Are Executive Function Difficulties Reported by Parents and Teachers Associated with Elevated Levels of Parenting Stress for Children Diagnosed with Attention-Deficit/Hyperactivity Disorder, with and without Oppositional Defiant Disorder?

by

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Parents raising children with Attention-deficit/hyperactivity disorder (ADHD) experience high levels of parenting stress, especially when ADHD is accompanied by comorbid Oppositional Defiant Disorder (ADHD/ODD). Children with ADHD experience difficulties with their executive functions in such areas as inhibition control, working memory, and emotional regulation. Despite evidence linking ADHD with parenting stress, and ADHD with executive function difficulties (EFDs), there is little research exploring whether EFDs within an ADHD population are associated with parenting stress.

This dissertation’s main objective is to determine whether parent-reported and teacher-reported childhood EFDs are associated with elevated levels of parenting stress. A secondary data analysis was completed on a cross-section of parent and teacher completed psychiatric assessment measures for children (n=243) diagnosed with ADHD. Measures included the Behavior Rating Inventory of Executive Function, the Conners’ Parent Rating Scale and the Parenting Stress Index, Long Form.

A number of important findings were produced; key of which was the finding that a strong association exists between parent-reported EFDs and Child Domain parenting stress. Consistent with prior ADHD research, difficulties with emotional control and inhibition were found to be potent predictors of Child Domain parenting stress. To a lesser degree, children’s difficulties with initiation and self-monitoring were associated with Child Domain parenting stress.
stress, suggesting that daily hassles pose challenges for parents, especially when the child attends a new school. Also important was the finding that parent-reported oppositionality partially mediated the relationship between EFDs with emotional control, inhibition and shift, and Child Domain parenting stress. Despite teachers’ reports that children displayed more severe behaviours than were reported by parents, teacher-reported EFDs were not significantly associated with Child Domain parenting stress, with a few exceptions. Although not a well-explored concept within the literature on ADHD and parenting stress, parental acceptance of the child emerged as source of Child Domain parenting stress and a potential focus for assessment and treatment. Findings from the current study suggest that early identification and intervention with emotional control difficulties and ODD are vital due to their strong association with clinically significant levels of Child Domain parenting stress.
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CHAPTER I – INTRODUCTION, OBJECTIVES AND BACKGROUND

Attention-Deficit/Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder typified by symptoms of inattention, hyperactivity and impulsivity. First recognized as a medical/psychiatric condition at the turn of the 20th century by paediatrician George Still (1902), this disorder is one of the most diagnosed and treated children’s mental health issues in North America (Barkley, 1998; Cantwell, 1996; Dulcan, 1997; Pliszka, 2000; Pliszka et al., 2007; Waschbusch, 2002). The estimated prevalence among school-aged children in North America is between 3-7% (American Psychiatric Association [APA], 2000; Faraone, Sergeant, Gillberg, & Biederman, 2003) with a worldwide prevalence around 5% (Polanczyk & Rohde, 2007; Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007). In North America, this translates into approximately one child with ADHD enrolled in every regular education classroom (DuPaul & Stoner, 1994). Children diagnosed with ADHD are prone to experience a range of comorbid psychiatric conditions and learning difficulties (Bird, Goud, & Staghezza, 1993; Pliszka, 2000; Semrud-Clikeman et al., 1992), the most prevalent of which being Oppositional Defiant Disorder (ODD). ODD, typified by patterns of rule defiance, anger and behavioural difficulties, is estimated to affect between 30-50 % of the childhood ADHD population (Acosta, Arcos-Burgos, & Muenke, 2004; August, Realmuto, Joyce, & Hektner, 1999; Biederman, Newcorn, & Sprich, 1991).

The etiology of ADHD is largely due to genetic inheritance rather than environmental factors (Castellanos, Sonuga-Barke, Milham, & Tannock, 2006; Tannock, 2003; Faraone & Biederman, 2000; Thapar, Holmes, Poulton, & Harrington, 1999; Waldman & Rhee, 2002), although this does not diminish the role environmental factors play in shaping the overall
functional ability and/or symptom presentation of children diagnosed with this disorder (Barkley, 2006; Nigg, 2006). Leading ADHD theories assert that genetic aberrations contribute to neurological impairments with the executive functions (Tannock, 2003), which are believed to underpin many of the behavioural symptoms associated with ADHD (Nigg, 2006; Doyle, 2006; Jonsdottir, Bouma, Sergeant, & Scherder, 2006).

Executive functions (EFs) are considered higher order cognitive processes, such as working memory, planning, organization, and inhibition (Baddeley, 1996; Pennington & Ozonoff, 1996; Pennington, Bennetto, McAleer, & Roberts, 1996; Royal et al., 2002). EFs are also commonly categorized as being of the ‘cool’ (e.g., working memory) or ‘hot’ (e.g., emotional control) variety. This distinction is made to demarcate the group of executive skills and associated brain regions\(^1\) engaged by the child during emotionally laden situations (i.e., hot situations), such as arguing with parents over bedtime or curfew, from those cognitive resources engaged in response to stimuli with little emotional valence to the child, such as completing school work (i.e., cool situations) (Zelazo & Muller, 2002; Zelazo, Qu & Muller, 2005). Difficulties with the performance of the EFs, referred to as executive function difficulties (EFDs), are considered the defining impairment underpinning ADHD symptoms (Barkley, 2006; Tannock, 2003; Nigg, 2006).

Children with ADHD are at risk to experience high rates of academic underachievement or failure, negative peer relations, poor self-esteem, as well as secondary emotional and behavioural difficulties (Barkley, 2006; Carlson, Lahey, Frame, Walker, &

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\(^1\) Categorizing the executive functions as either ‘hot’ or ‘cool’ also denotes that these cognitive processes are associated with distinct, yet interconnected, underlying neural regions. For example, difficulties with the working memory, a ‘cool’ executive function, may be suggestive of a dysfunction in the dorsolateral prefrontal cortex, while impaired emotional control, a ‘hot’ executive function, may suggest a dysfunction in the orbital frontal cortex (Pasini et al., 2007).

Currently, there is a paucity of research examining childhood ADHD populations to determine whether EFDs are associated with parenting stress. The lack of research in this area is somewhat surprising in light of the association between childhood ADHD populations and parenting stress (see Theule et al., in press) and the established relationship between EFDs and ADHD symptoms (Pennington & Ozonoff, 1996; Sergeant, Geurts, & Oosterlaan, 2002; Willcutt, Doyle, Nigg, Faraone, & Pennington, 2005).

Study Objectives

Expanding upon previous theory and research related to parenting stress with childhood ADHD populations, this dissertation examines child characteristics associated with
ADHD to understand their influence on levels of parenting stress. The main objective of this dissertation is to explore the relationship between parent-reported and teacher-reported childhood EFDs and levels of parenting stress reported by parents of children with various types of ADHD. In so doing, this dissertation explores a largely unexamined area of research and bridges disparate bodies of research that reveal a strong association between ADHD and parenting stress and those studies that show a strong association between ADHD and EFDs.

To achieve the main objective of this dissertation, the following questions and sub-questions are answered: (a) Do elevated levels of childhood EFDs reported by parents and/or teachers (as measured by the Behavior Rating Inventory of Executive Function) predict increased levels of parenting stress (as measured by the Child Domain and Parent Domain of the Parenting Stress Index)? If elevated levels of childhood EFDs do predict increased levels of parenting stress, which specific EFDs best predict these increases?; (b) Do parent reports of childhood oppositionality/defiance mediate the relationship between parent-reported EFDs and levels of Child Domain parenting stress?; and (c) Do factors, such as child age, child gender, child ADHD diagnostic category, or life stress (as measured by the Life Stress index of the PSI) influence the relationship between EFDs and Child Domain parenting stress?

To answer these questions, a secondary data analysis was completed on a cross-section of parent and teacher completed psychiatric assessment materials for children (n=243) diagnosed with various types of ADHD at the Scarborough Hospital ADHD Clinic. Key predictor/independent variables include parent and teacher reports on several scales of the Behavior Rating Inventory of Executive Function (Gioia, Isquith, Guy, & Kenworthy, 2000), as well as parent reports on the oppositionality scale of the Conners’ Parent Rating Scale (Conners, 2001). Parenting stress, the dependent variable, is measured using the Child and
Parent Domains of the PSI (Abidin, 1995). The overarching hypothesis for the current study is that elevated levels of parent-reported and teacher-reported EFDs are associated with elevated levels of Child Domain parenting stress.

Background on ADHD: Confusion and Controversies in Context

Diagnostic categories contained within the Diagnostic and Statistical Manual of Mental Disorders (DSM), such as ADHD, can be likened to theories used to impose meaning on clinical problems. Over time, these ‘theories’ are constructed and re-constructed from expert opinion and research. As new discoveries are made in children’s mental health, the definitions and diagnostic criteria for ADHD must evolve to more accurately reflect the nature of the disorder. In this regard, the DSM-based diagnosis of ADHD may be best understood as a working theory (APA, 2000), that reflects the field’s most current knowledge. Numerous changes to the names, definitions and diagnostic criteria of ADHD have contributed to confusion and controversy about the nature and validity of the disorder (Nigg, 2006). Key areas of confusion and controversy include the changing nosology of ADHD, variable rates in the worldwide prevalence for the disorder, growing medicalization of childhood learning and behaviour problems, and differing systems of belief held by North Americans about impairments and disability.

The Changing Nosology of ADHD

The changes that have occurred in ADHD’s diagnostic terminology and criteria may contribute to the confusion and controversy surrounding this disorder. Since Still’s (1902) original description, there have been multiple incarnations of the disorder, including post-encephalitic behaviour, minimal brain dysfunction, Hyperkinetic Reaction of Childhood, Attention Deficit Disorder (ADD) and ADHD. Each of these permutations represents the
leading theory of the time (Houghton, Carroll, Taylor, & O’Donoghue, 2006). While these name changes likely confused the issue, the heart of the validity controversy lies in the changing diagnostic criteria that directly influence prevalence rates. Although slight increases in prevalence have occurred over time, it is widely believed that the occurrence within the population has not changed drastically (Nigg, 2006). What has changed is how mental health professionals measure this phenomenon. Fluctuations in North American prevalence are largely believed to result from changes in DSM criteria for ADHD (Steinhausen, 2003).

The formal identification of children with what is now known as ADHD quickly followed the inclusion of Hyperkinetic Reaction of Childhood in the DSM-II (APA, 1968). With access to a formal diagnostic tool, mental health professionals were then able to apply unified terminology to describe, define and identify ADHD behaviours (Anastopoulos & Shelton, 2001). The confusion related to ADHD’s prevalence was greatest when the diagnostic criteria underwent significant changes between the DSM-III and DSM-IV-TR (Nigg, 2006). This confusion may have started with the introduction of diagnostic subtypes (e.g., ADD with and without hyperactivity) in the DSM-III (APA, 1980) that recognized inattention as a unique diagnosis distinct from hyperactivity. When the DSM-III was revised (i.e., DSM-III-R; APA, 1987), the diagnosis was collapsed into a single category, and it became more difficult for inattentive children to receive a formal diagnosis. Following the reinstatement of sub-typing (i.e., ADHD, Predominantly Inattentive Type [ADHD-I]; ADHD, Predominantly Hyperactive-Impulsive Type [ADHD-HI]; ADHD, Combined Type [ADHD-C]) in the DSM-IV and DSM-IV-TR (APA, 1994, 2000), inattentive children were once again

2 Although beyond the purview of the current discussion, there are credible explanations for the small, but meaningful increase in the incidence of ADHD (see Nigg, 2006). For example, medical advances have increased survivability of low birth weight infants who are at increased risk for neuro-developmental impairments, such as ADHD (Hack, Klein & Taylor, 1995).
recognized as experiencing a legitimate medical condition. Evolutions of the *DSM* criteria were intended to promote clarity within the diagnostic parameters for ADHD in accordance with advances in theory and research (Anastopoulos & Shelton, 2001). The unfortunate by-product of these clarifying efforts has been confusion, if not full-blown controversy, within the general public and professional disciplines not specializing in ADHD.

**Differing World Views of ADHD**

The confusion and controversy related to the use of mental health classification systems is not isolated to the evolving nature of the *DSM*. In fact, a great deal of the controversy related to ADHD stems directly from differences in how this disorder is measured and classified around the world. Since 1968, the APA has used the *DSM* as a means to define, codify and standardize assessment practices. The *DSM*’s influence is largely seen within North America, while the remainder of the world uses the World Health Organization’s (WHO, 1993) *International Classification of Disease (ICD-10)*. Despite attempts by the APA and the WHO to establish consistency between these classification systems, the definitions of ADHD and Hyperkinetic Disorder (HKD) remain significantly different (Lahey et al., 2006). The key definitional differences lie in the absence of sub-typing (e.g., ADHD-I and ADHD-C) in the *ICD-10* (Taylor et al., 2004), and, in particular, the *ICD*’s failure to recognize inattention as a diagnosable sub-type of the disorder (Lahey et al., 2006; Lee et al., 2008). *ICD* protocols also reject diagnosing HKD in the presence of mood disorders such as anxiety (Lahey et al., 2006). Although ADHD and HKD have common diagnostic features, HKD is more narrowly defined than ADHD (Lahey et al., 2006; Lee et al., 2008; Remschmidt et al., 2005; Taylor et al., 2004). The differences in scope between this diagnostic criteria explains the differing prevalence rates (Tripp, Luk, Schaugnecy, & Singh, 1999), measured at 1.5%
for HKD in Europe (Swanson et al., 1998) compared to 3-7% for ADHD in North American school-aged children (APA, 2000). When worldwide prevalence rates are measured using DSM-based criteria, research shows that rates for ADHD do not differ significantly between North America and Europe (Polanczyk et al., 2007).

Differences in prevalence rates for ADHD and HKD have often been misinterpreted as proof that ADHD is misdiagnosed and/or over-diagnosed in North America. Without acknowledging the differences in diagnostic protocols, theorists critical of child psychiatry use these differing prevalence rates to argue that North American ADHD rates must be artificially inflated (Pickering, 2006). ADHD researchers contest this conclusion, showing that the ICD’s more narrow diagnostic protocol actually under-identifies individuals with impairments that are substantial in nature (Lahey et al., 2006; Lee et al., 2008) but arguably more ‘hidden’ (i.e., impacted by significant problems with inattention, but do not display externalizing behavioural components, such as hyperactivity) (Miller & Sammons, 1999; Warshaw, 2004; Wolf, 2001). Critics concerned with the growing medicalization of children’s issues likely find little solace in the fact that more ‘hidden’ impairments are being identified, even if the current criteria improves the number of children being correctly identified (Anastopoulos & Shelton, 2001).

Rates for ADHD do, however, differ to some degree between countries and within cultural groups and between geographic areas within countries. For example, research shows that compared to North America, the rates for ADHD are higher in Africa (8.5%) and South America (11.8%) (Polanczyk et al., 2007). Prevalence can also vary by geographic area within countries, especially when comparing geographic areas with high and low urban density, as psychiatric conditions may be more prevalent in urban communities (Polanczyk et al., 2007).
Rates may also differ between ethno-cultural groups within the same geographic area. For example, in a meta-analysis conducted by Miller, Nigg and Miller (2009), the researchers found that despite displaying greater ADHD symptomatology, young people of African American heritage were diagnosed only two-thirds as often as young people of Caucasian heritage. These differences may be due in part to differing cultural or family beliefs about mental health/mental disorders, differing knowledge regarding mental health disorders, and differing levels of accessibility to psychiatric services (Bussing, Gary, Mills, & Garvan, 2003, 2007; McLeod, Fettes, Jensen, Pescosolido, & Martin, 2007; Miller et al., 2009). Barkley and colleagues (2004) suggest that although variance occurs in other psychiatric disorders (e.g., psychosis) and medical conditions (e.g., multiple sclerosis and sickle-cell disease), for the above stated reasons, differing prevalence rates are often used to discredit the validity of ADHD.

*Medicalization of Childhood Learning and Behavioural Problems*

The medicalization of childhood learning and behavioural issues is likely another source of confusion and clearly a source of controversy. Due to space limitations, it is beyond the purview of the current study to examine why bio-medical perspectives of ADHD have gained such purchase within North America. It is possible, however, to briefly examine the timeline associated with ‘medicalization’ of children’s difficulties and how this process unfolded. In a watershed moment for children’s mental health, the APA opted to include categories specific to childhood psychiatric issues within the *DSM-II* (APA, 1968). The inclusion of these categories was a formal acknowledgement by the medical profession that children do experience psychiatric difficulties that require professional assistance. By creating the specific diagnosis, Hyperkinetic Reaction of Childhood, psychiatry proffered that children
once considered mischievous, lazy, or simply “bad kids” (Conrad, 2006, p.6), may in fact be experiencing legitimate mental health difficulties. This shift in perspective towards childhood behavioural issues was accompanied by new ideas that these children may require support, treatment and advocacy rather than punishment in order to effect change in their behaviour patterns.

With the advent of tools such as the *DSM*, and the creation of effective and efficient treatments, medical professionals have shown increasing interest and investment in the field of ADHD (Buitelaar, & Rothenberger, 2004). For example, although the overall number of children thought to have ADHD (i.e., the prevalence rate for the disorder in the community) remains largely constant, the number of children actually diagnosed with the disorder is increasing (i.e., the administrative rates for the disorder) (Buitelaar & Rothenberger, 2004; Swanson et al., 1998). This can be understood to mean that more children in need of assistance are being formally identified within the health care system, thereby increasing the likelihood of their receiving treatment or supportive services. Primary care physicians (i.e., family doctors) are the most common source of ADHD diagnosis and prescription of medication for childhood ADHD in North America (Zito et al., 1999).

Another example of the increasing involvement of physicians (i.e., family doctors, paediatricians and child psychiatrists) in treating ADHD can be found in the sharp increase in psychostimulant use in North America. In the USA, these rates doubled in the 1980s (Safer & Krager, 1992) and again in the first half of the 1990s (Robison, Sclar, Skaer, & Galin, 1999; Safer, Zito, & Fine, 1996; Olfson, Marcus, Weissman, & Jensen, 2002). Dramatic increases in the use of medication with childhood populations have been situated at the centre of the

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3 This does not include prevalence changes that occurred directly as a result of the aforementioned changes to the *DSM* diagnostic criteria.
medicalization debate. This debate has raged since psychotropic medications were first used by Bradley (1937) to treat ADHD (Castellanos et al., 2006; Conrad, 2006; Cohen, 2008). Marked increases in medication treatment for ADHD over the last 30 years have also fuelled the rhetoric of ADHD detractors (see Timimi et al., 2004) and anti-psychiatry theorists (see Conrad, 2006; Cohen, 2008).

Despite the increasing use of medication, and contrary to common societal myths regarding the overuse of medications within ADHD populations, the prevalence rate for psychostimulant use falls below the prevalence for the disorder. Research reveals that the prevalence for stimulant use averages around 3-4% of the population studied (Angold, Erkanli, Egger, & Costello, 2000; Cox, Motheral, Henderson, & Mager, 2003; Goldman, Genel, Bezman, & Slanetz, 1998; Jensen et al., 1999; Mayes, Bagwell, & Erkulwater, 2008; Poulin, 2001; Safer & Zito, 1999; Zito et al., 2003), which is approximately half of the childhood prevalence for the disorder. Increasing rates of medication use also coincide with proportional increases in the use of non-pharmaceutical interventions for ADHD, such as behaviour modification (Barkley et al., 2004).

It is difficult to say with certainty whether social attitudes towards childhood behaviour problems in North America have changed (e.g., treatment for a mental health issue versus punishment for misbehaving) as a result of the medicalization of ADHD behaviours, or whether the medical community stepped in to fill a void in children’s services by providing needed psychiatric care for prototypical ADHD behaviours (Buitelaar & Rothenberger, 2004). Through the involvement of the medical institution, aided with the effective use of media information campaigns, North Americans are less likely to view this population of children as wilful rule breakers, or the product of negligent parenting or teaching, and more likely to view
this problem as a medical condition (Lloyd & Norris, 1999; Schmitz, Filippone, & Edelman, 2003). Regardless of whether one views the medicalization of ‘deviant’ childhood behaviour as positive or negative, it remains clear that more children with inattention, hyperactivity and impulsivity than ever before are accessing mental health professionals who in turn are increasingly diagnosing these behavioural symptoms as ADHD (Buitelaar & Rothenberger, 2004).

Differing Views of Impairment and Disability

The debates and controversies that surround children’s mental health issues, such as the contention surrounding ADHD, are rarely about helping or not helping children in need. On the surface, these debates appear to revolve around the types of help offered to children with ADHD, and are often over-simplified to the propriety of using medication treatments rather than psychosocial interventions or adopting a ‘let-kids-be-kids’ approach. On closer inspection, the fabric of these debates, especially within the mental health system, is most often composed of strong beliefs as to whether the problems of ADHD are inherent to children (i.e., genetic or biological) or whether they stem from a mismatch between childrens’ needs and their environments (i.e., unjust social practices and policies).

Ultimately, this debate arises from strongly held ideologies related to the nature of disability and impairment. These beliefs are influenced by personal experiences, cultural factors and/or geographic influences (Sergeant & Steinhausen, 1992). These beliefs often conform along partisan lines, consistent with the ideologies of either diagnostic-medical or social models of disability. The diagnostic-medical model, common in North American

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4 Long-standing tension exists between social work and psychiatry, as well as within the social work profession itself, regarding the propriety of children receiving psychiatric diagnoses and pharmaceutical interventions (see Cohen, 2008; Dziegielewski et al., 2002; Frazer et al., 2009; Taylor & Bentley, 2004).
psychiatry, equates disability with impairment and views disorders, such as ADHD, as intrinsic biological deficits (Gilson & Depoy, 2002; Williams, 2001). Conversely, proponents of the social model of disability (Finkelstein, 1980; Oliver, 1986, 1990, 1992) leave individual-level impairments to the purview of the medical establishment, focusing instead on the disabling problems that can arise through a mismatch between peoples’ needs and the unjust policies and practices of society and its key institutions (e.g., schools) (Oliver, 1986; Shakespear & Watson, 2001). The theoretical chasm between these two positions has narrowed since the height of the debate in the 1980s. Medical perspectives on ADHD now endorse features of the social model that recognize psychosocial and structural forces as key factors in determining the child’s overall symptom display and functional ability. Aspects of social disability doctrine once considered sacrosanct are also being reinterpreted in literature. For example, second wave social disability theorists recognize the need to account for the specific nature of individual level impairments (e.g., mental and neurodevelopmental disorders), while also accounting for the disabling conditions created and maintained through society’s institutions and/or socio-political forces (Crow, 1996; French, 1993; Hughes & Patterson, 1997; Shakespear & Watson, 2001). Gallichan and Curle (2008) applied a second wave social model of disability to ADHD concluding that this disorder is best conceptualized and addressed both at the level of the individual and at a societal level.

Mainstream views of ADHD offer little credence for debates surrounding the legitimacy of ADHD. In fact, leading ADHD researchers have produced an International Consensus Statement (Barkley et al., 2002) and a Global Consensus on ADHD/HKD (Remshmidt et al., 2005) to admonish pseudo-scientists and the media for continuing a validity debate that holds no merit. Although debate surrounding the legitimacy of the
disorder is considered moot by the scientific community (Barkley et al., 2004; Pliszka et al., 2007), these same researchers maintain a healthy debate as to the exact nature of the phenomenon. This debate has contributed to the existence of several theoretical models of ADHD such as the Attentional Network, as well as Energetic, Motivational, Integrative, and Executive models of ADHD (see Houghton et al., 2006 for a review). Chapter II provides a more thorough discussion of ADHD theory as it relates to the objectives of the current study.

Background and History of Stress and Parenting Stress

Childhood ADHD populations are commonly associated with high levels of stress within the parenting role (see Baker & McCal, 1995; Breen & Barkley, 1988; Goldstein, Harvey, & Friedman-Weieneth, 2007; Kadesjo, Stenlund, Wells, Gillberg, & Hagglof, 2002; Mash & Johnston, 1983; Theule et al., in press). In fact, parents raising children with ADHD and related difficulties are described as being among the most stressed caregivers of any special needs population (Abidin, 1995). But what do we mean exactly when we refer to a parent as stressed?

Stress, as a concept, originated neither within medicine nor the social sciences, but within the physical sciences and engineering (Lazarus, 1966). Physicist Robert Hook coined the term stress to describe the capabilities of man-made structures (e.g., bridges and buildings) to maintain their integrity, cope with strain and withstand structural failure in the presence of environmental forces (Hinkle, 1974; Lazarus, 1966; Lazarus & Folkman, 1984). Although his work was confined to the natural sciences, Hook’s early conceptualization of stress significantly shaped the landscape of human stress theories (Lazarus, 1993a). The application of this concept to the human experience is actually believed to predate a clear definition for ‘stress’ as it applies to humans (Lazarus & Folkman, 1984).
The study of human stress is rooted in the works of physiologists Claude Bernard (Bernard, 1859, as cited in Appley & Trumbull, 1967) and Walter Cannon (1932), who explored the influence of environmental forces on the human body. Bernard’s exploration of the reaction and change of biological organisms to external stress factors such as temperature and hunger led him to coin the term homeostasis; the tendency of a system to regulate itself and maintain cohesion in response to change or stress (Nichols & Schwartz, 1998). Cannon extended Bernard’s work by suggesting that automated physiological stress reactions of the body could occur in response to any environmental stimuli and are not limited to temperature and hunger. Cannon’s work provided the foundation for biologically dominated definitions and models of stress (Marks, Murray, Evans, & Willig, 2000), including Selye’s (1936, 1983) theories on stress, which continue to hold great influence within stress research.

