, parenting-related stress, less desirable personality traits, and less desirable coping styles. As mentioned earlier, parents may also have underreported positive outcomes (i.e. adaptive coping strategies), perhaps due to having a negative perception of their own abilities. In addition, many of the self-report measures used Likert Scales (i.e. BASC-3, PSI-SF, COPE, NEO-FFI), for which individual interpretation may differ. For example, the BASC-3 asks parents to indicate the frequency of their child's behaviours as Never, Sometimes, Often or Almost Always. What one parent perceives as 'Sometimes' may be the same as what another rates as 'Often'. In the present study a semi-structured interview (K-SADS-PL) was also utilised for rating a child's ADHD symptom severity. To increase the reliability of findings, future research should use parental interviews to ascertain parent's views of their personality traits, coping styles and stress levels, in addition to self-report measures.

Coping styles are said to be relatively stable over time and situations (Carver, 1997). Nevertheless, it is possible that different coping strategies may be attempted at different stages of facing a stressor. Parental coping closer to the time the child began displaying ADHD symptoms may result in a different pattern of results compared to those identified in the present study. Longitudinal studies would clarify the relation of coping strategies to higher or lower parenting-related stress over time.

Due to the cross-sectional correlational nature of the current study, no causal inferences can be determined from the results. Although one possibility is that ADHD symptom severity and parenting-related stress affect child adaptive functioning, child adaptive functioning may actually affect ADHD symptom severity and parenting-related stress. Therefore, it would be beneficial for longitudinal studies to investigate how these variables interact over time. Alternatively, a factor that was not accounted for in the present study may also be affecting children's adaptive functioning. Many variables such as gender, age and socioeconomic status were not statistically controlled for within the regression analyses. Thus, we are unable to state whether these variables accounted for additional unique variance in child adaptive functioning. Future studies should include larger samples to enable them to control for these factors.

Moreover, the present study was interested in children's overall adaptive functioning. It may be beneficial for future research to look at the individual domains of child adaptive functioning (i.e. social skills, activities of daily living, academic ability). This would clarify whether particular areas of adaptive functioning are more likely to be impaired by ADHD symptom severity, maternal parenting-related stress, personality and coping. If future research found this to be the case, interventions could place particular focus on the areas that are the most severely impacted.

Lastly, maternal parenting-related stress, coping and personality are not the only maternal factors that may account for unique variance in adaptive functioning. Future studies may seek to explore the relationship of other parent variables, such as parenting style, on child adaptive functioning. Given mothers of children with more severe ADHD symptomology experience greater parenting-related stress, it is likely that this level of stress also impacts on parenting style. Furthermore, there are a number of child factors that were not investigated in the present study that may contribute to child adaptive functioning. These factors include child temperament, executive functioning and emotional regulation. Future studies may wish to explore the contribution of these factors on child adaptive functioning.

It is important to note that many of the suggestions for future research were beyond the scope of the present study. Despite the limitations of the current study, our findings provide useful information in regard to what factors may be playing a unique additional role in child adaptive functioning, above and beyond ADHD symptomology. This study not only provides direction for future research, but also highlights important implications and applications.

### **Implications and Applications**

The findings of the present study have important implications regarding the diagnostic criteria for ADHD. As stated in the introduction of this thesis, the DSM-V does not provide a definition for what constitutes significant impairment (APA, 2013). The current study assists with this drawback by highlighting that impairment is a distinct construct that differs from ADHD symptomology. This is evident given factors other than ADHD symptom severity account for a child's level of impairment in adaptive functioning. This suggests that a child may exhibit high ADHD symptom severity without experiencing significant impairment in adaptive functioning, or alternatively a child may have few ADHD symptoms, but experience severe functional impairment. Thus, one should not assume a child's degree of impairment in

adaptive functioning based purely on the severity of their ADHD symptoms. Therefore, the DSM should provide a definition of what constitutes low-level versus high-level impairment.