The term stress was first used in a psychological context by Grinker and Spiegel (1945), psychiatrists with the American Air Force who applied this term to describe the psychological toll of war in their book *Men Under Stress*. Professionals treating soldiers following their return from World War II, the Korean War, and in particular, the Vietnam War, began to gravitate towards theories of psychological stress to describe this phenomenon (Lazarus, 1966; Lazarus & Folkman, 1984). This shift was due to the recognition that returning soldiers were experiencing psychological stress, or what is now known as Post-Traumatic Stress Disorder (Marks et al., 2000).

Historically, theorists and researchers working with families impacted by childhood disruptive behaviour disorders avoided studying the concept of psychological stress (Webster-Stratton, 1990). This concept garnered little attention due in part to difficulties operationalizing and measuring this complex construct (Webster-Stratton, 1990), and due to
the emphasis within the social sciences and children’s mental health on behavioural theories and approaches, which left few theorists or researchers equipped to apply cognitive-appraisal approaches to psychological stress (Lazarus, 1966; Lazarus & Folkman, 1984).

Constructivist understandings of psychological stress made great in-roads with theorists and researchers following the ‘cognitive revolution’ within the North American social sciences, circa 1950s to 1970s. During this period, physiological (i.e., stimulus-response) models of stress (e.g., Cannon, 1932; Selye, 1936) came under direct attack from theorists affiliated with the burgeoning psychological perspective of stress. These thinkers, influenced by the rise of ecological systems frameworks, general systems theory and cognitive theories within social science (Lazarus, 1966), challenged stimulus-response views of stress as “incomplete and inadequate” (Lazarus & Folkman, 1984, p. 4). Leading the way among theorists from the psychological perspective, Richard Lazarus championed the idea that psychological stress could not be an objective universally experienced human condition as the experience of psychological stress depends on a person’s value judgments or appraisals of the potentially stressful situation (Lazarus & Folkman, 1984). This groundbreaking insight immediately challenged the dominance of physiological models of stress (i.e., stimulus-response models) (Hancock & Szalma, 2007; Lazarus, 1996), solidifying the importance of cognitive appraisals to the experience of psychological stress and leading to the creation of the Interactional Model of Stress (IMS) (Lazarus, 1966; Lazarus & Folkman, 1984).

In the late 1970s, Lazarus’ constructivist ideas of psychological stress were applied to parent-child interactions through Richard Abidin’s work in the area of parenting stress (Burke & Abidin, 1978 as cited in Abidin, 1990; 1995). Abidin, a leader in the field of parenting stress, was later joined by other influential researchers including Charlotte Johnston, Eric
Mash and Carolyn Webster-Stratton, who contributed significantly to the understanding of how stress operates within the parent-child system. The importance of the work on parenting stress cannot be understated, as “the degree to which [caregivers] experience parenting as stressful has been recognized as one of the most important environmental contributors to child well-being” (Mulsow, Caldera, Pursley, Reifman, & Huston, 2002, p. 944). As will be discussed further in Chapter II, Lazarus’ (1966) IMS will serve as a cornerstone for the theoretical framework of the current paper. Models of parenting stress developed by Abidin (Burke & Abidin, 1978 as cited in Abidin, 1990; 1995) and Mash and Johnston (1990) will also be explored with more depth in Chapter II.
CHAPTER II – DEFINITIONS AND CONCEPTUAL MODEL

To explore these concepts, this chapter begins by defining ADHD, ODD and EFDs within the context of a multiple pathways orientation to ADHD (Castellanos & Tannock, 2002; Nigg, et al., 2005; Nigg, 2006; Sonuga-Barke, 2002, 2005) which contributes to the theoretical foundation of the current study. Following this, psychological stress is defined within the context of the Interactional Model of Stress (IMS: Lazarus, 1966; Lazarus & Folkman, 1984), and parenting stress is defined using models of parenting stress developed by Abidin (Burke & Abidin, 1978 as cited in Abidin, 1990; 1995) and Mash and Johnston (1990). Key principles of the IMS contribute to the theoretical foundation of the current paper, along with complimentary principles from the aforementioned parenting stress models which support the application of Lazarus’ principles to the context of the parenting role and parent-child relationship. A conceptual model is proposed (see Figure 1 on page 29) which incorporates key elements from these theories to inform the hypothesized interrelationship among the measured variables of the current study. This conceptual model extends previous models of parenting stress and childhood ADHD by proposing a link between EFDs and parenting stress.

Current Definition of ADHD

The current study defines ADHD as a neurodevelopmental disorder operationalized within the *DSM-IV-TR* (APA, 2000), the psychiatric classification system widely-used within North America. ADHD is characterized by symptoms of inattention, distractibility, hyperactivity and impulsivity that commonly appear in early childhood, contributing to serious impairments in social, emotional or behavioural functioning (APA, 2000). Although symptoms typically emerge in pre-school years, generally ADHD is not formally diagnosed
until the child attends school (Applegate et al., 1997). In North America, the prevalence rate for ADHD among school-aged children is estimated to range between 3-7 % (APA, 2000).5

The DSM-IV-TR stipulates the existence of three distinct subtypes: ADHD-I, ADHD-HI, and ADHD-C. ADHD-I has a symptom profile that includes being easily distracted, often forgetful, failing to follow through on tasks and difficulty paying close attention to details, sustaining attention, and organizing tasks. In total, the DSM-IV-TR outlines nine behavioural symptoms for ADHD-I, of which at least six must be present for a diagnosis to be confirmed. The symptom profile associated with ADHD-HI includes frequent fidgeting or interrupting, as well as excessive talking, running or climbing. There are also nine symptoms associated with this ADHD subtype; six pertaining to hyperactivity and three related to impulsivity. At least six of nine symptoms of hyperactivity-impulsivity must be present for a diagnosis to be confirmed. A diagnosis of ADHD-C is applied when six or more symptoms of inattention and six or more symptoms of hyperactivity-impulsivity are present. DSM-IV-TR diagnostic criteria also stipulates that symptom patterns have an onset prior to age seven, persist for at least 6 months, are atypical of developmental norms, maladaptive and cause significant functional impairments across multiple environments (e.g., school and home). Also, the symptoms must not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia or another psychotic disorder, or be better explained by another mental disorder (APA, 2000). Refer to Appendix A for a full synopsis of the diagnostic criteria for ADHD.

The 18 behavioural symptoms associated with ADHD, when taken out of context, may appear typical of normal childhood. However, Peris and Hinshaw (2003) note that in cases of

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5 Waddell and colleagues (2005) estimate the prevalence of ADHD in Canada to be around 4.8% for young people ages 4-17 years of age. This estimates draws upon previous epidemiological studies conducted in Canada and the USA, including the Ontario Child Health Study (Offord, Boyle, Fleming, Blum, & Rae Grant, 1989).
ADHD, these “everyday behaviours” (p. 1187) occur with a level of severity and intensity that frequently results in significant impairments at home and school; an experience well-outside the norm for non-ADHD children. Wakefield (1992) indicates that a key requirement to warrant psychiatric diagnosis is the demonstration of harm caused by the syndrome or disorder. Satisfying this condition requires a subjective appraisal of the child’s social, emotional and academic functioning by mental health professionals (e.g., psychiatrists, psychologists, social workers), along with key informants (e.g., parents/caregivers and teachers). In the case of ADHD, harm is determined in relation to the contextual inappropriateness of the behaviour (Kirmayer & Young, 1999). For example, excessive running and jumping for a child in a playground or park is rarely a concern, whereas a child unable to restrain these actions within a classroom setting, consistent with developmental norms, is more likely to cause ‘harm’ to his or her learning and/or social experience.

Determining the occurrence of ‘harm’ can invite controversy into the diagnostic process because the threshold which separates functionality from dysfunction or ability from disability includes subjective judgments that are influenced by cultural and societal factors (Sergeant & Steinhausen, 1992). This being said, the majority opinion is that “children with the most severe forms of ADHD would be impaired in virtually any culture, community or context” (Parens & Johnston, 2009, p. 17).

The hallmark functional impairments of ADHD include academic difficulties, low self-esteem, strained social or peer relations, and behavioural issues (Barkley, 2006; Cantwell, 1996; Carlson et al., 1987; DuPaul, Ervin et al., 1998; Faraone et al., 1998; Hinshaw, 2002; Massetti et al., 2008; Mrug et al., 2001). High levels of parenting stress are common to this population (Theule et al., in press), especially when ADHD is accompanied by comorbid
ODD (Anastopoulos et al., 1992; Evans, Sibley, & Serpell, 2009; Podolski & Nigg, 2001; Ross, Blanc, McNeil, Eyberg, & Hembree-Kigin, 1998). As many as half of those diagnosed with ADHD-C will also be diagnosed with comorbid ODD (Acosta et al., 2004; August et al., 1999; Biederman et al., 1991; Lalonde, Turgay, & Hudson, 1998).

**Defining ODD**

ODD is a *DSM*-based psychiatric diagnosis characterized by a pattern of anger and hostility towards authority figures, as well as active rule defiance, non-compliance and temper tantrums. *DSM-IV-TR* diagnostic criteria list a total of eight symptoms. To warrant a diagnosis, an individual must display at least four symptoms for a period of at least 6 months, and these behaviours must be atypical of age and developmental level. Receipt of a diagnosis also demands that these behaviours cause severe social and/or academic impairment but have not yet escalated into patterns of violence or criminality more indicative of Conduct Disorder (CD). Comorbid ODD is believed to be associated with symptoms of hyperactivity/impulsivity (Gaub & Carlson, 1997; Lahey et al., 1994) and is most often diagnosed in conjunction with ADHD-C (Volk, Neuman, & Todd, 2005). *DSM-IV-TR* criteria for ODD are summarized in Appendix B. Due to the high rates of ODD within childhood ADHD populations, ODD is included as a key variable within the current study but is only examined as a comorbid condition to ADHD and not as an independent pathological entity.

High comorbidity rates between ADHD and ODD are believed to occur for several reasons, including: 1) as an artefact of the *DSM* classification system; 2) due to the possibility of shared biological antecedents, or; 3) due to the possibility that ADHD functions as a precursor to ODD (Shaffer, 2004). The *DSM-IV-TR* does not have a single diagnostic category for children with ADHD and extreme behavioural issues consistent with ODD or CD as is the
case with the diagnosis Hyperkinetic Conduct Disorder contained in the *ICD-10* of the WHO (1993). Therefore, when extreme behavioural problems co-occur with ADHD, mental health practitioners employing the *DSM-IV-TR* may consider providing two distinct diagnoses (e.g., ADHD-C and ODD).

Despite being viewed as separate diagnoses in the *DSM*, some theorists hypothesize that ADHD and ODD may share a common neuro-biological antecedent (Schachar & Tannock, 1995). For example, EFDs with emotional regulation/control may underpin both ADHD and ODD (Aronowitz et al., 1994; Barkley, 2006; Hurt & Naglieri, 1992; Séguin, Boulerice, Harden, Tremblay, & Pihl, 1999; Sergeant et al., 2002). Behavioural genetic research (i.e., twin study methodology) provides indication that ADHD and ODD have some genetic factors in common, while also acknowledging the important contribution of shared environmental factors such as negative parenting practices (Dick, Viken, Kaprio, Pulkkinen, & Rose, 2005).

Other theorists suggest that ADHD may function as a precursor to the onset of behavioural problems such as ODD and CD (Loeber, Burke, Lahey, Winters, & Zera, 2000). Longitudinal research suggests that this may be true for a subgroup of children with ADHD (Biederman et al., 2008; Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). These theorists suggest that severe ADHD, likely arising from genetic origins, may create risk or vulnerability for parent-child interactions to be more negative in nature. This contributes to the onset and intensification of oppositional, defiant and aggressive symptoms throughout the child’s development. Most mainstream theories of ODD recognize the possible contribution of genetics, but emphasize the key role of shared environmental factors, especially negative parenting practices (Anderson, Hinshaw & Simmel, 1994; August et al., 1999; Barkley,
Fischer, Edelbrock, & Smallish, 1991; Chronis et al., 2007; Dodge, 2002; Eddy, Leve, & Fagot, 2001; Goldstein et al., 2007; Johnston & Jassy, 2007; Johnston, Murray, Hinshaw, Pelham, & Hoza, 2002; McKee, Harvey, Danforth, Ulaszek, & Friedman, 2004; Patterson, 1976, 1982; Seipp & Johnston, 2005). In sum, regardless of whether ADHD and ODD share common genetic factors or act as risk factors, it is clear that a subgroup of children with ADHD is likely to be more susceptible to develop ODD than children from the general population.

Beyond the Diagnosis: A Multiple Pathways Orientation to ADHD

Most research investigating childhood ADHD populations examines this neurodevelopmental disorder from an atheoretical perspective that conceptualizes ADHD only in terms of DSM diagnostic criteria. The atheoretical nature of this categorical classification system does not provide much, if any, insight into such factors as the etiology of ADHD or elucidate upon the mechanisms that may link underlying neurobiological/neuropsychological difficulties with the disorder’s behavioural manifestations (i.e., ADHD symptoms). Instead, such tasks are left to the purview of various ADHD theories, the most influential of which include the Attentional Network, Energetic, Motivational, Integrative, and Executive models of ADHD (see Houghton et al., 2006 for a review).

These mainstream models differ in how they specifically conceptualize ADHD, but most include genetic heritability, gene-environment interactions/correlations, and EFDs as central concepts (Houghton et al., 2006). Opposed to reductionist theories of ADHD, such as Barkley’s (1997a, 1998) Executive Attention Model, which distilled the mechanism of ADHD down to a single core dysfunction with response inhibition, several researchers (Castellanos et

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6 The phenomenon of ADHD is also conceptualized in terms of diagnostic criteria for Hyperkinetic Disorder, when ICD-10 criteria are used within research.
al., 2006; Castellanos & Tannock, 2002; Nigg et al., 2005; Nigg, 2006; Sonuga-Barke, 2002, 2005) champion a multiple pathways orientation to ADHD. Nigg (2006) describes that a multiple pathways orientation conceptualizes ADHD as having several distinct paths to explain why ADHD occurs (i.e., etiology, originating causes, or what leads to the problem) and how symptoms manifest (i.e., the mechanism that drive the current symptomatology). Instead of conceptualizing ADHD as caused by a single gene, or explaining symptom manifestation as a consequence of one neuropsychological mechanism (e.g., deficits with response inhibition or working memory), a multiple pathways orientation assumes that ADHD has multiple causal pathways implicating a heterogeneous range of EFDs and other difficulties. Environmental/experiential factors are important to the multiple pathways orientation because unlike single gene disorders activated by genetics alone (e.g., Huntington’s chorea), the polygenetic nature of ADHD is most likely expressed, or magnified, within an activating “context” (Nigg, 2006), likely contributing to the overall symptom presentation and level of functioning of the child.

Executive Function Difficulties: Definitions and Implications

From a multiple pathways orientation, EFDs are looked upon as key neuropsychological/neurobiological mechanisms to explain how symptoms manifest in ADHD populations (Nigg, 2006). Estimates suggest that between 30-50% of children with ADHD are identified with significant neurological problems related to EFDs (Nigg et al., 2005; Willcutt, Doyle et al., 2005). These rates may be even higher when children’s functional abilities with EFs within real world settings (e.g., home and school) are accounted for during assessment procedures (Brown, 2006; Barkley, 2006).
Interest in the relationship between the executive functions (EFs) and ADHD grew steadily following Virginia Douglas’ (1972) influential work which identified neurological impairments and attentional issues as the central problem underpinning this disorder (Doyle, 2006; Stefanatos & Baron, 2007). First described by Baddeley and Hitch (1974) as the central executive, EFs are now commonly defined as interrelated higher order cognitive processes that underlie self-regulation and effortful goal directed behaviour (Pennington et al., 1996). EFs help people to interpret problems or complex situations using effortful thought and purposeful responses to novel situations (Denckla, 1996a; DeLuca et al., 2003; Jurado & Rosselli, 2007; Lezak, 1995; Mahone et al., 2002; Pennington & Ozonoff, 1998). EFs are considered essential for adaptive human behaviour (Jurado & Rosselli, 2007).

A variety of terms are used to describe problems with the EFs, many of which are used interchangeably. These include executive function impairments, executive function deficits, executive function weaknesses, executive dysfunction and executive function difficulties (Brown, 2006; Castellanos et al., 2006; Doyle, 2006; Gioia et al., 2000; Martel, Nikolas, & Nigg, 2007; Sarkis, Sarkis, Marshall & Archer, 2005; Scheres et al., 2001; Sergeant et al., 2002; Shallice et al., 2002; Willcutt, Doyle et al., 2005). The term executive function difficulties (EFDs) is used in the current research due to its congruence with the construct measured by the Behavior Rating Inventory of Executive Function (BRIEF), one of the key measures (i.e., independent variable) used in the current study.

Historically, EFs were viewed as a single unified function (Anderson, 2002) controlled by a single brain region (Pennington & Ozonoff, 1998). Much of the early work connecting

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7 In fact, her work was of such importance that it helped spur the reconceptualization of the disorder from a problem of hyperactivity, defined at the time in the DSM-II as Hyperkinetic Reaction of Childhood (APA, 1968), to a problem of attention, which was subsequently encapsulated in the DSM-III as ADD (Houghton et al., 2006).
EFs with childhood behavioural disorders was guided by what Pennington and Ozonoff (1998) describe as the “frontal metaphor” (p. 51). This refers to the similar behavioural patterns displayed by individuals with ADHD and adults who had undergone lobotomies or experienced frontal lobe lesions due to stroke or head injury. This unitary approach to EFs has largely been rejected in favour of a subcomponents model that recognizes a set of distinct but interrelated cognitive processes and brain regions (Lezak, 1995; Zelazo, Carter, Reznick, & Frye, 1997). A subcomponents model may be particularly helpful when working with childhood populations (Hughes, 2002) where global deficits of EFs are extremely rare (Anderson, 2002). A subcomponents approach may also be more sensitive to nuanced developmental changes that occur for the various EFs during childhood and adolescence. Although the field has not fully agreed upon the core subcomponents (Brown, 2002), most theories include inhibition, emotional control/regulation, set shifting, working memory (WM) and planning (Baddeley, 1996; Brown, 2008; Pennington & Ozonoff, 1998; Pennington et al., 1996; Royal et al., 2002; Zelazo & Muller, 2002). Specific definitions for these core subcomponents are provided below.

Inhibition is typically defined as the top-down cognitive process that prevents or delays competing thoughts and/or behavioural actions from intruding upon the preferred course of action or thought associated with the purposeful self-directed goal (Barkley, 1997a; Nigg, 2006). Gioia, Isquith, Retzlaff and Espy (2002) describe the ability to inhibit as synonymous with the ability to resist or not act on impulse. Inhibition can be further deconstructed into prepotent response inhibition (i.e., preventing a behavioural response for which immediate reinforcement is available) and interference control (i.e., protecting cognitive material essential for the preferred goal from competing information or responses.
Such difficulties are highlighted during times of ‘losing one’s train of thought’) (Lansbergen, Kenemans, & van Engeland, 2007).

The subcomponent shift (set shifting) is the EF process that enables an individual to purposefully and seamlessly change between cognitive or behavioural scripts and/or between situations and activities (Gioia et al., 2000). Although interrelated to inhibitory processes, shift is viewed as a unique EF process. The ability to shift involves the ability to rapidly change between thinking and/or behavioural tasks without the need for a full stop and re-start. This is distinct from inhibitory processes that facilitate the complete cessation of a specific thinking/acting process in favour of another.

Working memory is considered a limited capacity memory process that is distinguished from passive short-term memory by its ability to hold, work on, and engage additional materials relevant to the intended goal (Pennington & Ozonoff, 1998). WM is typically deconstructed into sub-processes, including phonological/verbal WM, visuo-spatial WM and the central executive that integrates these sub-processes. Examples of WM might include remembering a list of household chores while cleaning the bedroom, conducting mathematical calculations inside one’s head, or remembering a question for the teacher while continuing to follow along with the lesson.

Planning is considered a distinct EF process (Pennington & Ozonoff, 1998) that involves the organization of action steps that are temporally sequenced, and that draw from long term memories to determine the best possible solution or course of action to the given situation. Planning is closely tied to other EFs including interference control, shift and WM.

Emotional control/regulation is a cognitive process that involves the down-regulation of activity within the motivational system (i.e., higher order cortical functions repressing or
squashing emotionally reactive behavioural patterns arising from more primitive subcortical regions of the brain). This allows for the modulation of emotions and emotionally driven reactions in response to external stimuli (LeDoux, 1996). Emotional regulation processes are closely tied to inhibition skills, essential in the prevention or cessation of affect-driven behavioural responses (Barkley, 2006; Gioia et al., 2000; Melnick & Hinshaw, 2000). Children with poor emotional regulation abilities often display poor frustration control, are prone to emotional blow-ups over seemingly inconsequential issues, and appear to have their emotions take over their rational thinking (Brown, 2008).

The current research uses a subcomponents approach to EFs/EFDs, as is reflected in the conceptual model presented in Figure 1 (located on page 29). Consistent with a multiple pathways orientation to ADHD, a number of subcomponents are hypothesized to underpin ADHD symptomatology, including planning, WM, shift, inhibit and emotional control. Two additional subcomponents, organization of materials and monitor, are also included in the conceptual model (Figure 1) because of their status as subscales of the BRIEF. These subcomponents have been organized hierarchically in Figure 1 to reflect the hypothesized severity of behavioural disturbance (parent-perceived) associated with each EFD. For example, the behavioural disturbance associated with EFDs in planning may be perceived as less intense by parents compared to the behavioural disturbance associated with emotional control difficulties.
Figure 1: Conceptual Model
‘Hot’ and ‘Cool’ Pathways: Genetics and Gene X Environment Correlations

As is depicted in Figure 1, EFs/EFDs are often further categorized as being of the ‘cool’ variety (e.g., WM) or ‘hot’ variety (e.g., emotional control). This distinction is made to demarcate the group of executive skills and associated brain regions engaged by the child during emotionally laden situations (i.e., hot EFs), from those executive skills engaged in response to stimuli with little emotional valence to the child (i.e., cool EFs) (Zelazo & Muller, 2002; Zelazo et al., 2005).

‘Cool’ EFs are believed to be evoked/activated during times of rational/non-emotional decision making by relatively abstract decontextualized problems (e.g., completing homework assignments that are not linked to a specific reward) (Zelazo & Muller, 2002; Séguin, Arseneault, & Tremblay, 2007). ‘Hot’ EFs are required for (or are activated during) situations that are emotionally significant to an individual or for situations where an individual must determine the affective significance of a situation or stimuli (Kerr & Zelazo, 2004; Zelazo & Muller, 2002). ‘Hot’ EFs are typically called upon in situations that are meaningful to the individual and are often associated with emotional responses (e.g., a child who is arguing with parents over bedtime or curfew). ‘Cool’ EFs are believed to be associated with the performance of the dorsolateral prefrontal cortex (DLPFC) while ‘hot’ EFs are associated with the performance of the orbital frontal cortex (OFC) (Kerr & Zelazo, 2004; Pasini, Paloscia, Alessandrelli, Porfiri, & Curatolo, 2007; Séguin et al., 2007). When problems are encountered with ‘cool’ EF processes, symptoms of inattention may emerge while difficulties with ‘hot’ EFs are thought to be related to symptoms of hyperactivity and impulsivity (Castellanos et al., 2006).
Conceptualizing EFDs in terms of ‘cool’ and ‘hot’ processes is consistent with a multiple pathways orientation to ADHD, which assumes that there are several pathways leading to the onset of ADHD. These paths are demarcated according to whether the onset is attributed to genetics, largely independent of environmental effects, or whether genetic potentials are actualized through the influence of environment effects (gene X environment interactions\textsuperscript{8}). Although multiple pathways exist, the current research focuses on two etiological pathways to ADHD that arise primarily through genetic factors (extreme temperament), which account for the majority of cases of ADHD (Nigg et al., 2005; Nigg, 2006; Sonuga-Barke, 2002, 2005). The final symptom presentation associated with these two pathways is unlikely to be static in nature, with temperamental factors (i.e., genetics) being mediated by experiential factors (gene X environment correlations), to a greater or lesser degree depending on the pathway (Nigg, 2006). The first path is associated with difficulties with ‘top down’ control by the ‘cool’ cortical processes, typical of ADHD-I and ADHD-C with lower levels of hyperactivity/impulsivity. The second path involves difficulties with ‘bottom up’ control processes within the ‘hot’ or sub-cortical regulatory system, typical of ADHD-C with high levels of impulsivity, and most notably with ADHD/ODD (Nigg, 2006). These two developmental pathways, described below as ‘cool’ and ‘hot’ pathways will be examined in more detail below.

\textit{A ‘Cool’ Pathway.}

The ‘cool’ pathway (see Figure 1 on page 29), typical of inattentive symptoms, ADHD-I and cases of ADHD-C with lower levels of hyperactivity/impulsivity without ODD

\textsuperscript{8} Pathways to ADHD occurring via gene X environment interactions are those where genetic potentials are activated by experiential stressors on the developing neural system, such as perinatal alcohol, exposure to Polychlorinated Biphenyls (PCBs) or early and/or extended exposure to lead (Nigg, 2006).
(Castellanos et al., 2006), is theorized to result from genetic aberrations (Nigg, 2006), possibly involving dysfunctions with dopamine transporters (e.g., DAT1) and dopamine receptor genes (e.g., DRD4). These genetic aberrations are believed to contribute to dopamine regulation issues within the DLPFC, implicated in EFDs with WM and planning (Comings et al., 2000; Cook et al., 1995; Faraone, 2000; Faraone & Biederman, 1998; Faraone et al., 1995; Faraone et al., 2005; Faraone, Doyle, Mick, & Biederman, 2001; Royal et al., 2002; Swanson et al., 2000). Behavioural-based genetic research\(^9\) (i.e., twin studies and adoptions studies) provides support for this assertion by concluding that genetics account for the majority of variance in ADHD symptoms for ADHD-I and ADHD-C. Specifically, behavioural genetic research based on parent reports, reveals that genetics account for between 70-80% of the variance in ADHD symptoms (Faraone & Biederman, 1998; Faraone & Biederman 2000; Faraone et al., 2005; Martin, Levy, Pieka, & Hay, 2006; Thapar et al., 1999; Waldman & Rhee, 2002) with 20-30% explained by non-shared environmental effects (uncommon risk factors).\(^{10}\) Findings from the few twin studies specifically examining the genetic contributions to EFDs reveal a comparable rate of genetic heritability (see Doyle et al., 2005).

Genetic heritability rates drop somewhat when calculated using teacher reports of ADHD symptomatology (Thapar, Harrington, Ross, & McGuffin, 2000), possibly due to contextual differences in children’s symptom patterns and/or due to biases in parent or teacher reporting (Nigg, 2006). However, when stringent diagnostic protocols are used to identify ADHD, the heritability estimates are similar for parents and teachers, implicating genetics and

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\(^9\) Behavioural-genetic research provides estimates of genetic and experiential/environmental influence on symptoms. Estimates are arrived at by first comparing the correlation between monozygotic twins (i.e., sharing approximately 100% of genetics) in relation to ADHD symptom ratings; then repeating this process with dizygotic twins (i.e., sharing approximately 50% of genetics); and finally comparing the difference in these correlations in order to unravel the role of genetics versus environmental contributions.

\(^{10}\) An example of a non-shared environmental factor is a child being delivered with a low-birth weight status.
non-shared environmental contributions (Sherman, McGue, & Iacono, 1997). To put these figures into perspective, the genetic contribution to ADHD closely compares to the role genes play in schizophrenia (approximately 80% of the variance) (Cannon, Kaprio, Lonnqvist, Huttunen, & Koskenvuo, 1998; Cardno et al., 1999; Levinson & Mowry, 2000; Owen, O’Donovan, & Gottesman, 2002) and is approximately twice the genetic heritability rate of breast cancer (approximately 20-30% of the variance) (Lichtenstein et al., 2000; Locatelli, Lichtenstein, & Yashin, 2004; Thompson & Easton, 2004).

Shared environmental contributions, such as parenting practices, are shown to have a negligible influence on the onset of uncomplicated ADHD (e.g., ADHD-I) and the associated ‘cool’ EFDs such as WM and planning. However, due to the protracted developmental/maturational processes of the EFs and affiliated neural regions that extend well into early adulthood (Bjorkland, 2005; Brocki & Bohlin, 2006; Garon, Bryson, & Smith, 2008; Jurado & Rosselli, 2007; Stuss, 1992; Wahlstedt, 2009; Welsh, Pennington, & Groisser, 1991; Zelazo & Muller, 2002; Welsh, 2002), it is highly likely that shared experiential factors (e.g., quality of the parent-child relationship, parenting practices and the family environment) contribute meaningfully to determining a child’s overall symptom presentation via gene X environment correlations. Specifically, it is likely that a passive gene X environment correlation (Scarr & McCartney, 1983) is at play for the ‘cool’ pathway, whereby children inherit genes that promote difficulties with WM, planning and organization; traits that are magnified by being raised in an environment that has a tendency to be disorganized by parents who are poor planners, due to their own genetic tendencies for ADHD and/or EFDs (i.e., one or more parents has ADHD).
For example, research shows that maternal ADHD is associated with greater difficulties with monitoring child behaviour and greater difficulties with problem solving regarding child rearing (Chen & Johnston, 2007; Murray & Johnston, 2006). Furthermore, family environments impacted by children with ADHD tend to be less organized compared to family environments not impacted by ADHD (Schroeder & Kelly, 2009). In a sense, children face a double jeopardy, inheriting genes from their parent(s) predisposing them to ADHD, and being raised in a parent-created environment that may be highly influenced by similar genes, albeit the parent’s genetics (i.e., a genetic predisposition for disorganization combined with a highly disorganized environment may represent a gene X environment correlation). ‘Cool’ EFDs likely impact parents, but are not believed to evoke a reciprocal process or negative interaction pattern, as is likely the case with the ‘hot’ pathway, discussed in further detail below.

A ‘Hot’ Pathway.

The second pathway of interest to the current study, consistent with a multiple pathways orientation to ADHD, is the ‘hot’ pathway (see Figure 1 on page 29). This pathway possibly involves a genetic aberration with norepinephrine receptor genes (e.g., alpha-2-noradrenergic receptor gene), leading to norepinephrine regulation issues within the motivational system (Barkley, 2006; Nigg, 2006). The motivational system includes subcortical brain regions, such as the limbic system and the locus coeruleus (LC), which have strong afferent connections to the OFC (Arnsten, 2001; Royal et al., 2002; Toplak, Jain, & Tannock, 2005; Zelazo & Muller, 2002). Problems with norepinephrine regulation in the motivation system and the OFC are believed to be a possible explanation for the occurrence of ‘hot’ EFDs, such as emotional control and inhibition (Arnsten, 2001; Pasini et al., 2007).
Difficulties with emotional control and inhibition are linked to symptoms of hyperactivity/impulsivity and are especially pronounced in children with ADHD/ODD (Castellanos et al., 2006).

 Whereas shared environmental effects, such as parenting, are negligible for the onset of the ‘cool’ pathway, the nature of parent-child interactions are highly meaningful to ADHD/ODD (Burt, Kruger, McGue, & Iacono, 2001; Derks, Dolan, Hudziak, Neale, & Boosma, 2007). In the ‘hot’ pathway gene X environment correlations are hypothesized to play a pronounced role in the onset, escalation and maintenance of behavioural symptoms linked to ‘hot’ EFDs with emotional control difficulties and ADHD/ODD. Rather than playing a passive role in the gene X environment correlation, environmental factors influencing the ‘hot’ pathway can be best described as an evocative gene X environment correlation (Scarr & McCartney, 1983). The evocative gene X environment correlation that promotes the onset of ODD within childhood ADHD is also believed to be highly influenced by the presence of parental ADHD (Barkley, 2006). Simply put, parents who are impulsive, poor planners and quick to anger may be more vulnerable to having a poor ‘goodness-of-fit’ with their child who shares many of these temperamental (i.e., genetic) features.

 Children reported to display ‘hot’ EFDs in the areas of emotional control, shift and/or inhibition, are hypothesized to be highly stressful to parents. The intense behaviours associated with childrens’ ‘hot’ EFDs may evoke parental perceptions/appraisals that the child is oppositional/defiant, which are hypothesized to magnify levels of parenting stress, contribute to negative and/or avoidant parenting behaviours, that may intensify childhood behaviour problems.
Although it is difficult to determine the starting point of this evocative process, Mash and Johnston (1990) propose that the reciprocity between parent and child is asymmetrical in influence. They suggest that it is most likely the child’s characteristics associated with ADHD/ODD that act to evoke a negative response from parents. This theoretical position has been largely substantiated through causal research showing that parents’ negative behaviours change rapidly in response to the child’s behavioural change, facilitated through the use of fast-acting medications (Barkley, 1988; Barkley & Cunningham, 1979; Barkley & Cunningham, 1980; Barkley, Karlsson, Pollard, & Murphy, 1985; Humphries, Kinsbourne, & Swanson, 1978).

From birth, children on this pathway typically struggle across development to regulate their emotionally reactive processes, leading them to display a fussy, ‘hard to get along with’ temperament and a tendency towards behavioural reactivity (Nigg, 2006). The child’s ‘hot’ emotionally dominated behavioural patterns quickly intensify as parents struggle to help the child reduce his or her behavioural reactivity (Greene, 2001; Green & Doyle, 1999; Nigg, 2006), often engaging in negative parenting practices that actually intensify the child’s behaviour problems and the negativity of parent-child interactions (Barkley et al, 1991; Chronis et al., 2007; Johnston & Jassy, 2007; Johnston et al., 2002; McKee et al., 2004; Patterson, 1976, 1982; Seipp & Johnston, 2005).

Children on this ‘hot’ pathway and their parents may be most at risk for negative developmental outcomes because of the severity of the childrens’ behaviour patterns, the highly evocative nature of these behaviours and the frequency with which these behaviours contribute to elevated levels of parenting stress. When this dynamic is not adequately addressed there is risk for these negative interaction patterns to become intractable and for
child behaviour patterns to intensify. At this stage, children are frequently on a trajectory towards behavioural problems warranting a diagnosis of ODD or CD (Loeber et al., 2000; van Lier, van der Ende, Koot, & Verhulst, 2007), and parents are on a trajectory towards experiencing clinically significant levels of parenting stress (Anastopoulos et al., 1992; Podolski & Nigg, 2001; Ross et al., 1998).

Psychological Stress and Parenting Stress

Despite being firmly cemented within the contemporary lexicon of social work and other mental health professions, the term stress does not represent a singular concept. Rather, stress can be viewed as an umbrella term that describes a wide array of psychological and physiological phenomena (Averill, 1989). Forging a single definition of stress has been hampered by groups of interdisciplinary professionals who have proffered various definitions, theories, models and frameworks leading to inconsistency, confusion, and contradiction (Lazarus, 1966). To make sense of the confusing landscape of stress theory, Cohen, Kessler, and Gordon (1995) suggest that theories of stress can be distilled into two major traditions along which lines most models conform: the environmental and psychological perspectives. The environmental perspective focuses on the occurrence of objective events that cause a stress-based physiological response within an individual (i.e., stimulus-response). On the other hand the psychological perspective views stress as a psychological state of being with possible physiological reactions which arise from the individual’s subjective evaluation of his or her ability to cope in a specific situation.

*Psychological Stress Defined and Conceptualized: The Interactional Model of Stress*

The current dissertation conceptualizes stress from the psychological perspective, specifically applying the Interactional Model of Stress (IMS) (Lazarus, 1966; Lazarus &
Folkman, 1984) to examine and interpret the psychological stress reported by parents raising children with ADHD. Opposed to physiological explanations for stress (i.e., stress as an autonomic response to a stimulus that is objectively and universally experienced) proposed by researchers such as Selye (1936), Lazarus (1966) viewed stress as a subjective experience unique to individuals. He defined stress within the IMS as a psychological state which results from an individual’s appraisal that a mismatch exists between the demands of the environment and the ability of that individual to cope with or reduce this mismatch (Hancock & Szalma, 2007; Lazarus, 1966; Lazarus & Folkman, 1984; Marks et al., 2000; Menaghan, 1983). This definition emphasizes the interaction between people and their environments (Lazarus & Folkman, 1984; Lazarus, 1991), which is highly consistent with the person-in-environment philosophy underpinning social work values and guiding principles (Bogo, 2006; Germain, 1994; Germain, & Bloom, 1999; Germain & Gitterman, 1996; Mattaini & Meyer, 2002; Payne, 2005). Appraisal and coping processes are central concepts of the IMS and are paramount to shaping the experience of psychological stress.

Parenting Stress Defined and Conceptualized

In order to effectively apply the principles of the IMS to stress specifically related to the parenting role, this dissertation also applies models of parenting stress, including those proffered by Abidin (Burke & Abidin, 1978 as cited in Abidin, 1990; Abidin, 1995) and Mash and Johnston (1990). Abidin’s model of parenting stress is particularly influential, in part because his theory underpins one of the most commonly used measures to research parenting stress (Eesdaile & Greenwood, 2003; Fischer, 1990), the Parenting Stress Index (PSI) (Abidin, 1995). Parenting stress is commonly defined as the negative mental response of a parent created by a mismatch between the perceived demands of parenting and the perceived
availability of resources to meet these demands (Abidin, 1995; Deater-Deckard, 1998; Deater-Deckard & Scarr, 1996). Lazarus’ (1966) influence on Abidin’s (1995) conceptualization of parenting stress can be seen in the symmetry between this definition of parenting stress and Lazarus’ previously described definition of psychological stress.

Convergence between the IMS and Abidin’s model of parenting stress also occurs through the shared assumption related to the importance of appraisals of psychological stress. Drawing upon Lazarus’ (1966) IMS, Abidin designed the items of the PSI Child Domain to tap into parental appraisals of the child, in addition to information on the occurrence of objective behavioural referents (Abidin, 1995; 1997). Abidin’s model of parenting stress includes other key assumptions including the idea that parenting stress is cumulative and may compound across time and across settings (e.g., school and home); and that parenting stress is multi-dimensional in nature, arising from two key sources: characteristics of the child and characteristics of the parent. Although Abidin’s model is considered the dominant model in the field, other authors, such as Mash and Johnston (1990) have also contributed significantly to the theoretical base in this field. Mash and Johnston’s (1990) model shares many of the aforementioned theoretical assumptions with Abidin’s model and includes a distinct parent-child interaction variable and an emphasis on the probabilistic nature of the model not addressed by Abidin.

**Applying the IMS and Parenting Stress Models to EFDs**

As depicted in Figure 1 (on page 29), the current dissertation conceptualizes parenting stress in a manner consistent with Abidin’s model. Parenting stress is dichotomized into two main sources of stress: stress related to children’s characteristics (i.e., Child Domain of the PSI, including adaptability, moodiness, distractibility/hyperactivity), and stress related to
parents’ characteristics (i.e., Parent Domain of the PSI, including parental competence, social isolation, role restriction). This dissertation, informed by Mash and Johnston’s (1990) model, proposes a probabilistic conceptual model to explain the likely contributions of child characteristics and parent characteristics to levels of parenting stress.

Consistent with the probabilistic nature of this conceptual model, the current dissertation is based upon the hypothesis that child characteristics associated with ADHD, including ‘cool’ EFDs, ‘hot’ EFDs, and oppositional/defiant behaviours are most likely to be associated with Child Domain parenting stress and to a lesser extent with Parent Domain parenting stress. Parenting stress associated with parent characteristics, captured by the Parent Domain of the PSI, are considered a less likely source of parenting stress in this model. Due to its probabilistic nature, this model suggests only that child characteristics (i.e., Child Domain parenting stress) are a more likely contributor to total levels of parenting stress at the group level (i.e., sample or population) and does not deny that parent characteristics can be meaningful contributors to total levels of parenting stress at the individual level (i.e., parenting stress levels of any specific parent may arise as a result of parent characteristics) (Mash & Johnston, 1990).

Informed by Abidin’s (1995) model of parenting stress, Figure 1 (on page 29) includes possible moderating variables that act to influence the relationship between EFDs and child-related parenting stress. Potential moderating variables examined in the current dissertation include child and parent gender, as well as stressful events in the family system measured by the PSI Life Stress Index (e.g., parent job loss, death of a family member, divorce). These variables do not act directly on the levels of Child Domain parenting stress, but potentially act upon the relationship between EFDs and Child Domain parenting stress.
Parents raising children diagnosed with ADHD who experience problems in both the home and school environments are known to experience greater levels of total parenting stress compared to parents of children dealing with problems in one environment (Beck et al., 1990). Figure 1 (one page 29) shows that teacher-reported EFDs (i.e., teacher reports of childhood EFDs displayed within the school environment) are hypothesized to influence the level of total parenting stress through the Child Domain via the subscales for distractibility/hyperactivity, demandingness, and acceptance. Due to the hassles (e.g., parent-teacher meetings) created for parents when their child experiences difficulties at school (Johnson & Reader, 2002; Theule et al., in press), teacher-reported difficulties are hypothesized to influence total levels of parenting stress through the Child Domain.

Figure 1 (on page 29) also shows that childhood oppositional/defiant behaviours reported by parents also factor prominently in the conceptual model for this dissertation. In accordance with Mash and Johnston’s (1990) model of parenting stress, Figure 1 depicts a reciprocal pattern of influence between the childhood oppositionality/defiance and Child Domain parenting stress. Although these influences are reciprocal, the contributions of the parent and the child to negative dynamics are likely asymmetrical, with characteristics of the child (i.e., ODD) likely precipitating or evoking (Scarr & McCarthy, 1983) the negative and stressful parent-child interactions (Mash & Johnston, 1990).

Research shows that above and beyond the influence of ADHD symptomatology, comorbid ODD is likely the key mechanism associated with elevated levels of parenting stress for childhood ADHD populations (Anastopoulos et al., 1992; Baldwin et al., 1995; Evans et al., 2009; Podolski & Nigg, 2001; Harrison & Sofronoff, 2002; Vitanza & Guarnaccia, 1999). Building on this research, Figure 1 (on page 29) depicts children’s oppositionality/defiance
(parent-reported) as a potential mediator for the relationship between ‘hot’ EFDs and Child Domain parenting stress. In conformity with accepted practices for mediator models (Baron & Kenny, 1986), Figure 1 suggests that much of the reason parents are stressed by their child’s ‘hot’ EFDs is because of (or largely due to) the influence of the child’s oppositional/defiance. This could mean that children displaying behaviours associated with ‘hot’ EFDs (e.g., inhibition and emotional control difficulties) are stressful to parents, and that these children are particularly stressful when underlying difficulties with ‘hot’ EFDs manifest as opposition/defiance. Alternately, drawing upon Lazarus’ IMS (Lazarus, 1966; Lazarus & Folkman, 1984) and its recognition of the importance of appraisals to psychological stress, the mediator relationship in Figure 1 (on page 29) can also be described in the following manner: the reason some parents are highly stressed by childrens’ ‘hot’ EFDs is largely due to their appraisal of these behaviours as oppositional/defiant. These behaviours may be perceived as threatening in some manner or as placing demands on parents that exceed their perceived coping resources. The importance that Lazarus (1966) and Abidin (1995) place on appraisals to the experience of psychological stress and parenting stress necessitates the more thorough discussion below with application to the current dissertation.

The Importance of Appraisals to Parenting Stress

Cognitive appraisal is best understood as an omnipresent evaluative process that mediates between a person’s transactions with their environment and their subsequent reaction (Lazarus & Folkman, 1984; Lazarus, 1993). Appraisals help people to categorize transactions with their environment according to the significance of their potential impacts (Lazarus & Folkman, 1984) and help to determine the availability of resources (i.e., intrinsic and extrinsic resources) to cope with these environmental demands. In relation to stress, Lazarus and
Folkman state that appraisals are an “evaluative process that determines why and to what extent a particular transaction or series of transactions between a person and environment is stressful” (1984, p. 19).

The probabilistic nature of this conceptual model supports the hypothesis that certain childhood characteristics or behaviours (e.g., emotional control difficulties, inhibition difficulties, ODD) may place demands on parents that are deemed to exceed, or actually exceed, parents’ coping resources, thereby making them more likely sources of parenting stress. For example, Figure 1 (on page 29) shows the hypothesis that parents will be more likely to report the behavioural disturbances associated with ‘cool’ EFDs as least intense and the behavioural disturbances associated with ODD as most intense. However, the current dissertation opposes the deterministic view that the presence of severe childhood behaviours automatically results in parenting stress, or that the mere occurrence of severe childhood behaviours fully explains the occurrence of parenting stress.

The theoretical position of this conceptual model is that the occurrence of behaviours (i.e., environmental stimuli) is not sufficient to explain the occurrence of parenting stress. Parental appraisals regarding the possible mismatch between the demands of raising a special needs child (e.g., EFDs or ODD) and the perceived availability of resources to cope with these needs are hypothesized to play a central and necessary role in determining whether parents will be stressed. This position is consistent with the IMS key assumption that stress is a highly contextualized and individualistic process, whereby the determination of whether a person-environment transaction is stressful hinges on the outcome of the cognitive appraisal process (Lazarus, 1966; Lazarus, 1993a; Lazarus & Folkman, 1984).
Although not directly measured as a separate construct,\textsuperscript{11} cognitive appraisal processes are incorporated as a central component of this dissertation’s conceptual model (see Figure 1 on page 29) in order to explain why some parents experience low levels of parenting stress in relation to their child’s characteristics (e.g., EFDs) while others experience high levels of parenting stress. Parent appraisal processes are represented in Figure 1 as key influences to explain low versus high levels of parenting stress in response to childhood EFDs. A separate variable related to parent appraisal is not necessary within this conceptual model. This is because the \textit{PSI}, the measure of parenting stress used in the current study, is constructed such that each of its 101 items, with few exceptions, gauges the occurrence of an objective behavioural referent and the parent’s appraisal of this behavioural stimulus (Abidin, 1995; 1997). The theoretical mechanism associated with appraisal and coping process, two core components of this dissertation’s conceptual model, will be further expanded upon below.

The IMS makes the distinction between primary and secondary appraisal processes\textsuperscript{12} (Lazarus & Folkman, 1984). Primary appraisal entails one’s judgement of an event to be benign or threatening. A secondary appraisal process is engaged if a threat is perceived in order to assess one’s ability to cope with the perceived threat (Lazarus, 1993b; Marks et al., 2000). A key facet of psychological stress is the experience of threat, defined as the anticipation of psychological harm (Lazarus, 1966, 1993b). Threat, whether real or anticipated, is characterized by negative emotions such as fear, anxiety and anger (Lazarus & Folkman, 1984). In the case of ADHD and ADHD/ODD, and possibly ‘hot’ EFDs, threat can include parents perceiving their authority under threat from the child (Johnston & Ohan, 1998).

\textsuperscript{11} Abidin (1995) indicates that appraisals are built into each item of the \textit{PSI}.

\textsuperscript{12} The IMS also includes re-appraisal as a third type of appraisal, which is the modification of an appraisal based on new information.
or the anticipation of behavioural or emotional outburst disrupting family functions or community activities. Informed by Lazarus’ (1993b) view that threats exist on a continuum of intensity, Figure 1 (on page 29) shows that parents may be more likely to feel threatened by severe behavioural disturbances, such as ‘hot’ EFDs and ODD, and less threatened by behaviours associated with ‘cool’ EFDs.

Coping

Lazarus defines coping as “cognitive and behavioural efforts to manage stress”, which are neither universally adaptive nor maladaptive (1993b, p. 237). Rather, coping efforts are highly contextualized and change with time and in accordance with the individual’s perceived challenges or threats and perceived availability of resources (Lazarus, 1993a). There are two forms of coping efforts articulated within the IMS: emotion-focused coping and problem-focused coping and (Folkman, Lazarus, Dunkel-Schetter et al., 1986; McKee et al., 2004; Lazarus, 1993a, 1993b).

Problem-focused coping involves attempts to change aspects of the person-environment transaction or the nature of the environment itself (Lazarus, 1993a, 1993b). Examples of problem-focused coping in relation to childhood ADHD and/or EFDs might include attempts to alter children’s behaviours, adjust the nature of parent-child interactions, change to household routine, or attempt to change the services or programs the child receives at school. Emotion-focused coping efforts do not target change in the environment. Rather, they comprise attempts to change either what is attended to or how it is appraised (Lazarus, 1993a) in an attempt to reduce the negative feelings associated with the threat or stressor (McKee et al., 2004). The selection of one form of coping over another often depends on an individual’s appraisal as to whether anything can be done to effect change in the situation.
When the situation or issue is deemed to be controllable, parents will likely pursue problem-focused efforts, while uncontrollable situations typically bring forward emotion-focused coping responses (Folkman, Lazarus, Dunkel-Schetter et al., 1986; Lazarus, 1993b).