Furthermore, as suggested throughout this thesis, it is important to identify factors that affect children's adaptive functioning above and beyond symptom severity. This allows us to determine other areas that can be targeted when treating children with ADHD. Medication is typically the first line treatment for ADHD and is successful in reducing the severity of ADHD symptoms (Ministry of Health, 2001; Visser et al., 2005). Medication is less successful at reducing impairment in adaptive functioning among children with ADHD (Gualtieri & Johnson, 2008; Loe & Feldman, 2007; Rapport et al., 1994). The findings of the present study suggest that although the severity of ADHD symptoms account for unique variance in adaptive functioning, parenting-related stress also accounts for unique variance. This suggests that interventions that target parenting-related stress may help to improve the adaptive functioning of children. However, given medication has been identified as successful in reducing children's ADHD symptomology, it is recommended that these interventions are used in conjunction with stimulant medication. While medication is often the first line treatment for children with ADHD, child behaviour management interventions are also regularly used in the treatment of childhood ADHD (Kendall et al., 2008; NICE, 2018). In an attempt to reduce the impairment in adaptive functioning that children with ADHD typically experience, behavioural interventions should also integrate techniques that focus on reducing parenting-related stress.

The present study also identified that dimensions of maternal personality account for unique variance in parenting-related stress. Having this insight indicates that treatment aimed at reducing parenting-related stress should first and foremost be offered to mothers of children with ADHD who are high in the trait of neuroticism. Personality traits are generally reported to be relatively stable over time (Terracciano et al., 2006), which suggests individuals may be

unable to change their tendency to be neurotic. Nevertheless, research indicates that interventions can successfully reduce aspects of neuroticism, such as stress reactivity (Davis, Zautra, Wolf, Tennen, & Yeung, 2015; Von Haaren, Haertel, Stumpp, Hey, & Ebner-Priemer, 2015), which has been identified as important in explaining the neuroticism-distress relationship (Bolger and Schilling, 1991). Moreover, a relatively recent review suggested that neuroticism is more malleable than initially thought and thus may be susceptible to direct intervention (Barlow, Sauer-Zavala, Carl, Bullis, & Ellard, 2014). Supporting this argument, Armstrong and Rimes (2016) had individuals high in neuroticism participate in an eight-week group based programme of mindfulness based cognitive therapy, which focused on factors related to neuroticism such as, stress reactivity, interpretation biases, avoidance and self-criticism. Compared to the control group, individuals who participated in the intervention reported significantly lower levels of overall neuroticism as well as lower rumination and higher self-compassion. Similarly, Tang and colleagues (2009) found that participants who were prescribed a selective serotonin reuptake inhibitor for depression or anxiety reported a decrease in neuroticism on the NEO-FFI compared to controls, even after depression was controlled for. Therefore, if parents of children with ADHD are identified to be high in neuroticism it is important that interventions focus on reducing neuroticism either directly, or via its associated traits, such as reactivity to stress.

The current study adds to the previous literature that has identified the need for family focused interventions for children with ADHD (Pressman et al., 2006). According to the findings of the present study, an important goal for family focused interventions is to reduce the level of parenting-related stress, which will hopefully reduce the impairment in adaptive functioning experienced by children with ADHD. Currently there are interventions available that target dimensions of parenting-related stress. For example, one study trialled a nine-session group-based parent stress management course for parents of children with ADHD

(Treacy et al., 2005). The programme incorporated components including education on stress and ADHD, problem solving skills, cognitive restructuring, communication skills, self-care skills, and parenting skills. Treacy and colleagues found that following participating in this parent stress management course, mothers experienced significant reductions in parenting-related stress, as well as improvements in parenting style, whereas fathers only improved in one domain of parenting style. Another intervention focusing on parenting-related stress in parents of children with ADHD was an eight-session group based mindfulness intervention (Van der Oord et al., 2012). This intervention included mindfulness-based cognitive therapy for children alongside mindfulness-based stress reduction training for their parents (n=21 mothers and 1 father). Following this intervention parents experienced a significant reduction in parenting-related stress, as measured by the PSI, as well as a reduction in overreactivity and an increase in mindful awareness. The authors also identified a significant reduction in parent-rated child ADHD symptomology following participating in the intervention. In regards to individual treatments, Gerdes et al. (2012) had 20 parents of children with ADHD complete 8 individual behavioural parent-training sessions. Sessions included psychoeducation about ADHD and behavioural principles, and the development of specific parenting strategies. Gerdes and colleagues found that following participating in individual parent-training, mothers experienced significant reductions in parenting-related stress. Moreover, mothers and fathers experienced some improvements in areas of parenting behaviour. Interventions such as these should be recommended to parents of children with ADHD, especially if the child experiences poor adaptive functioning, despite being prescribed ADHD medication. Although the present study focused on maternal factors, in 2018 NICE made an amendment to their recommendations, which stated that when support is offered to caregivers of children with ADHD this should involve both caregivers if possible.