To determine whether a situation is controllable, parents are likely to rely on causal attributions (Weiner, 1985), a cognitive process closely aligned with cognitive appraisals. Weiner (1985) contends that during situations where a person requires assistance (e.g., child), the potential helper (e.g., parent or teacher) relies on attributions to determine why help is needed. Weiner (1985) states, “If the cause is uncontrollable, then pity and help should be offered...if the cause is perceived controllable, then the person is held responsible, anger is experienced, and help should be withheld” (p. 569). In the case of childhood ADHD and EFDs, this conceptual model (Figure 1 on page 29) indicates that parents who are less accepting of their children having special needs (i.e., acceptance subscale of the PSI), may be more likely to experience higher levels of parenting stress. Furthermore, if parents consider childrens’ behaviours as more controllable, or wilful, as the case may be with ODD, parents may be less likely to meet the demands of their child. Instead, these parents may become stressed and angry (Seipp & Johnston, 2005), possibly adding to the negative parent-child interaction pattern depicted in Figure 1 (on page 29).

Parents who have difficulty accepting that their child has special needs such as ADHD and EFDs may be more likely to continue pursuing problem-focused coping (i.e., changing the child) (Kendall, 1998). When parents are fixated on altering the environment (i.e., changing the child’s temperament - not their symptom profile) when this is not feasible,
problem-focused efforts may be unhelpful, and can be counterproductive to the goal of reducing stress, possibly even creating a state of chronic stress (Lazarus, 1993b).

Informed by the IMS, the conceptual model is based upon the hypothesis that parents of children with ‘hot’ EFDs, displaying oppositional/defiant behaviours are more likely to engage problem-focused coping efforts that are reactive, confrontational, aggressive or ‘heated’, rather than deliberate, well-thought-out ‘cool headed’ strategies (Folkman, Lazarus, Dunkel-Schetter et al., 1986). The difference between these ‘heated’ or ‘cool headed’ approaches to problem-focused coping may have much to do with the history of the parent and child. Johnston and Ohan (2005) suggest that attributions made by parents of children with ADHD are heavily influenced by ‘automatic thinking’ that draws upon historical interactions, often clouded by negative stressful interactions. As previously discussed in the context of multiple pathways to ADHD, children with a temperamental (i.e., genetic) disposition towards EFDs (i.e., emotional control difficulties and inhibition difficulties) may evoke negative interactions from their parents (Scarr & McCartney, 1983). Parents who are more likely to engage in ‘heated’ problem-focused coping efforts with children genetically disposed to ‘hot’ EFDs are hypothesized to contribute to reciprocal patterns of negativity that magnify children’s behavioural symptoms and amplify parenting stress levels.

Parents may, however, have difficulties relinquishing problem-focused tactics in favour of emotion-focused coping efforts (i.e., coping that attempts to change either what is attended to or how it is appraised in an attempt to reduce the negative feelings associated with the threat or stressor). Problem-based approaches have long been venerated within western societies (Lazarus 1993b) to the detriment of emotion-based approaches due to social norms that prize ‘fixing’ problems over what can be misconstrued as ‘giving up.’ This may be
especially true for parents raising children with ADHD who report being judged for doing too little to effect change in their child’s condition or behaviours or being outright blamed for the occurrence of childhood behavioural problems (Blum, 2007; Brook & Boaz, 2005; Cronin, 2004; McCleary, 2002; Peters & Jackson, 2008; Shapiro, 1988). Parents are uniquely challenged to cope with the stressors associated with raising children with ADHD, EFDs and ODD. A family system can function as a veritable “reservoir of stress” (Pearlin, 1983, p. 7), requiring parents to act as the principal buffer between stress factors and childhood development (Lazarus, 1993b; Sparrow, 2007). How parents cope with the demands of special needs children with ADHD, EFDs and ODD may have a great deal to do with their future well-being of this vulnerable segment of the population (Mulsow et al., 2002).

Chapter Summary

A conceptual model was presented in this chapter in a manner that synthesized and built on core ideas from multiple pathways orientations to ADHD (Nigg, 2006; Sonuga-Barke, 2002, 2005), core concepts from the IMS (Lazarus, 1966), as well as leading parenting stress models offered by Abidin (Burke & Abidin, 1978 as cited in Abidin, 1990; 1995) and Mash and Johnston (1990). Parents sharing similar EFDs to their emotionally reactive children may have more difficulties coping with parenting stress, which contributes negative appraisal/negative interactions within the parenting role. Child evoked, stress induced negative appraisals/negative interactions are hypothesized to contribute to elevated childhood ODD behaviours. These in turn, contribute to more extreme levels of parenting stress, thereby perpetuating a negative reciprocal cycle between parents and children with EFDs and ODD. The current dissertation now turns to a review of the research literature to provide empirical support for this conceptual model and the proffered hypotheses.
CHAPTER III – REVIEW OF THE RESEARCH LITERATURE

The objective of the current study is to determine whether EFDs reported by parents and teachers are associated with elevated levels of parenting stress for a sample of children diagnosed with ADHD, with and without comorbid ODD. There is only one study known to this author that has examined this topic (see Joyner, Silver, & Stavinoha, 2009). The paucity of research in this area is somewhat puzzling considering that two extensive, albeit separately developed bodies of research, exist related to this subject matter; one showing a strong association between EFDs and ADHD and the other showing a strong association between childhood ADHD and parenting stress. Joyner and colleagues (2009) are believed to be the first to bridge these disparate bodies of research by investigating whether children’s EFDs (parent-reported and teacher-reported) are associated with levels of parenting stress for parents of children with ADHD. Using correlation analyses to compare ratings on the BRIEF and the PSI these authors concluded that a strong positive association exists between parent-reported EFDs and levels of parenting stress. Due to the lack of direct empirical support for this subject matter the current study draws upon the parallel body of research linking childhood ADHD with and without parenting stress. Prior to reviewing the literature pertaining to ADHD and parenting stress, this chapter first establishes that an association exists between EFDs and childhood ADHD by conducting a review of the literature in this area. The chapter concludes with a summary synthesizing the key findings from these disparate bodies of research, thereby highlighting the implications for the current research.

ADHD and EFD Subcomponents

Since Virginia Douglas (1972) reconceptualized ADHD as a neuro-cognitive impairment of attention and impulse regulation, researchers have sought empirical support for
the widely held theoretical position that EFDs are the central impairment underpinning ADHD symptomatology. Although most contemporary models of ADHD include EFDs as a central impairment of the disorder (see Barkley, 1997a, 2006; Castellanos & Tannock, 2002; Nigg et al., 2005; Sonuga-Barke, 2002, 2005), meritorious debate remains regarding the precise nature of the relationship between ADHD symptomatology and EFDs. Overall findings from a meta-analytic review of 83 individual studies,\(^\text{13}\) conducted by Willcutt, Doyle and colleagues, (2005) reveals that ADHD groups differed significantly\(^\text{14}\) from controls on all EF tasks, echoing conclusions from an earlier review by Pennington and Ozonoff\(^\text{15}\) (1998). Sergeant and colleagues (2002) arrived at a less firm conclusion from their meta-analysis, indicating that although children with ADHD have performance deficiencies in some EF tasks/tests, the pattern is not consistent between studies. Research using real-world activities and environments (e.g., video games and visits to a local zoo) also demonstrate that children with ADHD not only experience significantly more difficulties with EFDs on neuropsychological tests, but these difficulties also exist in real life (Lawrence et al., 2004).

Much of the research examining the relationship between EFDs and childhood ADHD applies a subcomponents approach that attempts to isolate children’s cognitive abilities in such areas as inhibition, WM, planning, shift and emotional control. A subcomponents approach to the study of EFDs is typically used with childhood populations (Hughes, 2002) where global deficits with EFs are extremely rare (Anderson, 2002). Research findings

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\(^{13}\) The meta-analysis conducted by Willcutt, Doyle and colleagues (2005) does not conform to systematic review protocols (i.e., Cochrane Collaboration). Nonetheless, to date, this analysis includes 83 individual studies and is among the largest in the field.

\(^{14}\) Weighted mean effect size of \(d = .54\) (medium effect) across all comparisons (Willcutt, Doyle et al., 2005).

\(^{15}\) Consistent findings between the meta-analytic reviews conducted by Pennington and Ozonoff’s (1998) and Willcutt, Doyle and colleagues (2005) is not surprising considering that Willcutt’s study includes 12 of the 18 studies previously reviewed by Pennington and Ozonoff (1998).
regarding ADHD and specific EF subcomponents including inhibition, WM, shift, planning and emotional control are further discussed below.

**Inhibition**

Research shows that children diagnosed with ADHD have pronounced difficulties in the area of inhibition control relative to non-clinical control groups (Barkley, Grodzinsky, & Dupaul, 1992\(^{16}\); Barnett, Maruff, & Vance, 2009; Mullane & Corkum, 2007; Sergeant et al., 2002; Toplak, Bucciarelli, Jain & Tannock, 2009; Willcutt, Doyle, & colleagues, 2005; Wodka et al., 2007). In fact, Willcutt, Doyle and colleagues (2005) conclude that within their meta-analysis, difficulties with inhibition\(^{17}\) are the most consistently identified EFD for children diagnosed with ADHD.

In the research literature related to behavioural inhibition, it is important to establish that some research deconstructs inhibition into subcomponent parts including prepotent response inhibition and interference control (see Barnett et al., 2009; Mullane & Corkum, 2007; Wodka et al., 2007). Studies specifically examining prepotent response inhibition indicate that difficulties in this area are central to childhood ADHD populations (Brocki, Nyberg, Thorell, & Bohlin, 2007; Brocki, Randall, Bohlin, & Kerns, 2008; Pasini, Paloscia, Alessandrelli, Porfiro, & Curatolo, 2007; Wahlstedt, Thorell, Bohlin, 2009; Willcutt, Doyle et al., 2005). Difficulties with interference control are also identified by some studies as being significantly associated with ADHD (Corbett et al., 2009; Lansbergen\(^{18}\) et al., 2007;  

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\(^{16}\) Two of the eight studies included in the review conducted by Barkley and colleagues (1992) were also included in the meta-analysis conducted by Willcutt, Doyle and colleagues (2005).

\(^{17}\) As measured by the Stop-signal task.

\(^{18}\) Four of the 19 studies included in this meta-analysis were also included in the meta-analysis conducted by Willcutt, Doyle and colleagues (2005).
Schwartz & Verhaeghen, 2008) while others are unable to show such a relationship (Brocki et al., 2008; van Mourik et al., 2009). Measuring both prepotent response inhibition and interference control simultaneously, Brocki and colleagues’ (2007) longitudinal research shows that both aspects of inhibition were important to ADHD, because both are independently related to the disorder, a finding confirmed by Mullane and Corkum (2007). Other research suggests that prepotent response inhibition may be directly related to ADHD, while problems with interference control may be indirectly related to ADHD by influencing the functioning of the WM, at least for children diagnosed with ADHD-I (see Brocki et al., 2008; Pasini et al., 2007; Verté, Geurts, Roeyers, Oosterlaan, & Sergeant, 2006).

**Working Memory**

The majority of research pertaining to WM shows that children diagnosed with ADHD experience significantly greater difficulties with WM compared to non-clinical groups (Barnett et al., 2009; Martinussen et al., 2005; Sergeant et al., 2002; Toplak et al., 2009; Wahlstedt et al., 2009; Willcutt, Doyle et al., 2005). Specifically, research shows that significant differences exist between ADHD groups and non-clinical controls for verbal WM (Barnett et al., 2001; Goldberg et al., 2005; Martinussen et al., 2005; Pasini et al., 2007; Rapport et al., 2008; Re et al., 2010; Willcutt, Doyle et al., 2005) but these differences are most significant in relation to spatial WM (Martinussen et al., 2005; Willcutt, Doyle et al., 2005). Other researchers have been unable to replicate these significant findings (Corbett, Constantine, Hendren, Rocke, & Ozonoff, 2009; Kerns, McInerney, & Wilde, 2001; Mullane & Corkum, 2007; Piek, Dyck, Francis, & Conwell, 2007; van de Voorde et al., 2010), likely

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19 Nine of 17 studies included in Schwartz and Verhaeghen’s (2008) meta-analysis were also included in the meta-analysis conducted by Willcutt, Doyle and colleagues (2005).

20 Effect size for spatial WM; $d = 0.63 \pm 0.16$ (Willcutt, Doyle et al., 2005) and $d = 1.06 \pm 0.19$ (Martinussen et al., 2005)
due to small sample sizes or when controlling for IQ (Mullane & Corkum, 2007). Nevertheless, these findings indicate that spatial WM likely plays a more pronounced role in ADHD than verbal WM and that both likely play a central role in the occurrence of childhood ADHD (Castellanos et al., 2006). Castellanos and colleagues (2006) extend this to suggest that EFDs with WM dethrone inhibition as the key contributor to ADHD, in contravention of Barkley’s (1997b) theory of EFDs and ADHD.

Planning

Research provides modest support that a relationship exists between childhood ADHD and EFDs with planning (Barnett et al., 2009; Sergeant et al., 2002; Toplak et al., 2009; Willcutt, Doyle et al., 2005). However, a small number of other studies (e.g., Goldberg et al., 2005; Wodka et al., 2008) have been unable to detect a significant difference, likely due to small sample sizes. Scheres and colleagues (2004) also note that significant relationships between planning deficits and ADHD may be best explained as an artefact of childrens’ IQ, rather than EFDs, suggesting that IQ should be controlled when researching this topic area.

Shift

Due to small sample sizes, most individual studies have been unable to detect a significant difference for shift (set shifting) between childhood ADHD groups and non-clinical controls (see Corbett et al., 2009; Goldberg et al., 2005; Mullane & Corkum, 2007; Scheres et al., 2004; Wodka et al., 2008). This limitation is overcome by the use of meta-analytic procedures to pool the samples of multiple studies and determine that a significant difference exists between ADHD groups and non-clinical controls (Willcutt, Doyle et al.,

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21 The reported effect size was $d = .46 +/-.09$ (Willcutt, Doyle et al., 2005).
2005). Modest support for the association between childhood ADHD and EFDs with shift is also found by Sergeant and colleagues (2002).

*Emotional Regulation*

There are few studies which examine the role of emotional regulation (Martel, 2009) and even fewer that examine emotional regulation difficulties within ADHD populations (Melnick & Hinshaw, 2000). Research comparing childhood ADHD groups with non-clinical controls shows that children with ADHD have more significant problems with emotional regulation (Walcott & Landau, 2004), but this difference may only be significant for children diagnosed with ADHD-C and not for those diagnosed with ADHD-I (Maedgen & Carlson, 2000). Consistent with theories proffered by Schachar and Tannock (1995) and Loeber and colleagues (2000), Martel (2009) concludes that problems with emotional regulation more likely define ADHD/ODD than ADHD, and that ADHD coupled with problems of emotional regulation may pose a risk factor for the development of ADHD/ODD. These theoretical assertions are consistent with the findings from Melnich and Hinshaw’s (2000) research in which they conclude that difficulties with emotional regulation establishes a vulnerability among ADHD populations to the onset of comorbid behavioural problems. Longitudinal studies suggest that this may be the case as overtime emotional regulation difficulties are shown to be associated with ADHD/ODD (Wahlstedt et al., 2008). Problems with emotional regulation appear only to predict future serious behaviour problems, and not ADHD itself (Morrell & Murray, 2003).

Research using the BRIEF to examine parent and teacher perspectives of childhood emotional regulation difficulties reveals that parents of children with ADHD report their children to have greater difficulties with ‘hot’ EFDs, including emotional control issues,
compared to children without ADHD (Gioia, Isquith, Retzlaff et al., 2002; Jarratt, Riccio, & Siekierski, 2005; McCandles & O’Laughlin, 2007). Furthermore, parents raising children with ADHD-C and ADHD/ODD are more likely to report their children to have significantly higher problems with emotional control compared to parents raising children with ADHD-I (Gioia, Isquith, Retzlaff et al., 2002; McCandles & O’Laughlin, 2007). When comorbid ODD is not present within the ADHD sample research shows that parents do not perceive significant differences in emotional control between groups of children diagnosed with ADHD-C and those diagnosed with ADHD-I (Riccio et al., 2006). Even when ODD is present within ADHD samples, research with the BRIEF shows that teachers are unable to detect significant differences in ‘hot’ EFDs (i.e., difficulties with inhibit, shift and emotional control) between children with ADHD-C, children with ADHD-I and non-clinical controls (Jarratt et al., 2005; McCandles & O’Laughlin, 2007).

**Summary of the Research on EFDs and ADHD.**

In summary, children diagnosed with ADHD experience more serious difficulties in all areas of EF compared to non-clinical controls. In relation to specific EFDs, children with ADHD are shown to experience more pronounced difficulties with inhibition, particularly in relation to controlling prepotent responses, but also in relation to interference control. Research also shows that EFDs with WM are significant among childhood ADHD populations for verbal and spatial WM. These difficulties may contribute to, or augment difficulties with interference control and/or planning. Research indicates that difficulties with spatial WM appear to be the principal deficit associated with ADHD. Only modest to moderate support exists within the research literature for an association between childhood ADHD and EFDs with shift and planning. Although there is limited research examining
emotional control/regulation and childhood ADHD, existing literature suggests that children with ADHD, particularly those with ADHD-C and ADHD/ODD, may experience more profound difficulties with emotional control/regulation compared to non-clinical groups. This research suggests that emotional regulation difficulties experienced by children with ADHD may place them at increased risk to develop comorbid behavioural disorders such as ODD, which has implications for parenting stress. In demonstrating that an empirically supported relationship exists between EFDs and ADHD this dissertation establishes that the research literature linking parenting stress and ADHD is highly relevant to the current study.

**ADHD and Parenting Stress**

To compensate for the lack of direct research examining parenting stress in relation to EFDs for children diagnosed with ADHD, the current study draws upon the parallel body of literature examining the relationship between childhood ADHD and parenting stress. Research examining parenting stress among childhood ADHD populations reveals that parents of children diagnosed with ADHD experience more parenting stress compared to parents raising typically developing children (Baker & McCal, 1995; Beck, Young, & Tarnowski, 1990; Breen & Barkley, 1988; Byrne, DeWolfe, & Bawdin, 1998; DuPaul, McGoey, Eckert, & VanBrakle, 2001; Goldstein et al., 2007; Kadesjo et al., 2002; Johnson & Reader, 2002). A recent meta-analysis of 22 published and 22 unpublished (e.g., dissertations) studies expanded upon these individual studies by determining that a large effect size exists for this comparison (Theule et al., in press).

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22 Parents of children with ADHD were reported to experience higher levels of parenting stress relative to non-clinical controls that were of large effect sizes: $d = 1.80 +/- .56$ for the PSI Total Domain; $d = 2.12 +/- .67$ for the PSI Child Domain; and $d = .90 +/- .4$ for the PSI Parent Domain (Theule et al., in press).
Much of the research in this field focuses on comparing differences in the levels of parenting stress experienced by parents of children with ADHD relative to parents of typically developing children. Much less research is dedicated to uncovering the mechanisms of the relationship between ADHD and parenting stress, including answering questions such as: Why are parents of children with ADHD so stressed within their parenting roles? Is this stress related to characteristics of the child, characteristics of the parents, factors within the broader family or social contexts, or some combination of these factors? In response to these questions, parenting stress theorists (see Abidin, 1995; Johnston & Mash, 2001; Mash & Johnston, 1990) suggest that the unique characteristics of children with ADHD are principally responsible for the elevated levels of parenting stress, with parent characteristics (e.g., depression and social isolation) also contributing to overall stress levels experienced by the parent.

**Parenting Stress Arising from Child or Parent Characteristics**

Research largely supports theoretical assertions that parents of children with ADHD do experience higher levels of parenting stress in relation to their own characteristics (i.e., Parent Domain of the PSI) when compared with parents of typically developing children (Breen & Barkley, 1988; Mash & Johnston, 1983). However, the greatest difference in parenting stress between these groups is in relation to the stress associated with child characteristics (i.e., Child Domain of the PSI) (Baker & McCal, 1995; Breen & Barkley, 1988; Mash & Johnston, 1983; Goldstein et al., 2007). Additional studies using multiple linear regressions show that child characteristics, particularly those related to ADHD
symptomatology, are among the most significant\textsuperscript{23} predictors of parenting stress (Baker, 1994; Baldwin et al., 1995). Theule and colleagues’ (in press) meta-analysis confirms the importance of child characteristics to parenting stress, showing that the difference between parents of children with ADHD and parents of typically developing children is significant with a large effect size.\textsuperscript{24}

Research studies employing the PSI-Long Form (PSI-LF) show that compared to parents of typically developing children, parents of children with ADHD reported significantly higher scores on many of the PSI subscales. Specifically, scores related to adaptability, demandingness, distractibility/hyperactivity differed significantly between parents of children with ADHD and parents of non-clinical control groups (Baker & McCal, 1995; Beck et al., 1990; Breen & Barkley, 1988; Mash & Johnston, 1983). Acceptability of the child was also shown to differ between these groups (Beck et al., 1990; Breen & Barkley, 1988; Mash & Johnston, 1983) with the exception of Baker and McCal (1995) who did not find that parents of ADHD children and controls differed significantly in their acceptance of the child. Baker and McCal (1995), Breen and Barkley (1988), as well as Mash and Johnston (1983) found significant differences between scores on the mood subscale of the PSI while Beck and colleagues (1990) and Byrne et al. (1998) did not. Furthermore, the scores on the PSI subscale reinforces parent were found to differ between parents of children with ADHD and parents of non-clinical controls in some studies (Breen & Barkley, 1998; Byrne et al.,

\textsuperscript{23} Baker (1994) found that the Child Behaviour Checklist (CBCL) emerged as the single largest predictor, accounting for 28% of the variance on the PSI Child Domain. Baldwin and colleagues (1995) found that the ADHD symptoms on the CBCL accounted for 18% of the variance in parenting stress, as measured by the Questionnaire on Resources and Stress (QRS-SFA). A limitation of Baldwin and colleagues’ study is that 40% of their sample was diagnosed with comorbid ODD, which was not included in the regression and left uncontrolled.\textsuperscript{24} Theule and colleagues (in press) report a large effect size $d = 2.12 +/- .67$ for difference in scores on the Child Domain of the PSI for parents of children with ADHD compared to non-clinical controls.
1998) while other authors found no such difference (Baker & McCal, 1995; Beck et al., 1990). Taken together these findings suggest that parents of children with ADHD are more stressed by their childrens’ ADHD symptoms. However, they are also significantly more stressed in relation to their childrens’ difficulties with adaptation and moodiness, as well as by the lack of reinforcement for their parenting efforts (i.e., parenting interventions are not rewarded with successful behaviour change). Furthermore, these findings suggest that parents experience high levels of parenting stress in relation to their parental expectations and their difficulties accepting that their children may have special needs.

The meta-analysis conducted by Theule and colleagues (in press) also reveals that parenting stress levels associated specifically with parent characteristics (i.e., PSI Parent Domain) differs significantly with a large effect size\(^{25}\) between parents of children with ADHD and those raising typically developing children. In particular, parents raising children with ADHD reported significantly higher levels of depression and/or social isolation (Baldwin et al., 1995; Befera & Barkley, 1985; Beck et al., 1990; Bussing, Zima et al., 2003; Chi & Hinshaw, 2002; Essex, Klein, Cho, & Kalin, 2002; Lange et al., 2005; Mash & Johnston, 1983; Podolski & Nigg, 2001; Seipp & Johnston, 2005; Renk, Roddenberry, Oliveros, & Sieger, 2007; Theule et al., in press; Webster-Stratton, 1988; Webster-Stratton & Hammond, 1988). Due to the high genetic heritability rate for ADHD, it is also possible, if not probable, that a parent is impacted by his or her own adult ADHD, possibly associated with parental depression, feelings of incompetency and difficulties within the spousal relationship (Weiss & Murray, 2003; Weiss, Hechtman, & Weiss, 2000). All three of these factors are known

\(^{25}\) A large effect size of \(d = .90 +/-.40\) was reported for the difference in scores on the Parent Domain of the PSI for parents of children with ADHD compared to non-clinical controls (Theule et al., in press).
sources of parenting stress (Abidin, 1995). Although not yet studied, parental ADHD may prove to be a potential source of parenting stress (Theule et al., in press).

Two particular findings from Theule and colleagues’ meta-analysis distinguish Child Domain parenting stress from Parent Domain parenting stress. First, Theule and colleagues note that not only are parents of children with ADHD more stressed by their childrens’ characteristics (i.e., PSI Child Domain) compared to parents of typically developing children, but these parents are also more stressed by their childrens’ characteristics compared to parents raising children with special needs other than ADHD (i.e., clinical control group). This was found to be the case in research conducted by Donenberg and Baker (1993) that showed parents of children with externalizing behaviours (e.g., hyperactivity, aggression) to be as stressed as parents of children with autism. Abidin (1995) made similar conclusions during the standardization process of the PSI, indicating that childhood ADHD, and especially childhood ADHD/ODD are among the most stressful populations to parent of any special needs population, including children with hearing or visual impairments, children with developmental delays/disabilities or children with Down’s syndrome or cerebral palsy.

The second finding from Theule and colleagues (in press) which distinguishes Child Domain parenting stress from Parent Domain parenting stress is that Parent Domain parenting stress does not differ appreciably between parents of children with ADHD and parents of other special needs children (i.e., clinical controls). Theule and colleagues suggest that parenting a special needs child may be associated with common stress factors, not unique to ADHD, including “hassles associated with having a child with a clinical disorder such as financial obligations and time commitments related to appointments” (p. 9). Lazarus and Cohen (1977) describe these types of stressors as daily hassles, setting them apart from stress
factors arising from major life changes. Daily hassles are important in relation to parenting stress, as they are believed to exert a heavy burden on parent and family functioning over time (Crnic, Gaze, & Hoffman, 2005).

**Parenting Stress and Daily Hassles.**

Parents raising children with special needs, such as ADHD, EFDs and ODD, often face the added burden of providing specialized care giving routines and supports that are more demanding than those faced by parents of typically developing children. Johnson and Reader (2002) find this to be true for parents of children with ADHD whose parenting stress is not isolated to the impact of the child’s ADHD symptomatology (e.g., interrupting or always being on the go), but is also associated with daily hassles of caring for and relating to a special needs child. In particular, they find that, compared to parents of typically developing children, parents of children with ADHD reported significantly higher levels of stress related to daily hassles, a large portion of which were hassles specifically involving the child’s school. This finding is supported by other research which shows that parents of children displaying ADHD related problems at home and school experience more overall stress than parents of children displaying problems in only one setting (Beck et al., 1990). More than ever before, parents are called upon to organize and manage school-based interventions (Riley et al., 2006). To fulfill the role of a ‘good parent,’ parents of children with special needs, such as ADHD, often perceive that they must actively engage the school system in meeting the child’s needs (Bendell, Stone, Field, & Goldstein, 1989; McKeever & Miller, 2004). This heightened level of involvement and responsibility vis-à-vis childrens’ schooling may contribute to heightened hassles and increased parenting stress. The stress associated with school contacts is magnified by the unpredictability of ADHD related problems (Cronin, 2004), which often require
parents to take time from work to attend meetings or take phone calls with school personnel (Johnston & Reader, 2002). During these interactions parents often feel judged by school personnel for either engaging in the use of psychiatric-based interventions (e.g., psychotropic medications), or, conversely, blamed for not doing enough to remediate the problems (Brook & Boaz, 2005; Cronin, 2004). Even those who might be expected to provide the most support to mothers raising children with ADHD (e.g., grandmothers, friends), were reported to be highly judgemental and deemed culpable for the child’s behaviour patterns (Peters & Jackson, 2008).

*Implications for the Current Research.*

Research establishing a relationship between childhood ADHD and parenting stress has important implications for the current study because it identifies childrens’ characteristics as particularly important contributors to elevated levels of parenting stress. In light of the theoretical and empirical relationship between EFDs and ADHD symptomatology, there is reason to believe that EFDs, a characteristic of ADHD children, may play an important role in the occurrence of parenting stress, as suggested by Joyner and colleagues (2009). Simply stated, if EFDs likely underpin ADHD symptoms (Barkley, 2006; Tannock, 2003; Nigg, 2006), and ADHD symptoms are in fact a key source of parenting stress, it is likely that EFDs will be childhood characteristics associated with elevated levels of parenting stress. Consistent with this line of thought, findings from Theule and colleagues (in press) suggest that parents raising children with ADHD may be more likely to experience stress in relation to childrens’ characteristics (i.e., Child Domain of PSI), influenced by EFDs, than in relation to stress affiliated with their own characteristics (i.e., Parent Domain of the PSI). It is also likely that childrens’ EFDs are associated with the daily hassles experienced by parents in relation to
childrens’ ADHD symptomatology (e.g., stress within household routines and stress due to frequent contact with school professionals). Examining parenting stress in relation to childhood EFDs, rather than in relation to ADHD symptomatology may increase our understanding of the specific mechanism involved in the relationship between parenting stress and childhood ADHD.

**ADHD Subtypes and Parenting Stress**

Relatively few studies have examined whether *DSM-IV* ADHD subtypes differ in relation to parenting stress. Many studies are unable to explore this relationship for a variety of reasons, including their reliance on *DSM-III* criteria (see Breen & Barkley, 1988; Mash & Johnston, 1983) or *DSM-III-R* criteria for ADHD subject inclusion (see Anastopoulos et al., 1992; Anderson et al., 1994; Baker, 1994; Baker & McCal, 1995; Baldwin et al., 1994; Beck et al., 1990; Byrne et al., 1998; Ross et al., 1998; Vitanza & Guarnaccia, 1999), or using rating scales rather than a *DSM*-based diagnosis for study inclusion (see Goldstein et al., 2007), or due to amalgamating subtypes into a single ADHD grouping variable for statistical analyses (see Bussing, Zima et al., 2003; Harrison & Sofronoff, 2002; Kadesjo et al., 2002; Whalen et al., 2006).

Three studies are known to this author to have explored the relationship between *DSM-IV* ADHD subtypes and parenting stress and have produced somewhat contradictory findings (Johnson & Reader, 2002; Podolski & Nigg, 2001; Yang, Jong, Hsu, & Tsai, 2007). Findings from two of these studies show a significant difference in parenting stress between parents of children with ADHD-C and parents of children with ADHD-I (Johnson & Reader, 2002; Yang et al., 2007), while the third study (Podolski & Nigg, 2001) was unable to
replicate these findings, possibly due to the small sample sizes for each grouping variable.\textsuperscript{26} Taken together, these findings offer weak support for the conclusion that ADHD-C is experienced as more stressful by parents. This conclusion is further weakened by the fact that none of the three studies controlled for comorbid ODD, despite reports that their ADHD-C groups likely contained high proportions of children with comorbid ODD.\textsuperscript{27} Therefore, it is difficult to determine from these results whether the elevated stress levels are associated with ADHD-C or the occurrence of uncontrolled oppositional-defiant behaviours.

The meta-analysis conducted by Theule and colleagues (in press) does not examine the role of \textit{DSM-IV} ADHD subtypes and therefore cannot directly clarify the role of subtypes in parenting stress. However, this meta-analysis does examine ADHD symptoms, revealing that inattentive symptoms and hyperactive/impulsive symptoms both play a role in parenting stress. Specifically, Theule and colleagues (in press) find that parents are significantly stressed with their children’s characteristics, if the child displays symptoms of hyperactivity/impulsivity, whereas parents are not significantly stressed in relation to their children’s characteristics if the child displays symptoms of inattention. These findings suggest that parents may experience children with ADHD-I as less stressful relative to ADHD-C where symptoms of hyperactivity/impulsivity are more severe.

\textit{Implications for the Current Research.}\n
The prospect that parents experience different levels of parenting stress depending on whether their child has ADHD-I or ADHD-C may have implications for the current research

\footnotesize\textsuperscript{26} Podolski and Nigg’s (2001) sample included ADHD-I (n=15), ADHD-C (n=22) and non-clinical controls (n=22).

\footnotesize\textsuperscript{27} Podlski and Nigg (2001) explicitly identified that their groups differed in relation to comorbid ODD, with three in the ADHD-I group and 13 in the ADHD-C. Yang and colleagues (2007) only noted that the ADHD-C and ADHD-I group differed significantly for comorbid ODD, with ADHD-C having higher rates.
because there is some evidence to suggest that ADHD subtypes differ significantly in relation to EFDs. Although the findings are somewhat mixed, research shows that EFDs specific to planning (Klorman et al., 1999; Nigg, Blaskey, Huang-Pollock, & Rappley, 2002), WM (Klorman et al., 1999), shift (Houghton et al., 1999; Nigg et al., 2002) and prepotent response inhibition (Hinshaw et al., 2002; Nigg et al., 2002) are more problematic for children with ADHD-C compared to children with ADHD-I.

Additional research reveals that when EFDs are experienced by children with ADHD-C, these difficulties are more closely linked to inattentive symptoms than symptoms of hyperactivity or impulsivity (Brocki, Eninger, Thorell, & Bohlin, 2010; Chhabildas et al., 2001; Pasini et al., 2007; Riccio et al., 2006). These findings are far from conclusive given that differences between ADHD-I and ADHD-C in relation to EFDs have been shown to be highly inconsistent (Willcutt, Doyle et al., 2005). In fact, multiple studies have been unable to find meaningful differences between ADHD subtypes in relation to WM (Geurts, Verté, Oosterlaan, Roeyers, & Sergeant, 2005; Huang-Pollock, Makami, Pfiffner, & McBurnett, 2009; Piek et al., 2007), shift (Klorman et al., 1999; Martel et al., 2007; Piek et al., 2007; Riccio et al., 2006), planning (Geurts et al., 2005; Riccio et al., 2006) interference control (Martel et al., 2007; Nigg et al., 2002; Pasini et al., 2007; Riccio et al., 2006; van Mourik et al., 2009), and prepotent response inhibition (Bedard et al., 2003; Chhabildas, Pennington, &

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28 The study conducted by Houghton and colleagues (1999) does not directly compare ADHD-C with ADHD-I. They find that the ADHD-C differs from non-clinical controls and that the ADHD-I group does not differ from non-clinical controls. Therefore, they inferred through an indirect comparison that “significant impairments in executive functions in children with ADHD compared to those without are mediated by ADHD subtype” (Houghton et al., 1999, p. 803).

29 Nigg and colleagues (2002) conclude that differences in behavioural inhibition between ADHD subtypes may be isolated to males. This conclusion, however, is challenged by Hinshaw and colleagues (2002) who find these differences to also exist for female populations.
Willcutt, 2001; Collings, 2003; Egeland, Johansen, & Ueland, 2009; Geurts et al., 2005; Huang-Pollock et al., 2009; Martel et al., 2007; Piek et al., 2007; Riccio et al., 2006).

In summary, research tentatively supports the conclusion that different ADHD subtypes present parents with different challenges in their parenting roles resulting in differential levels of parenting stress. Given that there is some evidence that ADHD subtypes differ in relation to EFDs, it is possible that EFDs represent unique child characteristics that could lead parents to experience different levels of parenting stress in relation to ADHD-I and ADHD-C. For example, it is possible that difficulties with WM and/or prepotent response inhibition experienced more often and/or with greater intensity by children with ADHD-C may place greater demands on the parent, leading to higher levels of parenting stress relative to children with ADHD-I. Gaining a more precise understanding of the factors that make children with ADHD-C more stressful to parents than children with ADHD-I is important because this may help elucidate the mechanism linking childhood ADHD with parenting stress.

**ADHD/ODD and Parenting Stress**

There is reason to believe that regardless of subtype, childhood ADHD by itself may not be a key source of parenting stress (Ross et al., 1998). Rather, clinically significant levels of parenting stress within childhood ADHD populations may be most closely tied to ADHD/ODD symptomatology (Abidin, 1995). Research studies employing linear regression analyses or structural equation modelling show that behavioural issues (i.e., aggression and/or behaviours consistent with ODD) comorbid to ADHD, and not ADHD itself, are the
predominate predictor\(^{30}\) of parenting stress within childhood ADHD populations (Anastopoulos\(^{31}\) et al., 1992; Baldwin et al., 1995; Evans et al., 2009; Harrison & Sofronoff, 2002; Podolski & Nigg, 2001; Vitanza & Guarnaccia, 1999). Furthermore, findings from direct comparisons reveal that parents of children with ADHD/ODD experience significantly higher levels of parenting stress relative to parents raising children diagnosed only with ADHD (Anastopoulos et al., 1992; Kadesjo et al., 2002). The meta-analysis conducted by Theule and colleagues (in press) determined that the difference between these two groups of parents is meaningful with a large effect size\(^{32}\) for child-related parenting stress (i.e., \(\text{PSI}^{\text{Child Domain}}\)).

To determine the unique contribution of ODD to parenting stress distinct from the intermeshed construct of ADHD/ODD (i.e., ODD comorbid to ADHD), Ross and colleagues (1998) compare children diagnosed with ODD only with children diagnosed with ADHD only, children diagnosed with ADHD/ODD, and children diagnosed with ADHD/ODD/CD. This study showed that parenting stress related to child characteristics was significantly higher for both the ADHD/ODD group and the ADHD/ODD/CD group compared to the ADHD only group. The ADHD only group did not differ significantly from the ODD only group. The importance of this finding is its suggestion that it is not ODD by itself that parents find

\(^{30}\) Comorbid behavioural disorders accounts for 10-37\% of the variance in parenting stress (Anastopoulos et al., 1992; Baldwin et al., 1995; Harrison & Sofronoff, 2002; Podolski & Nigg, 2001).

\(^{31}\) It is important to note that due to concerns for shared method variance in their regression analyses (i.e., an overlap between dependent and independent measures), Anastopoulos and colleagues (1992), created an adjusted total stress score by removing multiple subscales from the \(\text{PSI}\) including, Distractibility/Hyperactivity, Demandingness, Mood and Health. In their view, this procedure establishes a “purer measure of parenting stress - that is, one less affected by variance attributable to child and parent psychopathology” (Anastopoulos et al., 1992, p. 511). Despite irrevocably altering the validity of the \(\text{PSI}\) and thereby casting doubt on the veracity of their findings, this study continues to be one of the most frequently cited within the field of parenting stress and childhood ADHD.

\(^{32}\) An effect size of \(d = -.83 +/-.121\) was reported for Child Domain Stress comparing ADHD versus ADHD/ODD (Theule et al., in press).
stressful, as could be erroneously concluded from other studies (e.g., Anastopoulos et al., 1992; Podolski & Nigg, 2001), but it is the occurrence of ODD/CD behaviours within a relationship context simultaneously impacted by ADHD (Barkley, Anastopoulos, Guevremont, & Fletcher, 1992). Such a finding is aligned with Schachar and Tannock’s (1995) assertion that ADHD/ODD likely represents a distinct pathological entity that cannot be easily deconstructed into ADHD and ODD.

Two studies (Bussing, Gary et al., 2003; Bussing, Zima et al., 2003) offer additional insight into the mechanism linking ADHD/ODD with parenting stress. These studies suggest that in addition to the stress associated with the daily/situational hassles common to parents raising children with ADHD and ADHD/ODD, parents of children with ADHD/ODD also experience heightened stress in relation to their feelings of anger and resentment towards their children, a stress not associated with ADHD symptoms. Evidence suggests that parents of children with ADHD/ODD are not angry or negative people in all aspects of their lives. Instead, Whalen and colleagues (2006) showed that anger and stress experienced by these parents is largely isolated to their interactions with their ADHD-diagnosed child. During times of non-interaction, these parents do not differ from parents of typically developing children in relation to their anger and/or stress levels (Whalen et al., 2006). These findings bolster theories proffered by Mash and Johnston (1990) who observed through their clinical practice that parental anger within ADHD populations is largely fuelled by the parents’ interactions with their child. In short, the presence of comorbid ODD presents parents with the extra burden of dealing with an added set of behavioural problems, suggestive of underlying EFDs, as well as intensified feelings of anger and stress within a parent-child landscape already weathered by ADHD behaviours.
Implications for the Current Research

The findings from this body of research linking childhood ADHD/ODD and parenting stress may be relevant to the objectives of the current study, because there is evidence to suggest that some EFDs (e.g., difficulties with inhibition and emotional control) are associated with comorbid ODD behaviour patterns, and may even play a role in the manifestation of these behaviours. However, the research in this area is somewhat inconclusive, if not contradictory, with a portion of studies confirming the existence of a significant relationship between EFDs and comorbid ODD/CD, over and above the relationship between EFDs and ADHD (Aronowitz et al., 1994; Hurt & Naglieri, 1992; Pennington & Ozonoff, 1996; Séguin et al., 1999). Conversely, other studies show that EFDs in areas such as WM, planning, shift and inhibition are not significantly related to comorbid ODD (Barkley, Edwards, Laneri, Fletcher, & Metevia, 2001; Barnett et al., 2009; Bedard et al., 2003; Brocki et al., 2007; Clark, Prior, & Kinsella, 2000; Geurts et al., 2004; Klorman et al., 1999; Loo et al., 2007; Oosterlaan, Logan, & Sergeant, 1998; Sarkis et al., 2005; Schacher et al., 2000; Scheres et al., 2001; Sergeant et al., 2002; Solanto et al., 2001; Thorell & Wahlstedt, 2006; Toplak et al., 2009; Wahlstedt, 2009; Wahlstedt, Thorell, & Bohlin, 2008; Wodka et al., 2007).

Sergeant and colleagues (2002) suggest that the variability of the findings within the research literature on EFDs and ODD may be due in part to the age differences of the various samples. The formal identification of ADHD, ODD and EFDs in children may be influenced by the age/developmental stage of the child at the psychiatric/psychological assessment. This is because different behavioural patterns emerge at different times along the developmental continuum (Sergeant et al., 2002) and problems are typically recognized (and formally identified) when behaviours (or other symptomatology) fall outside of accepted
developmental norms (APA, 2000). For example, ODD behaviours are more common to early childhood and school-aged children, while CD is more common to adolescence (Loeber et al., 2000). Compounding this issue is the fact that specific EF skills (e.g., WM, planning, inhibition) and associated brain regions mature along an extended developmental timeframe across childhood and well into adolescence. For example, research with typically developing children and youth suggests that emotionally oriented ‘hot’ EFs (e.g., inhibition) mature earlier during school-age (Brocki & Bohlin, 2004; Espy, 1997; Levin et al., 1991; Welsh et al., 1991), while cognitively dominated ‘cool’ EFs (e.g., WM and planning) mature later during adolescence (Foreman, Foreman, Cummings, & Owens, 1990; Hitch et al., 1988; Welsh et al., 1991; Welsh, 2002). Therefore, the outcome of studies examining an association between comorbid ODD, EFDs and parenting stress may be influenced by the age range of the research sample, particularly those employing cross-sectional methodologies.

Despite the questions that remain regarding the exact nature of the relationship between EFDs and comorbid ODD, the current study hypothesizes that ‘hot’ EFDs, in particular difficulties with emotional control and inhibition, are closely associated with oppositional/defiant behaviour patterns and elevated levels of parenting stress (see Figure 1 on page 29). If EFDs with emotional control predispose children with ADHD to the onset of oppositional/defiant behaviours (Melnick & Hinshaw, 2000), and ADHD/ODD has been found to be strongly associated with elevated levels of parenting stress, it is possible that childrens’ difficulties with emotional control and inhibition may pose a risk factor for elevated parenting stress and for negative parent-child interactions to emerge and take root. Considering that research shows children with ADHD/ODD to be among the most stressful children to raise compared to other types of ADHD and other childhood special needs, it is of
value to understand more fully the possible association between ‘hot’ EFDs, comorbid ODD and parenting stress.

*Parenting Stress: Child and Parent Gender as Moderators*

Research exploring the potential influence of child or parent gender on the relationship between ADHD and parenting stress offers somewhat conflicting results. Some studies using ADHD samples and children at-risk for externalizing disorders conclude that there is little or no significant difference in levels of parenting stress in relation to child gender (Breen & Barkley, 1998; Deater-Deckard & Scarr, 1996; Harrison & Sofronoff, 2002; Johnson & Reader, 2002; Mash & Johnston, 1983). Other studies in this area identify child gender as a potent indicator for parenting stress (Bussing, Gary et al., 2003; Bussing, Zima et al., 2003), with male children reported to be significantly more stressful than females (Theule et al., in press). It is unclear, however, how well these studies controlled for the greater numbers of boys with ADHD/ODD than girls within their respective samples. As ADHD/ODD is more strongly associated with elevated parenting stress compared to ADHD, it is possible that the moderating effect for child gender merely reflects the gender imbalance in the diagnostic rates for ADHD/ODD.

Research regarding the association between parent gender and parenting stress has also been contrary. Parenting stress research has generally focused on mothers (Fischer, 1990) and has often assumed, perhaps incorrectly, that mothers and fathers experience parenting stress in the same way (Deater-Deckard & Scarr, 1996; Morgan et al., 2002). Some studies show mothers to be more stressed than fathers (Baker, 1994; Treacy et al., 2005; Webster-Stratton & Hammond, 1988) while other studies suggest that mothers and fathers experience similar levels of parenting stress (Mash & Johnston, 1983; Podolski & Nigg, 2001).
Beyond the absolute differences in scores on parenting stress measures, such as the PSI, male and female caregivers may experience their parenting roles in a qualitatively different manner and therefore report different levels of parenting stress. For example, Mash and Johnston (1983) note that mothers are influenced by the appraisals that their co-parent had of their child, such that when the father perceives the child as problematic, the mother is more stressed. Furthermore, research by Frank and colleagues (1991) with non-ADHD populations suggests that mothers’ stress may originate with the child, while fathers experience stress as a factor of the status of their co-parenting relationship, such that when the mother is stressed, the father becomes stressed. Baker and Heller (1996), studying a non-clinical sample, have also found that fathers only experience stress within the parenting role in the face of high levels of childhood behavioural symptoms, while mothers experience stress in relation to a wider range of childhood behaviours, including behaviours lower in severity, consistent with daily hassles. These differences may be linked to the fact that mothers continue to bear a disproportion amount of the direct parenting role compared to fathers, regardless of the number of hours worked outside of the family home (Harvey, 1998; Lee, Vernon-Feagans, Vazquez, & Kolak, 2003).

*Implications for Current Research.*

Findings from research on gender as a moderator for ADHD and parenting stress will assist with interpreting the current results because the majority of children are male, as are the vast majority of children with ADHD/ODD (see Chapter V). Furthermore, the vast majority of parents and teachers providing reports for the current dissertation are female. Due to the fact that there is no research examining the influence of gender (child or parent) on the relationship between EFDs and parenting stress, the current study draws upon the research
examining gender as a potential moderator force on the relationship between ADHD symptoms and parenting stress. The research in this area suggests that childrens’ gender has little influence on the relationship between EFDs and parenting stress. These findings also suggest that parent gender may yield influence on the relationship between EFDs and parenting stress, especially in relation to stress arising from the Parent Domain, which may capture stress levels associated with the daily hassles of caring for a special needs child (e.g., getting children off to school, engaging in parent-teacher meetings, homework and bedtime routines), which may differentially influence mothers.

Section Summary

This chapter reviewed the research literature pertaining to childhood EFDs in relation to childhood ADHD, with particular emphasis on a subcomponents model (e.g., WM, planning, inhibition), as well as the research pertaining to childhood ADHD and parenting stress. Findings from the research on EFDs and childhood ADHD are effectively summarized in the large meta-analysis conducted by Willcutt, Doyle and colleagues (2005), who found that ADHD groups differ significantly from controls on all EF tasks. Specifically, children with ADHD, relative to controls, are shown to experience more pronounced difficulties in the areas of inhibition, particularly with prepotent responses, but also with interference control; with verbal and spatial; planning; shift; and emotional regulation/control, especially in the presence of comorbid ODD.

Demonstrating that an empirically supported relationship exists between EFDs and ADHD is important to the current dissertation because there is only one study known to this author that has examined the relationship between childhood EFDs and ADHD (Joyner et al., 2009). Therefore, due to the lack of direct empirical support for this subject matter, the current
study extrapolates from the parallel body of research linking childhood ADHD populations with parenting stress. Findings from Joyner and colleagues (2009) research parallel the research findings linking ADHD symptoms and parenting stress (see Theule et al., in press) by revealing that behavioural manifestations of EFDs, reported by parents, are strongly associated with parenting stress, especially the stress arising in relation to characteristics of the child (i.e., the stress measured by the Parent Domain of the PSI). The current dissertation builds on this work by Joyner and colleagues (2009) by also examining the relationship between EFDs and parenting stress in terms of ADHD subtypes (e.g., ADHD-I, ADHD-C) and in relation to comorbid ODD behaviours.

Research suggests that it is important to examine the relationship between parenting stress and EFDs in terms of ADHD subtypes because the research shows that ADHD subtypes differ significantly in relation to EFDs. For example, ‘cool’ EFDs, such as WM or planning are believed to be more closely aligned with ADHD-I, while ‘hot’ EFDs such as inhibit or emotional control are more strongly associated with ADHD-C. These findings are important considering that research suggests that levels of parenting stress can vary in relation to ADHD subtype, with ADHD-C experienced as more stressful to parents compared to ADHD-I. The current research seeks to understand with greater precision what child factors related to EFDs may lead parents to experience different ADHD subtypes as more or less stressful.

Further research on parenting stress with ADHD populations suggests that regardless of subtype, childhood ADHD by itself may not be a key source of parenting stress. Furthermore, it appears that ODD in the absence of ADHD is not significantly associated with parenting stress. Rather, research suggests that extreme levels of parenting stress may be contingent upon the presence of ADHD and ODD, whereby comorbid ODD acts as a key
mechanism magnifying parenting stress to clinically significant levels. Separate research suggests that ‘hot’ EFDs, particularly in the areas of inhibition and emotional control, are closely related to ADHD/ODD and may even pose a risk factor to ADHD populations to develop ODD. In addition to being a potential risk factor for children with ADHD to develop ODD, ‘hot’ EFDs are hypothesized to pose a risk to parents for experiencing clinical levels of parenting stress, which may further exacerbate the negative dynamic between parents and children with ADHD/ODD.