Taken together the results of the present study have relevant implications and applications. The present study highlights the importance of defining and considering impairment in adaptive functioning when diagnosing ADHD. Furthermore, our findings highlight the need to offer parent-based interventions to families of children with ADHD to reduce the degree of parenting-related stress experienced by parents, and consequently improve the adaptive functioning of children.

### **Conclusions**

The current study has identified that there are factors that affect a child's adaptive functioning above and beyond ADHD symptom severity. These factors include parenting-related stress. Furthermore, maternal personality has been identified to influence parenting-related stress, above and beyond ADHD symptom severity. Given multiple factors have been identified as related to child adaptive functioning either directly, or indirectly, one should not assume that treating ADHD symptom severity alone will subsequently improve a child's adaptive functioning. Overall these findings highlight that interventions targeting parenting-related stress and aspects of maternal neuroticism may improve the adaptive functioning of children with ADHD.

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## Appendix A: Principal Component Factor Analyses with Varimax Rotation

Table A1

*Principal Components Factor Analysis, Varimax Rotation, examining the relationship among the BASC-3 PRS and TRS Adaptive Skills Scales*

BASC-3 Adaptive Skills Scales	Factor 1 (Adaptive Skills)
PRS Adaptive Skills	.855
TRS Adaptive Skills	.855

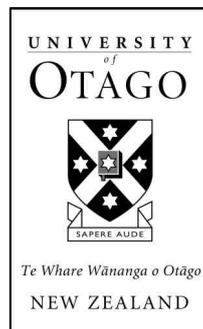
Table A2

*Principal Components Factor Analysis, Varimax Rotation, examining the relations between the 15 COPE domains*

Cope Domains	Factor 1 (Active Coping)	Factor 2 (Emotion-Focused Coping)	Factor 3 (Distraction)	Factor 4 (Avoidance)	Factor 5 (Substance Use)
Positive Reinterpretation and Growth	<b>.654</b>	-.011	.201	.075	-.128
Mental Disengagement	-.371	.270	<b>.621</b>	.008	.172
Focus on Venting of Emotions	-.001	<b>.785</b>	-.094	.047	.238
Use of Instrumental Social Support	.297	<b>.750</b>	.044	-.100	-.330
Active Coping	<b>.810</b>	.271	-.023	-.286	.011
Denial	-.085	.002	.337	<b>.716</b>	.132
Religious Coping	.077	-.147	-.302	<b>.736</b>	-.122
Humour	0.87	-.055	<b>.749</b>	.079	-.060
Behavioural Disengagement	-.281	.082	.391	<b>.542</b>	.173
Restraint	.335	.038	<b>.489</b>	.244	-.270
Use of Emotional Social Support	.101	<b>.855</b>	.008	-.059	-.187
Substance Use	-.064	-.119	.027	.039	<b>.774</b>
Acceptance	.231	-.160	<b>.674</b>	-.035	.070
Suppression of Competing Activities	<b>.668</b>	.144	.031	.305	.418
Planning	<b>.875</b>	.092	.028	-.174	-.134

## Appendix B: Information Sheets and Consent Forms

[Reference Number *H17/018*]  
[17/02/17].



**EXECUTIVE FUNCTION, THEORY OF MIND, AND THE PRAGMATICS OF  
LANGUAGE IN CHILDREN WITH VARYING LEVELS OF INATTENTION,  
HYPERACTIVITY, AND IMPULSIVITY  
CONSENT FORM FOR  
PARENTS/GUARDIANS**

I have read the Information Sheet concerning this project and understand what it is about. All my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage. I know that:

1. My child's participation in the project is entirely voluntary;
2. I am free to withdraw my child from the project at any time without any disadvantage;
3. Personal identifying information such as video recordings will be destroyed at the conclusion of the project but any raw data on which the results of the project depend will be retained in secure storage for at least 10 years in compliance with the Health Information Privacy Code (1994)
4. My child will receive a gift voucher to the value of \$20, and I will receive a \$40 petrol voucher as in thanks for participating.
5. The results of the project may be published and will be available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve my child's anonymity.