This dissertation builds on the work of several researchers (e.g., Anastopoulos et al., 1992; Podolski & Nigg, 2001; Harrison & Sofronoff, 2002) by exploring how parent-reported ‘hot’ EFDs in children with ADHD may contribute to the relationship between comorbid ODD and parenting stress. In addition, this dissertation builds on existing research by examining the role of parent-reported ‘cool’ EFDs, teacher-reported EFDs and the potential influence of moderating variables, such as child and parent gender. In so doing, this dissertation explores a largely unexamined area of research, extends the work of Joyner and colleagues (2009) and further bridges disparate bodies of research that show strong associations between ADHD and parenting stress and between ADHD and EFDs.
CHAPTER IV – RESEARCH DESIGN & METHODOLOGY

This chapter presents the research design, sampling procedures and inclusion/exclusion criteria used in the current study. An in-depth discussion follows regarding the measures used during the data collection process.

Sample Setting

The Scarborough Hospital, Canada’s largest urban community hospital, provides a wide variety of health care and mental health care related programs. The Scarborough Hospital ADHD Clinic specializes in the assessment and treatment of childhood ADHD for children and youth referred by a primary health care provider (i.e., family physician or paediatrician). The professional team at The ADHD Clinic is comprised of child psychiatrists, psychologists, and social workers who have extensive training and expertise in the area of ADHD assessment and treatment. Researchers are commonly attracted to hospital-based secondary data because of its perceived high quality, which results from the high calibre of professionals employed, rigorous data recording and record keeping procedures (Boslaugh, 2007; Nicoll & Beyea, 1999; Zaitzow & Fields, 2006). This hospital setting was selected due to the availability of a sizeable sample of secondary data specifically measuring ADHD and ADHD/ODD symptoms, as well as EFDs and parenting stress. The Scarborough Hospital (TSH) Research Ethics Board (REB) and the University of Toronto (U of T) REB have granted approval for the current study (see Appendix C for ethics approval from TSH’s REB and Appendix D for ethics approval from U of T’s REB).

Research Design

The current study involves a secondary analysis of a large data set, created by professional staff at The ADHD Clinic. The anonymous information contained within this
The data set comprises materials originally collected for assessment purposes and represents a two-year cross-section of children and their parents who participated in an initial psychiatric assessment related to childhood ADHD. The data set contains information from only those parties who agreed to have anonymous information included, and who also successfully completed the requisite consent/assent form (i.e., parents providing consent and children providing assent).

Cross-sectional data pertaining to an initial psychiatric assessment is well-suited to the purposes of the current study for two reasons. First, the thorough and standardized nature of the initial assessment process offers a large sample of rich data gathered systematically, thereby reducing the risk of measurement error. Second, the initial psychiatric assessment represents a common point in time for all cases included in the data set. The majority of children being assessed for ADHD had not started ADHD treatment services, including the use of medication, nor had the parents started parent-education or support groups designed to target and reduce parenting stress.33 Not engaging in medication treatment at the time of assessment may be particularly important for this study because medications typically used for ADHD have been shown to influence EFDs, resulting in a potential confound for the proposed study (Barkley et al., 2001; Barnett et al., 2001; Goldberg et al., 2005; Kobel et al., 2009; Rhodes, et al., 2006; Royal et al., 2002; Semrud-Clikeman, Pliszka, & Liotti, 2008; Shallice et al., 1993; Tannock, Ickowicz, & Schacher, 1995).

**Sampling Procedure & Inclusion/Exclusion Criteria**

Non-probabilistic purposive sampling was used to select cases from this secondary data set. Only those cases that satisfied the following criteria were included in the proposed study:

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33 A small minority of children referred for an assessment to The ADHD Clinic reported beginning a medication trial with their paediatrician or family doctor while awaiting entry to the services at The ADHD Clinic.
(a) The child was between 5-12 years of age, conforming to the age parameters of the psychological measures used within the proposed study;34

(b) The child received a primary diagnosis of ADHD from The ADHD Clinic. Diagnostic assessments at the Scarborough Hospital ADHD Clinic were conducted by child psychiatrists following a semi-structured interview process with parent(s) and children consistent with DSM-IV criteria. Assessments also included the use of parent and teacher completed standardized measures for ADHD including the ADHD Rating Scale-IV, Conners’ Rating Scale. The Child Symptom Inventory was used to screen for comorbid mental disorders. Psychologists with the ADHD Clinic also employed the Weschler Intelligence Scale for Children (WISC) and the Weschler Individual Achievement Test (WIAT) to assess for learning disabilities/disorders. Due to high rates of comorbidity within ADHD samples (Bird et al., 1993) and the rarity of ‘pure’ ADHD (Kadesjo & Gillberg, 2001), children with ODD and learning disabilities are included and these comorbid issues are controlled for statistically where possible (Kerns et al., 2001; Sergeant et al., 2002). Children with comorbid Conduct Disorder (CD) were excluded from the sample due to low expected rates of occurrence for the study’s age range and the potential for these children to act as extreme behavioural scores (outliers), which are highly influential for regression analyses. Excluding CD cases systematically is preferred over the practice employed by other authors (see Podolski & Nigg, 2001) which combines children with CD and ODD into one grouping variable. When studies group together ODD and CD, their findings may serve only to obfuscate the issue because ODD and CD often have different etiologies, divergent developmental trajectories and differing severity levels.

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34 This selected age range reflects the age requirements for two of the psychological measures. The BRIEF is valid for children ages 5-18 years, while the PSI is valid for children 1 month of age through 12 years of age.
(Biederman et al., 2008; Faraone, Biederman, Mennin, Russell, & Tsuang, 1998), which could potentially influence the veracity of any conclusions regarding the relationship between EFDs and comorbid ODD;

c) The child had a T score of $\geq 70$ on one ADHD subscale on either the parent or teacher *ADHD-IV Rating Scale* (DuPaul et al., 1998), and a T score of $\geq 60$ from the other informant. This criterion conforms to inclusion criteria used by Rogers, Wiener, Marton and Tannock (2009b) and Wiener and Mak (2009). Research specific to childhood ADHD and parenting stress used a range of different diagnostic criteria for subject inclusion (see Theule et al., in press), with little indication of the optimal cut-off levels for ADHD rating scales for multiple informants (i.e., parent and teachers). The current inclusion is set to provide a balance of specificity and sensitivity, including cases rated markedly or moderately impaired by both raters (i.e., T score of $\geq 70$), as well as cases rated markedly or moderately impaired by one informant and mildly or borderline impaired by the other informant. This wide ranging inclusion criterion allows the current dissertation to explore the impact of a range of childhood behavioural disturbance on levels of parenting stress;

d) The assessment measures were scored and deemed valid by The ADHD Clinic’s psychology team.

**Sample Size**

To ensure an adequate sample size for the current study, an *a priori* sample size estimation was calculated using formulas designed specifically for regression analyses (Tabachnick & Fiddell, 2001), the principal statistical procedure employed within the current study. Conventional power tables (Rubin & Babbie, 2005) were also consulted to confirm the adequacy of this *a priori* sample size estimate. Rather than rely on inaccurate sample size
estimations, such as the conventional 10-15 cases per predictor variable (Green, 1991), the current study applies the formula \( N > \left( \frac{8}{f_2^2} \right) + (m-1) \) where \( m \) represents the number of predictor variables and \( f_2 \) represents small (.01), medium (.15) or large (.35) effect sizes (Garson, 2010; Tabachnick & Fiddle, 2001). Anticipating that the largest regression equation in the current study can include up to 16 predictors (i.e., all subscales for both parent and teacher BRIEFs), the sample requirement for the current study is 38-68 cases in order to detect a medium to large effect size. A sample size of 815 cases would be required to detect the occurrence of a small effect size. These calculated sample sizes are comparable to estimates from conventional power tables (Rubin & Babbie, 2005) that stipulate the need for between 30-90 cases at an \( \alpha \) significance level of .05 and power level of .8 to detect a medium to large effect size. Detecting a small effect size using the same power and significance level requires a sample larger than 800 cases (Rubin & Babbie, 2005).

The final sample size for the current study also took into account the fact that rates of EFDs within a childhood ADHD population can be as low 30-50% (see Nigg et al., 2005; Willcutt, Doyle et al., 2005). Thus, the minimum final sample for the current study needed to exceed the \textit{a priori} sample size estimation of 68, which was increased by a factor of 3. This increase resulted in a minimum total sample size of 204 cases, in order to satisfy power requirements and maximize the chances of including children with clinically significant EFDs.

From a consort group of approximately 600 cases that attended the ADHD Clinic during the time frame of this cross-sectional study, 400 cases (i.e., parent(s) and child) consented/assented to be included in the anonymous data set. Purposive sampling based on the current study’s inclusion criteria revealed that 245 cases were eligible for inclusion from
this secondary data set, with 100 cases being excluded due to the child’s age and an additional 55 cases were excluded due to issues such as incomplete or invalid measures. The final sample was reduced from 245 to 243 cases, following the removal of two children diagnosed with ADHD Predominantly Hyperactive/Impulsive Type (2 males each 6 years of age). Although these two cases conformed to the study’s inclusion criteria, they were considered an impediment to analyzing the sample according to ADHD diagnostic subtype (e.g., ADHD-I, ADHD-C) and were therefore excluded.

Measures

*ADHD: The ADHD Rating Scale-IV.*

The home and school versions of the *ADHD Rating Scale-IV* (DuPaul et al., 1998) were used to determine the ADHD symptom severity of the child. This measure is valid for children ages 5 to 18 years and is commonly used in the assessment of childhood ADHD. The home and school versions each ask 18 identical questions that closely match the *DSM-IV-TR* criteria for ADHD. Both versions are designed to be completed independently by the child’s teacher and parent/caregiver who report on the child’s behaviour over the previous 6 months. This measure consists of two, nine item subscales: Inattention (odd numbered items) and Hyperactivity-Impulsivity (even numbered items). Each of the 18 items is presented in a four point Likert scale response format ranging from 0 to 3 (“never or rarely”, “sometimes”, “often”, “very often”).

The *ADHD Rating Scale-IV* is widely used for ADHD screening and assessment procedures and is reported to have acceptable levels of reliability and validity (DuPaul et al., 1998).

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35 Children under 5 years of age were excluded because their parents completed the Preschool BRIEF and children over 12 years of age were excluded because their parents completed the Stress Index for Parents of Adolescents.
Coefficient alphas for internal consistency for the school version were .96 for the Inattention scale and .88 for the Hyperactivity-Impulsivity scale. Internal consistency estimates for the home version were also acceptable with the Inattentive scale and Hyperactivity-Impulsivity scales, being .86 and .88, respectively. DuPaul and colleagues (1998) report the test-retest reliability at 4 weeks was adequate for the school Inattention scale \( (r = .89) \) and Hyperactivity-Impulsivity scale \( (r = .88) \). The test-retest coefficients for the home version were also found to be adequate at 4 weeks for both the Inattentive scale \( (r = .78) \) and the Hyperactive-Impulsive scale \( (r = .86) \). Inter-rater reliability coefficients were also produced for parent and teacher completed measures, revealing only low agreement on the Inattention scale at .45 and the Hyperactivity-Impulsivity scale at .40.

Criterion validity was established by comparing scores for children diagnosed with ADHD on the *ADHD Rating Scale-IV* with scores from other established rating scales including the Conners’ Parent (*CPRS-R:L*) and Teacher Rating scales (*CTRS-R:L*). DuPaul and colleagues (1998) report that the school version Hyperactivity-Impulsivity scale strongly correlated with the *CTRS* Hyperactivity scale \( (r = .79, p < .0001) \), and the home version hyperactivity-impulsivity index correlated strongly with *CPRS* Hyperactivity index \( (r = .81, p < .0001) \). Discriminant validity was also established by showing that the Inattentive Scale could distinguish children diagnosed with ADHD-I or ADHD-C from controls, and could differentiate those with ADHD-HI from ADHD-C (DuPaul et al., 1998, p. 38).

**Oppositionality: The Conners’ Rating Scale Revised- Long Version.**

Both the parent and teacher versions of the Conners’ Rating Scale Revised-Long Version (Conners, 2001) were used to measure the levels of oppositionality in the home and school environments. This measure is valid for children ages 3 to 17 years and is commonly
used in the assessment of childhood ADHD and behavioural disorders (Conners, 2001). The parent version (CPRS-R:L) contains 80 items and the teacher version (CTRS-R:L) is comprised of 59 items. Each item is presented in a 4-point Likert scale response format (“never, seldom” to “very often, very frequently”). The CPRS-R:L and CTRS-R:L\(^{36}\) contain subscales related to externalizing and internalizing problems including oppositionality, cognitive problems/inattention, hyperactivity, anxious-shy, perfectionism, social problems, ADHD index, Conners’ Global index: restlessness-impulsive, Conners’ Global index: emotional lability, Conners’ Global index: total, DSM-IV Inattentive, DSM-IV Hyperactive-Impulsive, and DSM-IV: Total. The oppositionality subscale of the CPRS-R:L will be included as a key predictor variable in the main analysis section of the current study. This subscale comprises ten questions related to oppositionality and defiance and provides interval level data (raw and T scores).

Conners (2001) reported the CPRS-R:L oppositionality scales to have good internal reliability with coefficient alpha scores at .911 for males (5-18 years) and .902 for females (5-18 years). The CTRS-R:L was also found to have strong internal reliability with coefficient alpha scores of .915 for males (5-18 years) and .906 for females (5-18 years). The authors also reported that the test-retest reliability between 6-8 weeks for the CPRS-R:L and CTRS-R:L oppositionality scale was .62 and .84, respectively. Discriminant validity was established for the CPRS-R:L subscales, including the oppositionality scale, through testing that showed that this measure was able to effectively distinguish clinical groups with ADHD from non-clinical groups (Conners, 2001, p. 137). Similarly, the CTRS-R:L was also able to distinguish ADHD groups from non-clinical groups.

\(^{36}\) The CTRS-R:L does not contain the subscale pertaining to psychosomatic issues contained within the CPRS-R:L.
Parenting stress: The Parenting Stress Index.

The PSI-long form was used to measure the occurrence of parenting stress (Abidin, 1995). The PSI is described as one of the most commonly used tools to directly measure parenting stress (Baker, 1994; Esdaile & Greenwood, 2003; Ostberg et al., 2007; Fischer, 1990) and is considered particularly well-suited for clinicians working with families who have special needs children (Abidin, 1995). Kazdin and Whitley indicate that the utility of the PSI lies in its ability to “assess perceived sources of stress, delineate perceived stressors from [stressful] life events, and distinguish sources of stress [related to] the child and sources of stress related to the parent...” (2003, p. 506).

This 101 item parent completed questionnaire is reported to be a valid indicator of parenting stress for parents of children ages 1 month to 12 years (Abidin, 1995), although the item content is primarily focused towards children ages 6 months to 10 years (Abidin, 1997). The PSI’s 101 items are presented in multiple-choice format, or as 5-point Likert scale questions (“strongly agree” to “strongly disagree”). Factor analysis was used to establish 13 subscales for the PSI organized into two domains: the Child Domain and the Parent Domain. The Child Domain measures stress emanating from the parent’s perception of the child’s characteristics and comprises 6 subscales, including Adaptability (11 items), Demandingness (9 items), Mood (5 items), Distractibility/ hyperactivity (9 items), Acceptability (7 items), and Reinforces parent (6 items). The Parent Domain measures stress related to a parent’s personality and potential psychopathology, as well as situational stressors in the parent’s life.

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37 The PSI has 120 items in total, but 19 questions pertaining to the Life Stress Index are considered optional.
38 Although classified within the Child Domain, Abidin (1995) distinguishes the subscales of acceptability and reinforces parents to be “interactive types of scales” (p.29). These scales measure stress arising from transactions between the parent and child, rather than arising independently from either party.
The Parent Domain comprises seven subscales including Depression (9 items), Attachment (7 items), Role restriction (7 items), Competence (13 items), Isolation (6 items), Spouse (7 items), and Health (5 items). A Total Stress index is calculated by combining the scores from the Child Domain and Parent Domain.

Consistent with the theoretical body of work from which the PSI is derived (see Lazarus, 1966; Lazarus & Folkman, 1984), each of the 101 items, for the most part, includes an objective behavioural referent and an appraisal of the impact of this potential stressor on the parent (Abidin, 1995, 1997). The majority of these 101 items are rated on five-point scale (“Strongly Agree”, “Agree”, “Not Sure”, “Disagree”, “Strongly Disagree”). Eight questions are multiple choice style questions; asking parents to select the best option among five choices (e.g., “Which statement best describes your child? 1. Almost always likes to play with me; 2. Sometimes likes to play with me; 3. Usually doesn’t like to play with me; and 4. Almost never likes to play with me”).

The PSI also includes a 19 item Life Stress Index, described as “an optional measure because it provides assessment of the global situational stressors that moderate or exacerbate parenting stress” (Abidin, 1995, p. 30). Items on this scale are in a yes/no format and inquire about the occurrence of stressors within the family’s broader ecological context, such as a household move or death of a relative. Scores on the Life Stress Index are not calculated into the Child or Parent Domain or the Total Stress score.

Abidin (1995) reports that the PSI demonstrates good reliability and validity, a conclusion echoed by other independent researchers (see Anastopoulos et al., 1992; Fischer, 1990; Kazdin & Whitley, 2003; Mash & Johnston, 1983; Treacy et al., 2005). Reliability for the PSI is adequate with Cronbach’s alpha coefficients ranging between .70 and .83 for the
Child Domain subscales and between .70 and .84 for Parent Domain subscales. Strong test-retest reliability also exists for the Child Domain ($r = .91$) and Total Stress index ($r = .96$) across a one to three month period. Test-retest stability for the Parent Domain across the same time period was much lower ($r = .63$).

The PSI is also reported to have good discriminate validity (Abidin, 1995). Studies (see Abidin 1995, p. 39) have shown the PSI as capable of consistently identifying higher levels of parenting stress in families with a special needs child. For example, studies pertaining to children with ADHD and ODD symptoms conducted by Kazdin (1990), Beck and colleagues (1990), Webster-Stratton (1998), and Mash and Johnston (1983), provide support for the discriminant validity of the PSI.

Despite its longevity and popularity in the field of parenting stress research, the validity of the PSI is not beyond reproach. Questions have been raised as to whether the construct of parenting stress may tap into parental psychopathology or simply measures the presence of child psychopathology (Anastopoulos et al., 1992; Costa et al., 2006; Deater-Deckard, 1998; Harrison & Sofronoff, 2002). To address this concern with the PSI, Anastopoulos and colleagues (1992), recommend the removal of several PSI subscales (e.g., Distractibility/Hyperactivity, Demandingness, Mood and Health) to form an adjusted overall score for the PSI, deemed to be a “purer measure of parenting stress” (Anastopoulos et al., 1992, p. 511). Others have questioned such procedures due the likelihood of altering the validity of the PSI by removing numerous subscales (Harrison & Sofronoff, 2002).

**Executive function difficulties: Behavior Rating Inventory of Executive Function.**

Parent and teacher versions of the BRIEF (Gioia et al., 2000) were used to measure the display of childhood EFDs in the home and school environments. Valid for children ages 5-18
years, these 86 item\textsuperscript{39} standardized observational measures are completed independently by teachers and parents. Each item is rated on a three-point scale (“never”, “sometimes”, “often”). Factor analysis used during the development of the \textit{BRIEF} guided the organization of the measure into eight correlated but non-overlapping subscales (Donders, 2002; Gioia et al., 2000). The \textit{BRIEF} subscales conform to accepted subcomponent models of EFs discussed previously and outlined elsewhere (see Baddeley, 1996; Pennington & Ozonoff, 1996; Pennington et al., 1996; Royal et al., 2002; Zelazo & Muller, 2002).

The subscales Inhibit (10 items), Shift (8 parent or 10 teacher items\textsuperscript{40}), and Emotional Control (10 parent or 9 teacher items) each produces a score specific to that scale (raw score and T score), as well as a composite score referred to as the Behavioural Regulation Index (BRI). Scores from the BRI are theoretically consistent with the concept of ‘hot’ EFDs (Baron, 2000; Gioia et al., 2000). The remaining subscales, Initiate (8 parent or 7 teacher items), WM (10 items), Plan/Organize (12 parent or 10 teacher items), Organization of Materials (6 parent or 7 teacher items), and Monitor (8 parent or 10 teacher items) each produces a score. When combined, the scores from these individual subscales form the Metacognitive Index (MI) which is theoretically consistent with the concept of ‘cool’ EFDs (Baron, 2000; Gioia et al., 2000). The composite scales, BRI and MI, combine to form the Global Executive Composite (GEC), which provides an overall index of EFDs for the child.

In addition to providing subscales that overlap with subcomponents typically included in models of EF (i.e., inhibition, emotional regulation, set shifting, planning and WM), Gioia and colleagues (2000) include three other subscales, tapping into the constructs initiate, initiate, and Emotional Control.
organization of materials and monitor. Issues with initiate commonly arise at home in relation to getting children started on household chores or homework, while at school the difficulties may involve getting down to work. EFDs with monitoring are generally related to personal monitoring functions, such as self-assessing performance within a social exchange, or ensuring that the completion of school or work assignments proceeds without rush and with vigilance to error checking (Gioia et al., 2000). Organization of materials is the manifestation of several other areas, including monitor and planning, which determine the organized state of the child’s concrete world (e.g., bedroom, workspace, school bag, and locker) (Gioia et al., 2000).

The BRIEF has demonstrated good reliability through the standardization process. Gioia and colleagues (2000) demonstrate the measure to have good internal reliability with Cronbach alpha coefficients ranging between .82 and .98 for the various subscales. Inter-rater reliability between parents and teachers was moderate with an overall mean for the subscales at $r = .32$ (Gioia et al., 2000). Studies by Blake-Greenberg (2003) and Kenealy (2002) confirm similar levels of inter-rater reliability. Rather than indicate bias, dissimilar parent and teacher ratings on the BRIEF more likely reflect the different situational demands placed on children at home and school, and the very real differences in EFD profiles across these two environments (Mares et al., 2007; van de Oord et al., 2006).

The BRIEF has demonstrated good discriminate validity in relation to childhood ADHD populations and is used to effectively distinguish those with ADHD from controls (Gioia et al., 2000; McCandles & O’Laughlin, 2007; Toplak et al., 2009), as well to discriminate between ADHD subtypes (Riccio et al., 2006; Toplak et al., 2009). The BRIEF is also reported to offer strong ecological validity by being able to accurately assess the child’s
functioning in a real-world setting, such as school or home environments (Anderson, 2002; Biederman et al., 2004; Denckla, 2002; Donders, 2002; Gioia, Isquith, Kenworthy et al., 2002; Jurado & Rosselli, 2007; Isquith, Gioia, & Espy, 2004; Riccio et al., 2006).

There has been more difficulty demonstrating the concurrent validity of the BRIEF, due in part to the fact that it was one of the first measures developed using behavioural reports from parents and/or teachers to assess EFs/EFDs in school-aged children. Findings are mixed as to the validity of the BRIEF when compared to performance-based measures of EFDs typically conducted by psychologists. Some studies show the BRIEF to have little or no relationship with established performance-based measures (Bodnar et al., 2007; Mahone et al., 2002; McAuley, Chen, Goos, Schachar, & Crosbie, 2010), while other studies show a poor to modest relationship (Anderson, 2002; Toplak et al., 2009). Toplak and colleagues (2009) suggest that the BRIEF may function well to compliment the use of established performance-based measures of EFDs (e.g., Stop-signal response task; the Stroop task; Digit-Span Backward test; Cambridge Neuropsychological Test Automated Battery; Tower of London; and Wisconsin Card Sort Task) due to its heightened sensitivity to ADHD symptoms. They do not, however, recommended that the BRIEF replace performance-based measures of EFs/EFDs due to the limited evidence that the BRIEF is a valid measure of EFDs.

Data Analysis

The results of the data analysis are presented in Chapters V and VI. Chapter V provides a review of the sample’s characteristics using descriptive statistics and preliminary analyses. Chapter VI outlines the main statistical analysis and provides the results pertaining to the study’s objectives. All analyses were conducted with the aid of SPSS version 17. Analyses were conducted using the T scores produced by the BRIEF, CPRS-R:L, and CTRS-R:L. Rather
than use raw scores or percentile scores, T scores were calculated for all PSI scales using normative data provided by Abidin (1995).

The preliminary analysis section includes the application of descriptive statistics and univariate statistics to provide a context for the findings from the main inferential statistics. Descriptive statistics were calculated for all variables through a variety of means such as frequency and cross tabulation procedures. These statistics provide an in-depth picture of the sample’s composition (e.g., age range, ratio of boys to girl, frequency of ADHD subtypes, mean T scores for ADHD symptomatology, and mean T score for the EFDs at home and school). MANOVA, ANOVA and t-test procedures were also employed to compare components of the sample and compare the current sample against other research samples.

The main analysis section begins with a series of analytic procedures used to determine if the key statistical assumptions have been met for the application of various forms of multiple linear regressions. Specifically, correlation matrices were produced to determine if relationships exist among predictor variables, without the presence of multicollinearity. Maximum likelihood factor analysis with oblique (correlated) rotation was used to determine the statistical overlap between highly correlated variables, such as the parent BRIEF BRI and oppositionality scale of the CPRS-R:L. Box plots were used to determine the presence of outliers. Procedures such as histograms and the Shapiro-Wilks test were used to determine if key variables were normally distributed. Scatterplots were used to ascertain the linearity of variables, as well as to determine their homoscedasticity/heteroscedasticity.