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

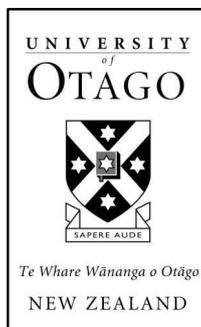
.....  
(Signature of parent/guardian)

.....  
(Today's date)

.....  
(Name of child)

This study has been approved by the University of Otago Human Ethics Committee. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (ph +643 479 8256 or email [gary.witte@otago.ac.nz](mailto:gary.witte@otago.ac.nz)). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

[Reference Number: *H17/018*]  
[17/02/17]



**EXECUTIVE FUNCTION, THEORY OF MIND, AND THE PRAGMATICS OF  
LANGUAGE IN CHILDREN WITH VARYING LEVELS OF INATTENTION,  
HYPERACTIVITY, AND IMPULSIVITY**

**PARENT/GUARDIAN –CONSENT FORM (TEACHER)**

I \_\_\_\_\_ provide consent for my child's teacher to complete three questionnaires: the **Children's Problem Checklist**, the **BASC-3 Teacher Rating Scales**, and the **ADHD-RS: School Version**, and the **School Functioning Questionnaire** regarding my child's behavior at school and for \_\_\_\_\_ to observe my child for 30 minutes of class time. These forms can be sent directly to the researcher (Alannah Corson Keogh) in the enclosed envelope.

\_\_\_\_\_  
Name of school

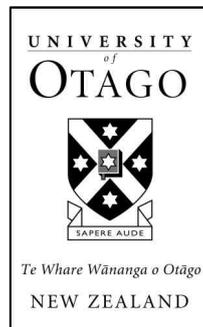
In respect of \_\_\_\_\_, \_\_\_\_\_  
Child's name Date of Birth

\_\_\_\_\_  
Signature of parent

\_\_\_\_\_  
Date

This study has been approved by the University of Otago Human Ethics Committee. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (ph +643 479 8256 or email [gary.witte@otago.ac.nz](mailto:gary.witte@otago.ac.nz)). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

[Reference Number *H17/018*]  
[17/02/17].



### LANGUAGE AND SELF-CONTROL CONSENT FORM FOR CHILD PARTICIPANTS

I have been told about this study and understand what it is about. All my questions have been answered in a way that makes sense.

I know that:

1. I do not have to take part if I don't want to and nothing will happen to me.
2. Anytime I want to stop, that's okay.
3. Sid/Alannah will video record me during one task so that they can remember what I say, but the recording will be erased after the study has ended.
4. If I don't want to answer some of the questions, that's fine.
5. If I have any worries or if I have any other questions, then I can talk about these with Sid/Alannah.
6. They won't tell anyone else what I have said.
7. Sid/Alannah and the people they work with will write up the results from this study for their University work. The results may also be written up in journals and talked about at conferences. My name will not be on anything Sid/Alannah writes up about this study.

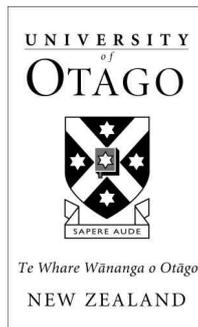
I agree to take part in the study.

.....  
Signed

.....  
Date

[Reference Number: *H17/018*]

[17/02/17]



**BRAIN PROCESSES, UNDERSTANDING OTHER'S BELIEFS, AND LANGUAGE  
USE IN CHILDREN WITH VARYING LEVELS OF INATTENTION,  
HYPERACTIVITY, AND IMPULSIVITY**

**INFORMATION SHEET FOR PARENTS/GUARDIANS**

You and your child are being invited to take part in our study comparing specific brain processes, understanding of other's beliefs, and language use in children with varying levels of attention, hyperactivity, and impulsivity. Please read this information sheet carefully before deciding whether or not to participate. If you or your child have any questions at all we would be happy to discuss the study further with you or them.

**The nature and purpose of the research**

The purpose of this study is to investigate the relations between the specific brain processes, understanding of other's beliefs, and language use in children with varying levels of attention, hyperactivity, and impulsivity. If specific links are found then it could lead to intervention strategies aimed at increasing children's language ability. This project is being undertaken as part of the requirements for Sid Wales' PhD. As a secondary component, relations between self-regulation and academic achievement are being investigated for Alannah Corson Keogh's PhD.

**What type of participants are being sought?**

150 children aged between 6-12 years who either meet the diagnostic criteria for ADHD or do not show any elevated levels of hyperactivity/impulsivity and inattention will be sought for this study.