The main analyses rely on the use of various forms of multiple linear regressions, including hierarchical linear regression (HLR), as well as path analysis employing multiple linear regression and HLR. In each HLR, the coefficients of multiple determination ($R^2$) and
the adjusted $R^2$ and $F$-tests were reported in relation to the significance of relationship and the strength of the statistical prediction.

HLR was used to achieve the first objective of this dissertation; to determine whether elevated levels of childhood EFDs reported by parents and/or teachers predict increased levels of parenting stress. The composition of each of the steps of the HLR was selected by the author, drawing upon research related to parenting stress and childhood ADHD. HLR was used to regress the Child Domain of the PSI (criterion variable) onto parent and teacher-reported scores on the BRIEF MI and BRI composite scales (predictor variables). Predictor variables were entered into the regression as four separate steps, with the parent-completed BRI entered last. By entering the parent BRIEF BRI in the last step, the study was able to test the central hypothesis, that elevated levels of ‘hot’ EFDs in the home will predict increased parenting stress, while controlling for common variance.

The first objective included a sub-objective related to determining which specific EFDs best predict increases in parenting stress, if findings show that childhood ‘hot’ and/or ‘cool’ EFDs due in fact predict increased levels of parenting stress. To achieve this sub-objective a series of follow-up HLR procedures were conducted, replacing previously significant predictor variables (e.g., parent BRIEF BRI) with corresponding BRIEF subscales (e.g., shift, inhibit and emotional control). Non-significant subscales ($p > .05$) in each step of the HLR were manually removed by the researcher, allowing only significant subscales to remain in the final HLR procedure. The above processes were repeated interchanging the Child Domain of the PSI (criterion variable) with the PSI Parent Domain (criterion variable).

The second objective of this dissertation was to determine whether reports of childhood oppositionality/defiance mediate the relationship between parent-reported EFDs and levels of
child related parenting stress. In order to achieve this second objective, simple path analysis, utilizing a series of multiple linear regression (MLR) equations (enter method), was used. To establish mediation, the proposed study drew upon the process outlined by Baron and Kenny (1986).

The third objective of the current study was to determine whether factors, such as child age, child gender, child ADHD diagnostic category, or life stress (as measured by the Life Stress index of the PSI) moderate the relationship between parents and/or teacher reported EFDs and levels of parenting stress. Simple path analysis, using HLR, was used to investigate a series of moderator models pertaining to this objective. Following Baron and Kenny’s (1986) protocol, child gender, child age and stressful life events (i.e., the Life Stress scale of the PSI) were each investigated in order to determine if they function as moderators for the relationship between EFDs and parenting stress. In order to determine if ADHD diagnostic groups (i.e., ADHD-I, ADHD-C and ADHD/ODD) influenced/moderated the relationship between EFDs and parenting stress, dummy variables were created for the diagnostic categories, and the regression coefficients were compared for significant interaction in relation to diagnostic categories. Regression coefficients pertaining to the relationship between EFDs and parenting stress were obtained by regressing the subscales of the BRIEF onto the Child Domain. Details related to the statistical analyses used to achieve the objectives of this dissertation can be found in Chapter V and Chapter VI.

41 The Global Executive Composite (GEC) scale of the parent BRIEF was used as the predictor variable and the Child Domain scale of the PSI was used as the criterion variable with an interaction variable pertaining to each of the dichotomized questions of the PSI Life Scale Index (i.e., whether a stressful life event, such as divorce or death of a family member had or had not occurred in the recent past).
CHAPTER V - SAMPLE CHARACTERISTICS

The purpose of this chapter is to describe the characteristics of the sample including a reporting of the descriptive statistics and preliminary statistical procedures needed to provide a context for the results from the main analyses. Specifically, this chapter includes a review of the reliability of the study’s measures in relation to the current sample, provision of the descriptive statistics related to the children and parents whose data are included in the anonymous data set, and provides a description of the levels of ADHD and ODD symptomatology experienced by the sample. This chapter also involves an examination of the results from univariate statistics pertaining to the key variables that are further examined and reported upon in the main analysis section. In addition to conducting univariate statistics to report important descriptive statistics, additional preliminary statistical procedures are used to compare the current sample with samples from similar studies. Preliminary statistical procedures are also employed to examine how ADHD subtypes may differ in relation to parenting stress levels, and EFDs. The objective of this chapter is to provide the necessary background and context for the study to accurately interpret the results of the main analyses.

Composition of the Secondary Data Set

The secondary data set utilized for the current study was constructed by the professional staff of The ADHD Clinic, Training and Research Institute of the Scarborough Hospital, in accordance with the ethics protocol approved by The Scarborough Hospital Research Ethics Board (REB) PSY-18 (see Appendix C). The anonymous information contained within this data set represents a two-year cross-section of children and parents who participated in an initial psychiatric assessment related to childhood ADHD. This data set comprises non-identifying information originally collected for clinical assessment purposes, including raw
and standardized scores from psychological assessment measures and \textit{DSM-IV-TR}-based diagnostic codes reflecting each child’s psychiatric diagnosis. Basic demographic information derived from the standardized measures are also contained in the data set, including the child’s age and gender, as well as the ethnicity of the child/family, and the parent’s age, gender and marital status.

The accuracy of the data entry process for the secondary data set was established through the review of 25 randomly selected cases, representing approximately 10\% of the total number of cases in the data set. Data-entry was verified as highly accurate with only one of 1825 items identified as an incorrect entry. Therefore, the accuracy rate for the data set is estimated to be above 99\%. A high rate of accuracy leads to enhanced confidence that any conclusion drawn from this data accurately reflects the experiences of the children and parents who attended the ADHD Clinic for an initial psychiatry assessment for ADHD.

Internal consistency estimates (Cronbach’s alpha) were computed for the subscales of all measures employed in the current study to establish the reliability of these measures for the current sample. Determining the internal consistency for the data set is important to establish that these measures are reliable for the current sample (Green & Salkind, 2005). Internal consistency estimates of .70 are considered adequate, while estimates exceeding .80 are considered indicative of a good measure (Garson, 2010).

Cronbach’s alpha scores computed for the parent-completed \textit{BRIEF} were acceptable at .96 for both the BRI and MI and ranging from .82 to .94 for the \textit{BRIEF} subscales (e.g., emotional control, shift, WM). Coefficients for the subscales of the teacher-completed \textit{BRIEF} ...

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\footnote{42 Please refer to the measures section for additional information related to the particular psychological measures included in the current study.}

\footnote{43 In the case of a two parent-headed household, the data set only contains demographic information pertaining to the parent who completed the assessment measures.}
were also acceptable with a range between .84 to .95. Similarly, the teacher-reported BRI and MI had acceptable coefficients of .97 and .96, respectively. Cronbach’s alpha coefficient for the CPRS-R:L subscale oppositionality was found to be adequate at .90, but low for teachers (CTRS-R:L) at an \( \alpha \) level of .57. The coefficients for the majority of PSI subscales were acceptable, ranging from .70 to .80. Adaptability, acceptability and attachment subscales for the PSI were the exception with lower coefficient levels of .69, .68 and .58, respectively.

However, internal consistency estimates of .88 for the PSI Child Domain and .94 for the PSI Parent Domain indicate high reliability.

The particularly low internal consistency score for the CTRS-R:L oppositionality score requires additional commentary as the \( \alpha \) coefficient of .58 for this scale for the current sample falls well below the corresponding scale for the CPRS-R:L (\( \alpha \) . 90) and below the levels obtaining through the norming process (i.e., \( \alpha \) .92 for males and \( \alpha \) .91 for females). Failing to find any outliers or incorrectly entered data for this subscale within the secondary data set, it is possible that the low internal consistency score is indicative of some factor of the sample itself (i.e., an issue specific to teachers in this sample that reduces their ability to consistently rate children’s oppositionality), or possibly due to other factors. For example, the low internal consistency score may result from the fact that the CTRS-R:L oppositionality scale comprises only 6 items, compared to the 10 items of the CPRS-R:L oppositionality scale. Fewer items may make the CTRS-R:L more susceptible to variability of internal consistency scores.

Furthermore, it is possible that teachers are less consistent in rating children’s oppositionality, because they are more prone than parents to report childhood anxiety symptoms as overlapping with symptoms of oppositionality. This is shown through factor analyses conducted in the current dissertation (see Table 14 on page 137 and Table 15 on page 138),
which reveals that teacher reports on the *CTRS-R:L* oppositionality scale load together with anxiety (i.e., externalizing symptoms loading together with internalizing symptoms), while this is not the case with parent reports on the *CPRS-R:L* (i.e., externalizing scales load together with externalizing and internalizing scales load together with internalizing scales). The differences in the internal consistency scores between the current sample and Conners’ (2001) normative sample may arise from the differences in sample size. The comparatively small size of the current sample, at only 12% of the sample reported by Conners’ (2001), may make the current sample more susceptible to variability in overall scale consistency due to the simple fact of having fewer cases included when calculating the Cronbach alpha coefficient.

Overall, the Cronbach’s alpha coefficients calculated for the current sample are sufficiently large to indicate a high degree of reliability for these measures as they relate to the cases contained within the current data set. Table 1 presents a summary of the Cronbach’s alpha levels for the current sample, as well as a comparison to the Cronbach’s alpha levels reported by the developers of the measures utilized in the current study.
Table 1
*Cronbach’s Alpha Coefficients for the Measures Used in the Current Study*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Subscale</th>
<th>Cronbach’s α related to norming sample</th>
<th>Cronbach’s α for the current sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>related to norming sample</td>
<td>for the current sample</td>
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<tr>
<td></td>
<td></td>
<td>β</td>
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<tr>
<td>Parent</td>
<td>BRIEF</td>
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<tr>
<td></td>
<td>Inhibit</td>
<td>.94</td>
<td>.93</td>
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<tr>
<td></td>
<td>Shift</td>
<td>.88</td>
<td>.79</td>
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<tr>
<td></td>
<td>Emotional Control</td>
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<td>.92</td>
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<tr>
<td></td>
<td>Initiate</td>
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<td>.72</td>
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<tr>
<td></td>
<td>Working Memory</td>
<td>.92</td>
<td>.87</td>
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<tr>
<td></td>
<td>Plan/organize</td>
<td>.91</td>
<td>.86</td>
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<tr>
<td></td>
<td>Organization of Materials</td>
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<td>.85</td>
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<tr>
<td></td>
<td>Monitor</td>
<td>.85</td>
<td>.75</td>
</tr>
<tr>
<td></td>
<td>BRI</td>
<td>.96</td>
<td>.92</td>
</tr>
<tr>
<td></td>
<td>MI</td>
<td>.96</td>
<td>.94</td>
</tr>
<tr>
<td>Teacher</td>
<td>BRIEF</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Inhibit</td>
<td>.95</td>
<td>.90</td>
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<tr>
<td></td>
<td>Shift</td>
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<td>Organization of Materials</td>
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<tr>
<td></td>
<td>MI</td>
<td>.96</td>
<td>.88</td>
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<tr>
<td>CPRS-R:L</td>
<td>Oppositionality</td>
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<td>.90</td>
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<tr>
<td>CTRS-R:L</td>
<td>Oppositionality</td>
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<td>.57</td>
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<td>PSI</td>
<td>Distractibility/Hyperactivity</td>
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<td>Adaptability</td>
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<td>Reinforces Parent</td>
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<td>Demandingness</td>
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<td>Mood</td>
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<td>Acceptability</td>
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<td>Child Domain</td>
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<td>Competence</td>
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<td>Isolation</td>
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<td>Attachment</td>
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<td>.58</td>
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<td></td>
<td>Role Restriction</td>
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<td>Spouse</td>
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</tr>
<tr>
<td></td>
<td>Parent Domain</td>
<td>.93</td>
<td>.94</td>
</tr>
</tbody>
</table>

*Internal consistency scores reported by the authors of the respective measures including the BRIEF, CPRS-R:L, CTRS-R:L and PSI. Cronbach α for the BRIEF, CPRS-R:L, CTRS-R:L and PSI were calculated on respective samples of (n=852) (Gioia et al., 2000), (n=2482), (n=1973) (Conners, 2001), and (n=2633) (Abidin, 1995).
Sample Demographics and Characteristics

*Family Structure and Background*

The total sample size for the current study is N= 243. Basic demographic information related to the children and parents who attended the ADHD Clinic for an initial psychiatric assessment were obtained from the parent who completed the assessment measures (see Table 2). The assessment measures included in the current study were completed most frequently by mothers (89%, n=216),\(^{44}\) followed by fathers (11%, n=27). Mothers ranged in age from 21 to 56 years with a mean age of 37.82 years (SD=7.27). Fathers ranged in age from 30 to 62 with a mean age of 41.23 (SD=8.32). Twenty-one mothers and six fathers did not report their age.

The children and parents who participated in the current study were from a variety of family structures that were organized by this author into two categories; two-parent-headed families (67%) and one-parent-headed families (26%). Due to limitations of the secondary data set, a small number family structures were not reported (7%). The majority of families were categorized as two-parent-headed families, including families identifying as married, common-law and reconstituted families (where one caregiver is a step-parent). Due to limitations of the secondary data set, obtaining precise numbers related to these deconstructed family categories was not possible. However, information pertaining to separation and/or divorce within the year preceding the psychiatric assessment at the ADHD Clinic was available through the Life Scale index of the *PSI*. This information revealed that approximately 8% of the families experienced a parental separation which resulted in divorce for four families. Overall, 3% of the families experienced divorce in the year preceding the

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\(^{44}\) One female included within the “mother” category self-identified as a “guardian”.

psychiatric assessment. Only two of these families reconciled their marriage/common-law within that year.

One-parent-headed families comprise 26% of the sample. This group includes single parents and/or parents who were separated or divorced at the time of the ADHD assessment. Twenty-three percent of families in the current sample were described as mother-headed single parent families and the remaining 3% were reported to be father-headed single parent families. Again, due to limitations inherent in the secondary data set, further deconstruction of this family structure category was not possible. In approximately 7% of cases, the relationship status/status of the family structure could not be determined.

Although parents were invited to report on their ethnic group on the PSI, a large number 44% failed to respond to this inquiry. Of those parents who did respond to this question, 22% identified as Caucasian/White, 6% identified as Black/African/Caribbean, 5% as Asian/Chinese, 4% identified as being of European descent, 3% South Asian/Filipino, 3% as East Indian, and 5% reported being of mixed/other ethnicity. An additional 8% of those who reported their ethnic group described themselves only as “Canadian”.

Other family demographic variables include financial stressors and household moves. Approximately 17% of parents reported that their family income decreased substantially in the year preceding the assessment, leading half of these families to go deeply into debt. In 22% of these cases, a separation and/or divorce occurred within the family system, possibly contributing to the drop in income. Household moves occurred for 22% of the total sample in the year preceding the psychiatric assessment, requiring a change of schools for 64% of these children. An additional 7% of the sample’s children, who were not affected by household moves, started a new school within the year leading to the psychiatric assessment.
The death of an immediate family member was another major life change that occurred in 13% of the families, 33 families in total. A closer inspection of this demographic information was warranted due to the high positive response rate to this question, as the death rate reported by Statistics Canada (2010) is 7.1 per 1000 people in Ontario. Unfortunately, limitations associated with secondary data prevented obtaining information about precisely who died, and the nature of the loss. However, an examination of the secondary statistics with key members of the ADHD Clinic professional staff identified that 19 of these families, or 58% of those that experienced a death, maintained intact families headed by a mother and father. This suggests that the death in these families could refer to the death of an aunt, uncle or grandparent. In consultation with professional staff from the ADHD Clinic, it was determined that item 120 of the PSI, pertaining to the “death of an immediate family member” is often interpreted by families to include the loss of a grandparent, uncle or aunt. Unfortunately, more precise conclusions are not possible and should be noted as a potential limitation. To determine the potential influence of these elevated intrafamilial death rates, a univariate regression analysis was conducted. An affirmative response on question 120 on the PSI Life Scale Index (i.e., death of an immediate family member) was not significantly related to parenting stress on the Child Domain of the PSI, EFDs, or with symptoms of ADHD or oppositionality.
Table 2

**Summary of Key Demographic Variables**

<table>
<thead>
<tr>
<th>Demographic Information</th>
<th>Number of Cases (% of total sample in parentheses)</th>
</tr>
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<tbody>
<tr>
<td><strong>Child’s Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>169 (70%)</td>
</tr>
<tr>
<td>Female</td>
<td>74 (30%)</td>
</tr>
<tr>
<td><strong>Child’s Primary Diagnostic Classification</strong></td>
<td></td>
</tr>
<tr>
<td>ADHD Inattentive Type (ADHD-I)</td>
<td>42 (17%)</td>
</tr>
<tr>
<td>ADHD Combined Type (ADHD-C)</td>
<td>141 (58%)</td>
</tr>
<tr>
<td>ADHD/ODD</td>
<td>60 (25%)</td>
</tr>
<tr>
<td><strong>Family Structure</strong></td>
<td></td>
</tr>
<tr>
<td>One parent headed family</td>
<td>63 (26%)</td>
</tr>
<tr>
<td>Two parent headed family</td>
<td>163 (67%)</td>
</tr>
<tr>
<td><strong>Ethno-cultural background (self-identified)</strong></td>
<td></td>
</tr>
<tr>
<td>Failed to identify</td>
<td>107 (44%)</td>
</tr>
<tr>
<td>Caucasian/white</td>
<td>54 (22%)</td>
</tr>
<tr>
<td>South Asian/Filipino/East Indian</td>
<td>14 (6%)</td>
</tr>
<tr>
<td>Asian/Chinese</td>
<td>12 (5%)</td>
</tr>
<tr>
<td>Black/African/Caribbean</td>
<td>15 (6%)</td>
</tr>
<tr>
<td>European</td>
<td>10 (4%)</td>
</tr>
<tr>
<td>Mixed/Other</td>
<td>12 (5%)</td>
</tr>
<tr>
<td>Canadian</td>
<td>19 (8%)</td>
</tr>
<tr>
<td><strong>Life Changes for family</strong></td>
<td></td>
</tr>
<tr>
<td>(within last 12 month period)</td>
<td></td>
</tr>
<tr>
<td>Death of Immediate Family Member</td>
<td>32 (13%)</td>
</tr>
<tr>
<td>Parental Separation</td>
<td>19 (8%)</td>
</tr>
<tr>
<td>Divorce</td>
<td>7 (3%)</td>
</tr>
<tr>
<td>Substantial Income Decrease</td>
<td>41 (17%)</td>
</tr>
<tr>
<td>Household Moves</td>
<td>56 (23%)</td>
</tr>
<tr>
<td>Parent-Teacher Problems</td>
<td>53 (22%)</td>
</tr>
<tr>
<td>Child entered new school</td>
<td>53 (22%)</td>
</tr>
</tbody>
</table>

β Due to limitations of the secondary data set, a small number of the family structures (7%) were unavailable.
Child Demographics and Characteristics

The final sample (N=243) consisted of assessment information pertaining to 169 boys and 74 girls who were diagnosed with ADHD at The Scarborough Hospital ADHD Clinic. The age distribution for the children was between 5 and 12 years of age with a mean age of 8.4 years (SD =1.96). At the time of testing, the mean age for males was 8.37 years (SD=1.98) and the mean age for females was 8.45 years (SD=1.93). There was no significant difference between the ages of the boys and girls included in the current study (t (241) = 0.19, p=.85). All children included in the sample were attending school in grade levels ranging from Kindergarten to Grade 7. Grade 1 was the most common (mode) grade attended. The majority of children were taught by female teachers (86%), with 9% taught by male teachers. Teacher gender could not be identified for 5% of the educators.\(^{45}\) Parent reports (on the PSI) indicate that approximately 22% of the sample experienced “trouble with teachers at school”. Of those parents experiencing trouble with teachers, 15% were parents of children with ADHD-I, 40% were parents of children with ADHD-C, and 45% were parents of children with ADHD/ODD.

ADHD diagnosis and symptom severity.

All children included in the current study met DSM-IV-TR (APA, 2000) criteria for ADHD. Specifically, 42 (males=21, females =21) children were diagnosed with ADHD-I, 141 (males=99, females=42) children were diagnosed with ADHD-C, and 60 (males=49, females=11) children were diagnosed with ADHD/ODD. The majority of the ADHD/ODD group (95%) were comprised of children who received a primary diagnosis of ADHD-C (males=47, females=10) with a secondary diagnosis of ODD. The remaining members of the

\(^{45}\) Teacher gender could not be determined in 5% of cases due to teacher forms being completed only with first initial without the use of titles such as Mr., Mrs., or Ms. etc.
ADHD/ODD group received a primary diagnosis of ADHD-I (males=2, females=1) along with the secondary diagnosis of ODD.

In order to examine the central question of the current study, whether EFDs experienced by children diagnosed with ADHD are associated with elevated levels of parenting stress, it was important to first establish that the children included in the current study had ADHD (see inclusion criteria pages 77-78 for additional information on assessment procedures).

Conforming to inclusion criteria, results showed that the mean T score for the parent-reported Inattention scale of the *ADHD Rating Scale-IV* to be 77.26 (Standard Deviation [SD] =10.88) for the ADHD-I group, 75.49 (SD=9.62) for the ADHD-C, and 77.28 (SD=9.42) for the ADHD/ODD group. The average T score for parent-reported Hyperactivity/Impulsivity on the *ADHD Rating Scale-IV* was 61.76 (SD=12.72) for the ADHD-I group, 71.03 (SD=11.57) for the ADHD-C group, and 77.09 (SD=11.76) for the ADHD/ODD group.

Teacher reports using the *ADHD Rating Scale-IV* showed the average T score for the Inattentive scale to be 68.89 (SD=5.72) for the ADHD-I group, 67.14 (SD=6.39) for the ADHD-C group and 66.70 (SD=6.33) for the ADHD/ODD group. Teacher reports for the Hyperactivity/Impulsivity index of the *ADHD Rating Scale-IV* reveal the average T scores to be 56.78 (SD=10.78) for the ADHD-I group, 65.37 (SD=9.33) for the ADHD-C group and 66.75 (SD=6.63) for the ADHD/ODD group. Table 3 also provides a summary of the results pertaining to ADHD symptom severity for the sample, including results from the *ADHD Rating Scale-IV* and results from CPRS-R:L and CTRS-R:L subscales known to be reliable and valid measures of ADHD symptoms. These results are summarized according to ADHD diagnostic group (e.g., ADHD-I, ADHD-C and ADHD/ODD).
### Table 3

**ADHD Symptom Severity for the Current Sample**

<table>
<thead>
<tr>
<th>Measures</th>
<th>ADHD-I Mean T score n=42</th>
<th>ADHD-C Mean T score n=141</th>
<th>ADHD/ODD Mean T score n=60</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ADHD Rating Scale-IV</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inattention (Home)</td>
<td>77.26 (10.88)</td>
<td>75.49 (9.62)</td>
<td>77.29 (9.41)</td>
</tr>
<tr>
<td><strong>ADHD Rating Scale-IV</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hyperactive/Impulsive (Home)</td>
<td>61.76 (12.72)</td>
<td>71.03 (11.57)</td>
<td>77.09 (11.76)</td>
</tr>
<tr>
<td><strong>CPRS-R:L</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive Problems/Inattention</td>
<td>77.74 (11.17)</td>
<td>73.74 (11.13)</td>
<td>73.62 (11.41)</td>
</tr>
<tr>
<td><strong>CPRS-R:L</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hyperactivity</td>
<td>61.74 (13.66)</td>
<td>71.40 (13.39)</td>
<td>78.33 (13.60)</td>
</tr>
<tr>
<td><strong>CPRS-R:L</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADHD Index</td>
<td>74.33 (9.94)</td>
<td>74.17 (9.29)</td>
<td>76.12 (7.97)</td>
</tr>
<tr>
<td><strong>CPRS-R:L</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSM-IV Inattention</td>
<td>75.24 (11.26)</td>
<td>73.09 (10.00)</td>
<td>73.67 (9.49)</td>
</tr>
<tr>
<td><strong>CPRS-R:L</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSM-IV Hyperactivity</td>
<td>62.24 (13.73)</td>
<td>73.38 (13.11)</td>
<td>78.50 (11.64)</td>
</tr>
<tr>
<td><strong>ADHD Rating Scale-IV</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inattention (School)</td>
<td>68.89 (5.72)</td>
<td>67.14 (6.39)</td>
<td>66.71 (6.33)</td>
</tr>
<tr>
<td><strong>ADHD Rating Scale-IV</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hyperactive/Impulsive (School)</td>
<td>56.78 (10.78)</td>
<td>65.37 (9.33)</td>
<td>66.75 (6.63)</td>
</tr>
<tr>
<td><strong>CTRS-R:L</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive Problems/Inattention</td>
<td>78.74 (11.05)</td>
<td>74.78 (11.20)</td>
<td>71.93 (10.89)</td>
</tr>
<tr>
<td><strong>CTRS-R:L</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hyperactivity</td>
<td>63.81 (16.02)</td>
<td>75.70 (14.44)</td>
<td>76.03 (12.13)</td>
</tr>
<tr>
<td><strong>CTRS-R:L</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADHD Index</td>
<td>75.67 (11.62)</td>
<td>78.63 (10.96)</td>
<td>78.12 (10.21)</td>
</tr>
<tr>
<td><strong>CTRS-R:L</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSM-IV Inattention</td>
<td>80.83 (9.92)</td>
<td>76.97 (9.51)</td>
<td>74.74 (9.52)</td>
</tr>
<tr>
<td><strong>CTRS-R:L</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSM-IV Hyperactivity</td>
<td>63.90 (17.39)</td>
<td>74.48 (13.15)</td>
<td>75.33 (11.28)</td>
</tr>
</tbody>
</table>

*Bold indicates significant differences.*

Comorbid disorders: Oppositional Defiant Disorder.