**The procedure and how long it will take**

This project will require you and your child to attend a 3-4 hour session at the University of Otago Psychology Department. If preferable, this can be broken into multiple shorter sessions. Sessions can be scheduled any day that suits you including weekends. Multiple breaks will also be offered throughout the session.

If you and your child meet the criteria for the study, and should you both consent, we will invite you and your child to attend an appointment at our research clinic. Firstly, you will be interviewed to assess current and past episodes of mental disorder in your child. This is used to settle on a formal diagnosis of ADHD and to screen for the commonly co-occurring disorders of oppositional defiant disorder and conduct disorder. Your child will then complete six sections of the procedure:

While your child completes these sections, you will complete some standard questionnaires about yourself and regarding your child's behaviour. These include the Alabama Parenting Questionnaire, the NEO Personality Inventory (third edition; NEO-PI-3), the Parent Stress Index (fourth edition; PSI-4), the COPE inventory, and the Depression and Anxiety Stress Scales (DASS-21). You will also be asked to sign a form that gives permission for your child's teacher to complete similar questionnaires about your child and for a trained post-graduate student to observe your child for a 20 minute period of class time. The teacher will then be contacted and asked to complete questionnaires about your child's school functioning along with organising a time for the observation. Signed permission to observe in the classroom will be obtained from the teacher at the time of the observation.

**Section 1:** In the first section your child will have a 15 minute conversation with you. This conversation will be video recorded so that the interaction can be observed by the researcher. We will code specific aspects of conversation used by your child in order to assess their conversation skills. During this conversation you will be asked to discuss three past events that you have experienced with your child, which were one-offs and lasted less than one day. Past examples include: birthday parties, day trips, museum visits, or school trips.

**Section 2:** In the second section your child will be administered an assessment of cognitive functioning in the form of four skills (Verbal Comprehension, Perceptual Reasoning, Working Memory, and Processing Speed) derived from ten core and five supplemental subtests which will take roughly 1.5 hours to complete. Responses to these subtests designed to assess cognitive functioning in children will be recorded.

**Section 3:** In the third section your child will be administered selected subtests of an assessment of neuropsychological development which includes sorting pictures of animals, listening to and responding to sets of words, reading analogue clocks, drawing, and responding to different shapes. Responses to these tasks designed to assess neuropsychological development in children will be recorded. This will take around 30 minutes to complete.

**Section 4:** In the fourth section your child will be required to point to pictures of objects described by the researcher which should take around 20 minutes to complete. Responses to this task will be recorded.

**Section 5:** In the fifth section your child will listen to excerpts from conversations and answer some questions about them which should take around 10 minutes to complete. Participant error rates will be recorded. This will be used to estimate the ability of your child to detect aspects of language that don't quite make sense.

**Section 6:** In the final task your child will be asked questions about comic strips and short paragraphs which will take around 10 minutes to complete. Responses to this task will be recorded.

After the second task your child will be offered a 20 minute break along with a drink and a snack. They will also be allowed to ask for breaks between any of the other tasks. The entire procedure should not take longer than 3-4 hours to complete and is a one-off commitment. During this time we will also conduct a brief interview with you. The purpose of this interview is for us to gain a better understanding of your child's behaviour.

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 talk about it.

Please be aware that you may decide not to take part in the project without any disadvantage to yourself of any kind.

Demographic information such as gender, age, and ethnicity will also be recorded.

This information will only be available to the student researchers, supervisors, and research assistants involved in the project.

You shall be informed should any clinically relevant information be discovered about your child throughout the study.

The data collected will be securely stored in such a way that only those mentioned below will be able to gain access to it. Data obtained as a result of the research will be retained for **at least 10 years** in secure storage in compliance with the Health Information Privacy Code (1994). Any personal information held on the participants may be destroyed at the completion of the research even though the data derived from the research will, in most cases, be kept for much longer or possibly indefinitely.

The results of the project may be published and will be available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve your anonymity.

### **Any risk or discomfort involved**

Your child is unlikely to, but if they experience any discomfort (e.g., too hot, feeling tired) this will be addressed immediately.

### **Withdrawal from the project**

Participation in this study is completely voluntary. You may withdraw from participation in the project at any time and without any penalty or discrimination.

### **The name and contact details of the staff member responsible for the project and an invitation to contact that person over any matter associated with the project**

If you have any questions please feel free to contact either:

Alannah Corson Keogh (PhD Candidate)  
Department of Psychology  
Telephone Number:- +64 27 713 1583

Sid Wales (PhD candidate)  
Department of Psychology  
Telephone Number:- +64 27 671 2224

Dr. Dione Healey (supervisor)  
Department of Psychology  
University Telephone Number:- +64 3 479 7620

Dr. Mele Taumoepeau (supervisor)  
Department of Psychology  
University Telephone Number:- +64 3 479 4029

Dr. Ben Wheeler (host principal investigator)  
Dunedin School of Medicine, Health Sciences  
Telephone Number:- +64 3 470 9189

#### **Details of Any Reimbursement or Compensation Payable In The Event Of Harm;**

There is no cost in participating in this study. To thank you for your commitment to this study you will be reimbursed with a **\$40 petrol voucher** and your child will receive a **\$20 Warehouse voucher**.

At your request, we can provide you with written feedback in the form of a report or letter regarding your child's test scores, the behavioural scales completed by you and your child's teacher, and the interview that we conduct with you during the evaluation session.

This study has been approved by the University of Otago Human Ethics Committee. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (Ph: +643479 8256 or [gary.witte@otago.ac.nz](mailto:gary.witte@otago.ac.nz)). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

We really appreciate you taking the time out of your busy schedule to provide us with this information.

Thank you!

## Appendix C: Ethical Consent



H17/018

Academic Services  
Manager, Academic Committees, Mr Gary Wine

6 March 2017

Dr D Healey  
Department of Psychology  
Division of Sciences  
Union Place East/Leith Walk

Dear Dr Healey,

I am again writing to you concerning your proposal entitled "**Executive function, theory of mind, and the pragmatics of language in children with varying levels of inattention, hyperactivity, and impulsivity**", Ethics Committee reference number **H17/018**.

Thank you to Sid Wales for his e-mail of 1st March 2017 with response attached addressing the issues raised by the Committee.

On the basis of this response, I am pleased to confirm that the proposal now has full ethical approval to proceed.

The standard conditions of approval for all human research projects reviewed and approved by the Committee are the following:

Conduct the research project strictly in accordance with the research proposal submitted and granted ethics approval, including any amendments required to be made to the proposal by the Human Research Ethics Committee.

Inform the Human Research Ethics Committee immediately of anything which may warrant review of ethics approval of the research project, including: serious or unexpected adverse effects on participants; unforeseen events that might affect continued ethical acceptability of the project; and a written report about these matters must be submitted to the Academic Committees Office by no later than the next working day after recognition of an adverse occurrence/event. Please note that in cases of adverse events an incident report should also be made to the Health and Safety Office:

<http://www.otago.ac.nz/healthandsafety/index.html>

Advise the Committee in writing as soon as practicable if the research project is discontinued.

Make no change to the project as approved in its entirety by the Committee, including any wording in any document approved as part of the project, without prior written approval of the Committee for any change. If you are applying for an amendment to your approved research, please email your request to the Academic Committees Office:

gary.witte@otago.ac.nz

jo.farronediaz@otago.ac.nz

Approval is for up to three years from the date of this letter. If this project has not been completed within three years from the date of this letter, re-approval or an extension of approval must be requested. If the nature, consent, location, procedures or personnel of your approved application change, please advise me in writing.

The Human Ethics Committee (Health) asks for a Final Report to be provided upon completion of the study. The Final Report template can be found on the Human Ethics Web Page <http://www.otago.ac.nz/council/committees/committees/HumanEthicsCommittees.html>

Yours sincerely,



Mr Gary Witte  
**Manager, Academic Committees**  
Tel: 479 8256  
Email: gary.witte@otago.ac.nz

c.c. Professor M W Colombo Department of Psychology

## Appendix D: Regression Analyses for ADHD Inattentive Symptom Severity

Table D1

*Hierarchical Linear Regression analysis examining whether Maternal Personality and Coping account for unique variance in Parenting-Related Stress, above and beyond ADHD Inattentive Symptom Severity*

Predictor Variables	$\beta$ *	SE	Beta	t	p
<b>Child ADHD Symptom Severity</b>					
ADHD Inattentive	1.185	.289	.317	4.106	<b>.000</b>
<b>Parent Personality</b>					
Neuroticism	.509	.248	.229	2.048	<b>.043</b>
Extraversion	-.562	.287	-.188	-1.960	.053
Openness	-.124	.295	-.036	-.420	.676
Agreeableness	-.716	.271	-.200	-2.644	<b>.010</b>
Conscientiousness	1.30	.288	.038	.453	.651
<b>Parent Coping Style</b>					
Active Coping	-2.375	1.741	-.116	-1.364	.176
Emotion-focused Coping	1.907	1.635	.093	1.167	.246
Distraction	.766	1.479	.038	.518	.606
Avoidance	3.116	1.587	.153	1.964	.053
Substance Use	.972	1.503	.048	.647	.519

\* *Unstandardised coefficients*

Table D2

*Hierarchical Linear Regression analysis examining whether Parenting-Related Stress accounts for unique variance in Children's Adaptive Functioning, above and beyond ADHD Inattentive Symptom Severity*

Predictor Variables	$\beta$ *	SE	Beta	t	p
<b>Child ADHD Symptom Severity</b>					
ADHD Inattentive	-.101	.015	-.552	-6.735	<b>.000</b>
<b>Parenting-Related Stress</b>					
Total Stress	-.012	.004	-.254	-3.105	<b>.002</b>

\* *Unstandardised coefficients*

Table D3

*Hierarchical Linear Regression analysis examining whether Parenting-Related Stress moderates the relationship between ADHD Inattentive Symptom Severity and Adaptive Functioning*

Predictor Variables	$\beta$ *	SE	Beta	t	p
<b>Child ADHD Symptom Severity</b>					
ADHD Inattentive	-.073	.055	-.397	-1.324	.188
<b>Parenting-Related Stress</b>					
Total Stress	-.006	.012	-.132	-.549	.548
<b>Interaction Term</b>					
ADHD x Stress	.000	.001	-.245	-.538	.562

\* *Unstandardised coefficients*

Appendix E: Regression Analyses for ADHD Hyperactive/Impulsive Symptom  
Severity

Table E1

*Hierarchical Linear Regression analysis examining whether Maternal Personality and Coping account for unique variance in Parenting-Related Stress, above and beyond ADHD Hyperactive/Impulsive Symptom Severity*

Predictor Variables	$\beta$ *	SE	Beta	<i>t</i>	<i>p</i>
<b>Child ADHD Symptom Severity</b>					
ADHD Hyperactive	1.032	.269	.290	3.838	<b>.000</b>
<b>Parent Personality</b>					
Neuroticism	.604	.345	.272	2.465	<b>.016</b>
Extraversion	-.627	.290	-.210	-2.159	<b>.034</b>
Openness	-.211	.295	-.016	-.174	.477
Agreeableness	-.648	.275	-.181	-2.355	<b>.021</b>
Conscientiousness	.216	.292	.063	.741	.461
<b>Parent Coping Style</b>					
Active Coping	-2.062	1.750	-.101	-1.178	.242
Emotion-focused Coping	1.646	1.646	.081	.999	.320
Distraction	.773	1.495	.038	.517	.606
Avoidance	2.499	1.600	.122	1.562	.122
Substance Use	1.968	1.520	.096	1.295	.199

\* *Unstandardised coefficients*

Table E2

*Hierarchical Linear Regression analysis examining whether Parenting-Related Stress accounts for unique variance in Children's Adaptive Functioning, above and beyond ADHD Hyperactive Symptom Severity*

Predictor Variables	$\beta$ *	SE	Beta	<i>t</i>	<i>p</i>
<b>Child ADHD Symptom Severity</b>					
ADHD Hyperactive	-.051	.016	-.294	-3.263	<b>.002</b>
<b>Parenting-Related Stress</b>					
Total Stress	-.020	.004	-.408	-4.525	<b>.000</b>

\* *Unstandardised coefficients*

Table E3

*Hierarchical Linear Regression analysis examining whether Parenting-Related Stress moderates the relationship between ADHD Hyperactive Symptom Severity and Adaptive Functioning*

Predictor Variables	$\beta$ *	SE	Beta	<i>t</i>	<i>p</i>
<b>Child ADHD Symptom Severity</b>					
ADHD Hyperactive	-.017	.060	-.096	-.278	.781
<b>Parenting-Related Stress</b>					
Total Stress	-.013	.012	-.273	-1.109	.270
<b>Interaction Term</b>					
ADHD x Stress	.000	.001	-.290	-.591	.556

\* *Unstandardised coefficients*