The most commonly diagnosed comorbid disorder in this study was ODD. Approximately 25% of the sample (n=60) were diagnosed with ADHD/ODD. Children diagnosed with ADHD-C were most likely (n=57) to receive this secondary diagnosis, accounting for 95% of those diagnosed ADHD/ODD. The three remaining children included in the ADHD/ODD group were diagnosed with ADHD-I and secondary ODD.

Due to the high rates of ODD within the ADHD sample, and in line with Davis’ (2006) recommendation, a distinct diagnostic grouping of ADHD/ODD was created to parcel out the potential influences of comorbid ODD. Parcelling out comorbid ODD within the study’s sample is important because factors related to oppositionality and defiance may bear direct influence on the measurement of EFDs within an ADHD sample (Geurts, et al., 2004; Oosterlaan et al., 1998; Pennington & Ozonoff, 1996). The mean oppositionality T scores, as measured by the CPRS-R:L are 55.45 (SD=13.61) for the ADHD-I group, 61.39 (SD=12.78) for the ADHD-C group and 72.05 (SD=12.20) for the ADHD/ODD group. Results from teacher reports reveal that the average oppositionality T scores on the CTRS-R:L are 59.57 (SD=16.01) for the ADHD-I group, 64.54 (SD=16.39) for the ADHD-C group, and 78.68 (SD=17.84) for the ADHD/ODD group. Overall, parents and teachers report that children in the ADHD/ODD group experience the highest levels of oppositionality, well beyond two standard deviations above the mean. Scores elevated to this level of severity are described by Conners as “markedly atypical” and are a strong indication that the child experiences “significant problems” relative to peers of the same age and gender (2001, p. 44). Figure 2 depicts the mean oppositionality scores across the three ADHD diagnostic groups.
A Multivariate Analysis of Variance (MANOVA) was computed in order to determine if there are significant differences among the three ADHD diagnostic groups (e.g., ADHD-I, ADHD-C and ADHD/ODD) in relation to the oppositionality subscales of the CPRS-R:L and CTRS-R:L. Results of the MANOVA reveal that the oppositionality levels differ significantly among these three diagnostic groups [Wilks’ $\Lambda = .757$ is significant, $F(4, 478) = 17.86, p <$
The multivariate $\eta^2 = .13$ based on Wilks’ $\Lambda$ is strong, indicating that 13% of the variance of oppositionality in the sample is associated with the grouping factor (i.e., ADHD-I, ADHD-C, ADHD/ODD). Table 4 contains the means and standard deviations related to the parent ($CPRS-R:L$) and teacher ($CTRS-R:L$) reported oppositionality scores. Follow-up analyses of variance (ANOVA) procedures reveal that oppositionality scores for the $CPRS-R:L$ were significant [$F(2, 240) = 23.46, p < .0001, \eta^2 = .164$], as are the scores on the oppositionality subscale for $CTRS-R:L$ [$F(2, 240) = 20.38, p < .0001, \eta^2 = .145$]. The Bonferroni procedure was utilized to adjust the significance level ($p < .025$) in order to account for multiple ANOVA procedures.

Post hoc analyses were also conducted using the Scheffe test to determine which diagnostic grouping is associated with the most oppositionality. Each pair-wise comparison was tested to a Bonferroni corrected significance level ($p < .008$). The ADHD/ODD group has significantly higher oppositionality scores on the $CPRS-R:L$ compared to both the ADHD-I and ADHD-C groups. Furthermore, the post hoc analysis reveals that the ADHD/ODD group has significantly higher oppositionality scores on the $CTRS-R:L$ than the ADHD-I and ADHD-C groups. The ADHD-I group and the ADHD-C group do not differ significantly on levels of parent or teacher reported oppositionality (as measured by the $CPRS-R:L$ and $CTRS-R:L$). Figure 2 provides a review of the oppositionality levels reported by parents and teachers across the three ADHD diagnostic groups. Table 4 provides a comparison of the mean T scores related to oppositionality levels.
Table 4

Comparison of Oppositionality Levels for ADHD Diagnostic Categories

<table>
<thead>
<tr>
<th>Scale</th>
<th>ADHD-I Mean T score</th>
<th>ADHD-C Mean T score</th>
<th>ADHD/ODD Mean T score</th>
<th>F</th>
<th>η²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=42</td>
<td>n=141</td>
<td>n=60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPRS-R:L</td>
<td>55.45</td>
<td>61.39</td>
<td>72.05</td>
<td>23.46**</td>
<td>.164</td>
</tr>
<tr>
<td>Oppositionality</td>
<td>(13.61)</td>
<td>(12.78)</td>
<td>(12.20)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTRS-R:L</td>
<td>59.57</td>
<td>64.54</td>
<td>78.68</td>
<td>20.38**</td>
<td>.145</td>
</tr>
<tr>
<td>Oppositionality</td>
<td>(16.01)</td>
<td>(16.39)</td>
<td>(17.84)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ª CPRS-R:L = Conners’ Parent Rating Scale; β CTRS-R:L = Conners’ Teacher Rating Scale.

** p < .001. Standard deviation in parentheses.


Confirmed Learning Disorders (LD)ª were the second largest comorbidity, identified in 18% of the total sample (4.5% of ADHD-I, 9% of ADHD-C, 4.5% ADHD/ODD).

Information related to the precise nature of these LDs is limited due to the fact that these LD diagnoses were provided by professionals working external to The ADHD Clinic. In addition to cases with confirmed LDs, approximately 24% of children from the total sample were recommended to undergo a psychoeducational assessment with the ADHD Clinic’s Psychology team to rule in or out a suspected LD. Information pertaining to these psychoeducational assessments was not included within the purview of the secondary data set used in the current study. The implications and possible limitations of a high number of children diagnosed with LD in the current sample are discussed further in the limitations section.

Comorbid disorders: Communication Disorders.

ª The term learning disorder is used in the current study, rather than learning disability, which is more commonly associated with the acronym LD, in order to remain consistent with the DSM-IV-TR terminology employed throughout the current study. DSM-IV-TR diagnostic criteria for learning disorders stipulate standardized assessment procedures that render these two terms synonymous.
Communication disorders (expressive, receptive and mixed type) were also identified in approximately 5% of the total sample. Specifically, Expressive Communication Disorders were identified in two children from the ADHD-I group, two children from the ADHD-C group and two children from the ADHD/ODD group. Mixed Receptive/Expressive Communication Disorders were identified in three children in ADHD-I group, three children in the ADHD-C group and one child in the ADHD/ODD group.

Other comorbid disorders.

Tourette’s Disorder and Generalized Anxiety Disorder were additional comorbid conditions apparent within the current sample. Three children were diagnosed with Tourette’s Disorder in the ADHD-C group and two children in ADHD/ODD group. Generalized Anxiety Disorder was diagnosed in three children in the ADHD-I group and two children in the ADHD/ODD group.

Medication status of sample.

It is not uncommon for paediatricians or family physicians to prescribe medications for ADHD to a child whom they have referred for a psychiatric assessment, especially in situations where the waiting list for specialists is greater than 6 months. A total of 13% of the children in the current sample were reportedly taking a psychotropic medication for ADHD at the time of assessment at The ADHD Clinic. Understanding the medication status of the children included in the current sample is important because medications for ADHD have been shown to influence the EFs of children diagnosed with ADHD (Barkley et al., 2001; Barnett et al., 2001; Goldberg et al., 2005; Kobel et al., 2009; Rhodes, et al., 2006; Royal et al., 2002; Semrud-Clikeman et al., 2008; Shallice et al., 1993; Tannock et al., 1995). Results for the current sample reveal that of those children taking medication, 33% were later
diagnosed with ADHD/ODD and 61% were diagnosed with ADHD-C. Only 6% of the children medicated at the time of the assessment went on to receive a diagnosis of ADHD-I.

A MANOVA was used to determine if the child’s medication status (i.e., medicated or not medicated) yielded significantly different results on the core variables of this study, including the parent and teacher *BRIEF* BRI and MI subscales, the oppositionality subscale of the *CPRS-R:L* and *CTRS-R:L*, and the Child and Parent Domains of the *PSI*. Results from the MANOVA reveal that there are no significant differences between the medicated and non-medicated groups in relation to the aforementioned key variables [Wilks’ Λ = .951, *F*(8, 234) = 1.50, *p* = .157]. These findings suggest that the child’s medication status is unlikely to differentially influence the results in the current study.

**Descriptive Analysis of the Independent and Dependent Variables**

*Descriptive Statistics Related to EFDs – Independent Variable*

*Parent-reported EFDs.*

Parent reports on the *BRIEF* identify several problem areas related to EFDs for children diagnosed with ADHD. Gioia and colleagues (2000) state that scores on the *BRIEF* exceeding a T score of 65 “should be considered as having potential clinical significance” (p. 14), with higher scores “indicating greater degrees of executive dysfunction” (p. 14). Results from the parent *BRIEF* showed that on average, children diagnosed with ADHD-I experience clinically significant (T score > 65) scores in relation to their ‘cool’ EFDs in the areas of WM, plan/organize, and initiate. EFDs with WM and plan/organize are pronounced while scores on the *BRIEF* related to initiate and monitor hover at the clinically significant cut-point. Parents of children from the ADHD-C group reported ‘hot’ and ‘cool’ EFDs to be clinically

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47 Executive dysfunction are referred to as Executive Function Difficulties (EFDs) throughout this dissertation.
significant, particularly with the subcomponents inhibit, WM, plan/organize, and monitor. Weaknesses in the areas of WM and plan/organize were pronounced, whereas scores pertaining to the subscales inhibit, initiate and monitor straddled the clinically significant cut-point. Parents of children diagnosed with ADHD/ODD reported that their children displayed clinically significant ‘hot’ and ‘cool’ EFDs with all BRIEF subcomponents including inhibit, shift, emotional control, initiate, WM, plan/organize, and monitor. EFDs with inhibit, WM, Plan/organize, monitor are pronounced, while scores pertaining to initiate, shift and emotional control are less pronounced, straddling the clinical threshold set by Gioia and colleagues (2000). Please refer to Table 5 for the mean T scores for each EFD subcomponent, organized into the three ADHD diagnostic groups. Table 5 also shows the percentage of cases above the threshold considered clinically significant (T score > 65).
Table 5

*Executive Function Difficulties Measured by the Parent BRIEF*

<table>
<thead>
<tr>
<th>Parent BRIEF Subscales</th>
<th>ADHD-I Mean T score n=42</th>
<th>% of cases with T score &gt; 65</th>
<th>ADHD-C Mean T score n=141</th>
<th>% of cases with T score &gt; 65</th>
<th>ADHD/ODD Mean T score n=60</th>
<th>% of cases with T score &gt; 65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhibit</td>
<td>55.45 (12.00)</td>
<td>24%</td>
<td>66.21 (10.52)</td>
<td>52%</td>
<td>73.03 (10.09)</td>
<td>75%</td>
</tr>
<tr>
<td>Shift</td>
<td>56.69 (10.82)</td>
<td>17%</td>
<td>57.65 (11.48)</td>
<td>29%</td>
<td>64.67 (13.09)</td>
<td>45%</td>
</tr>
<tr>
<td>Emotional Control</td>
<td>53.64 (13.28)</td>
<td>19%</td>
<td>57.20 (12.09)</td>
<td>27%</td>
<td>65.35 (11.54)</td>
<td>55%</td>
</tr>
<tr>
<td>Initiate</td>
<td>65.76 (11.45)</td>
<td>45%</td>
<td>64.55 (10.53)</td>
<td>48%</td>
<td>65.57 (9.60)</td>
<td>53%</td>
</tr>
<tr>
<td>Working Memory</td>
<td>71.67 (8.77)</td>
<td>74%</td>
<td>71.04 (10.15)</td>
<td>73%</td>
<td>70.81 (7.40)</td>
<td>75%</td>
</tr>
<tr>
<td>Plan/Organize</td>
<td>71.38 (11.08)</td>
<td>71%</td>
<td>69.92 (10.48)</td>
<td>71%</td>
<td>70.95 (8.32)</td>
<td>80%</td>
</tr>
<tr>
<td>Org. of Materials</td>
<td>56.57 (10.51)</td>
<td>24%</td>
<td>61.25 (8.58)</td>
<td>43%</td>
<td>61.10 (8.47)</td>
<td>37%</td>
</tr>
<tr>
<td>Monitor</td>
<td>64.97 (9.48)</td>
<td>60%</td>
<td>66.31 (10.18)</td>
<td>59%</td>
<td>69.15 (8.70)</td>
<td>73%</td>
</tr>
<tr>
<td>BRI*</td>
<td>55.78 (11.63)</td>
<td>21%</td>
<td>62.28 (10.74)</td>
<td>37%</td>
<td>70.88 (11.11)</td>
<td>72%</td>
</tr>
<tr>
<td>MI**</td>
<td>69.33 (9.73)</td>
<td>70%</td>
<td>69.70 (9.58)</td>
<td>69%</td>
<td>70.95 (7.76)</td>
<td>77%</td>
</tr>
<tr>
<td>GEC***</td>
<td>65.14 (9.50)</td>
<td>45%</td>
<td>68.24 (9.43)</td>
<td>64%</td>
<td>72.57 (8.52)</td>
<td>83%</td>
</tr>
</tbody>
</table>

*BRI= Behavior Regulation Index; **MI=Metacognitive Index; ***GEC=Global Executive Composite Scale. Standard deviation in parentheses.

Teacher-reported EFDs in the school environment.

Teacher reports on the BRIEF also reveal that each ADHD diagnostic group has a distinct EFD profile. Similar to parent reports, teachers indicated that, on average, children diagnosed with ADHD-I experience clinically significant (T score > 65) EFDs in the ‘cool’ metacognitive areas measured by the BRIEF, including EFDs with initiate, WM, plan/organize, organization of materials and monitoring. EFDs with behaviour regulation (BRI subscales) approach the level of clinical significance, but are not the key area of
difficulty for this group. Also consistent with parent reports are the findings from teachers who noted that on average the ADHD-C group presented a similar EFD profile to the ADHD-I group, but with the additional EFD in the area of inhibit. Teachers reported EFDs in the area of emotional control to be at the threshold for clinical significance for the ADHD-C group.

What is clear from the teacher reports on the BRIEF, as is also evident from parent reports, is that the ADHD/ODD group is set apart from the ADHD-C group by EFDs in the area of emotional control. Although the ADHD-C group does display clinically significant EFDs with emotional control, the ADHD/ODD group experiences more severe difficulties with this subcomponents. These difficulties are a full standard deviation higher than the other two ADHD subtypes, and extreme at 2.5 standard deviations above the mean. Please refer to Table 6 for the mean T scores reported by teachers, for each EFD subcomponent, organized into the three diagnostic groups. Table 6 also shows the percentage of cases that are above the cut point to be considered clinically significant (T score > 65).
Table 6

Executive Function Difficulties Measured by the Teacher BRIEF

<table>
<thead>
<tr>
<th>Teacher BRIEF Subscales</th>
<th>ADHD-I Mean T score n=42</th>
<th>ADHD-C Mean T score n=141</th>
<th>ADHD/ODD Mean T score n=60</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% of cases with T score &gt; 65</td>
<td>% of cases with T score &gt; 65</td>
<td>% of cases with T score &gt; 65</td>
</tr>
<tr>
<td>Inhibit</td>
<td>64.95 (16.86) 38%</td>
<td>73.77 (13.47) 76%</td>
<td>76.23 (11.28) 90%</td>
</tr>
<tr>
<td>Shift</td>
<td>64.95 (13.58) 45%</td>
<td>63.57 (13.26) 42%</td>
<td>71.45 (12.65) 63%</td>
</tr>
<tr>
<td>Emotional Control</td>
<td>61.48 (16.87) 19%</td>
<td>65.09 (16.51) 27%</td>
<td>74.88 (15.73) 55%</td>
</tr>
<tr>
<td>Initiate</td>
<td>79.95 (8.89) 95%</td>
<td>72.93 (9.61) 78%</td>
<td>73.82 (8.99) 82%</td>
</tr>
<tr>
<td>Working Memory</td>
<td>86.19 (12.59) 97%</td>
<td>77.26 (10.79) 86%</td>
<td>75.53 (9.61) 83%</td>
</tr>
<tr>
<td>Plan/Organize</td>
<td>80.93 (8.71) 100%</td>
<td>75.45 (9.86) 86%</td>
<td>73.50 (10.37) 83%</td>
</tr>
<tr>
<td>Org. of Materials</td>
<td>83.26 (19.06) 81%</td>
<td>75.44 (15.65) 75%</td>
<td>75.73 (14.82) 82%</td>
</tr>
<tr>
<td>Monitor</td>
<td>76.81 (12.10) 83%</td>
<td>76.04 (9.95) 86%</td>
<td>77.68 (10.53) 88%</td>
</tr>
<tr>
<td>BRI*</td>
<td>65.5 (15.83) 45%</td>
<td>70.25 (12.69) 62%</td>
<td>77.27 (13.37) 78%</td>
</tr>
<tr>
<td>MI**</td>
<td>84.83 (10.56) 69%</td>
<td>78.18 (10.07) 69%</td>
<td>77.78 (10.03) 77%</td>
</tr>
<tr>
<td>GEC***</td>
<td>79.86 (11.42) 88%</td>
<td>76.88 (10.27) 90%</td>
<td>79.51 (10.25) 93%</td>
</tr>
</tbody>
</table>

*BRI= Behavior Regulation Index; ** MI=Metacognitive Index; *** GEC=Global Executive Composite Scale. Standard deviation in parentheses.

Percentage of sample impacted by EFDs.

In a recent meta-analysis, Willcutt, Doyle and colleagues (2005) conclude that EFDs do not universally affect children with ADHD. Estimates suggest that between 30-50% of children diagnosed with ADHD experience significant EFDs (Nigg et al., 2005; Willcutt, Doyle et al., 2005). Findings from the current study showed that scores on the parent BRIEF identify a large segment of the sample as experiencing EFDs in several key areas. Specifically, parent reports reveal that over half (50%) of the ADHD-I group experience
clinically significant EFDs (T score > 65) with WM, plan/organize, and monitoring. Furthermore, over half of the ADHD-C group experience clinically significant EFDs with inhibit, plan/organize, and WM. Finally, over half of the cases of ADHD/ODD experience clinically significant EFDs with inhibit, emotional control, WM, and monitor. Table 5 shows the percentage of cases with parent-reported BRIEF subscales in excess of a T score of 65.

Teacher reports on the BRIEF show that the majority of the ADHD-I group experience clinically significant scores in relation to ‘cool’ EFDs with initiate, WM, plan/organize, and monitor. Over half (50%) of the children in the ADHD-C group experience clinically significant EFDs with inhibit, initiate, WM, plan/organize, organization of material, and monitor. Teacher reports related to the ADHD/ODD group showed that over half of this group experience clinically significant EFDs in each of the subcomponents measured by the BRIEF. The ADHD/ODD group is, however, the only diagnostic group where over half of the cases experience clinically significant EFDs with emotional control. This observation is consistent with ADHD theory suggesting that a difficulty with emotional control/regulation underpins the occurrence of ODD within childhood ADHD populations (Barkley, 2006). Table 6 provides results for each of the teacher completed BRIEF subscales and identifies the specific percentage of cases that exceed a T score of 65.

EFD profiles by ADHD diagnostic category.

Research on EFDs with childhood ADHD populations suggests that there is merit to examining EFDs by ADHD subtype rather than approaching ADHD as a homogeneous entity. This is due to the fact that EF profiles and EFDs likely differ by ADHD subtype (Chhabildas et al., 2001; Houghton et al., 1999; Klorman et al., 1999, Nigg et al., 2002; Toplak et al., 2009; Willcutt, Doyle et al., 2005). A MANOVA was conducted with the current sample to
determine if significant differences exist among the three ADHD diagnostic groups (i.e., ADHD-I, ADHD-C and ADHD/ODD) in relation to EFDs, as measured by the parent BRIEF BRI and MI, and teacher BRIEF BRI and MI. Findings from the MANOVA reveal significant differences in EFDs among the three ADHD diagnostic groups [Wilks’ Λ = .71 is significant, \( F(8, 474) = 11.17, p < .0001 \)]. The multivariate \( \eta^2 = .16 \) based on Wilks’ Λ was strong, indicating that 16% of the multivariate variance associated with the EFDs (measured by the BRIEF) was attributed to the ADHD diagnostic grouping. Table 5 and Table 6 contain the means and standard deviations for EFDs across the diagnostic groups, as reported by parents and teachers respectively. Follow-up ANOVAs reveal that the BRI subscale of the Parent BRIEF was significant \( [F(2, 240) = 24.71, p < .0001, \eta^2 = .171] \), as is the BRI of the teacher BRIEF \( [F(2, 240) = 10.24, p < .0001, \eta^2 = .08] \), and the MI subscale of the teacher MI \( [F(2, 240) = 7.74, p = .0001, \eta^2 = .06] \). Results from the ANOVAs also reveal that the MI subscale on the parent BRIEF is not significant \( [F(2, 240) = .504, p < .605, \eta^2 = .004] \). The Bonferroni procedure was applied to each ANOVA adjusting the significance level to .0125 (.05 divided by 4 ANOVAs) in order to control for Type I error.

Post hoc analyses were also conducted using the Scheffe test to determine which particular ADHD diagnostic groups (i.e., ADHD-I, ADHD-C or ADHD/ODD) were associated with the most significant EFDs. Each pair-wise comparison was tested at the .008 level (.025 divided by 3) in accordance with the Bonferroni procedure. The ADHD/ODD group was rated by parents as experiencing significantly more ‘hot’ EFDs, as measured by the BRIEF BRI, relative to both the ADHD-I group and the ADHD-C group. The ADHD-C group also experience significantly more ‘hot’ EFDs relative to the ADHD-I group. There are no significant differences between the ADHD diagnostic groups in relation to ‘cool’ EFD,
measured by the parent *BRIEF* MI subscale. Although limited research utilizing the *BRIEF* with childhood ADHD exists, the current findings appear to be consistent with findings showing BRI scores on the *BRIEF* to be significantly higher for children with ADHD-C relative to children with ADHD-I (McCandles & O’Laughlin, 2007; Riccio et al., 2006). These studies did not include a specific category for ADHD/ODD.

Teachers reported the ADHD/ODD group to have significantly more difficulties with ‘hot’ EFDs, as measured by the *BRIEF* BRI, in relation to both the ADHD-I group and ADHD-C group. Teachers did not, however, report any significant differences in ‘hot’ EFDs between children from the ADHD-I group or ADHD-C group. In relation to ‘cool’ EFDs within the school environment, teacher reports on the *BRIEF* MI scale indicate that children from the ADHD-I group experience significantly more EFDs than either children from the ADHD-C group or ADHD/ODD group. Teachers also report no significant differences between the ADHD-C group and the ADHD/ODD in relation to ‘cool’ EFDs, as measured by the *BRIEF* MI subscales. Table 7 depicts the differences in the mean T scores for the MI and BRI subscales of the parent-reported *BRIEF*. 
Table 7

Differences in EFDs between Diagnostic Subtypes as Reported by Parents & Teachers

<table>
<thead>
<tr>
<th>Measure</th>
<th>ADHD-I Mean T score n=42</th>
<th>ADHD-C Mean T score n=141</th>
<th>ADHD/ODD Mean T score n=60</th>
<th>F</th>
<th>η²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent BRIEF*</td>
<td>55.78 (11.63)</td>
<td>62.28 (10.74)</td>
<td>70.88 (11.12)</td>
<td>24.71*</td>
<td>.17</td>
</tr>
<tr>
<td>Parent BRIEF MI**</td>
<td>69.33 (9.73)</td>
<td>69.70 (9.58)</td>
<td>70.95 (7.76)</td>
<td>.504</td>
<td>.004</td>
</tr>
<tr>
<td>Teacher BRIEF</td>
<td>65.50 (15.83)</td>
<td>70.23 (12.69)</td>
<td>77.27 (13.95)</td>
<td>10.24*</td>
<td>.08</td>
</tr>
<tr>
<td>Teacher BRIEF MI</td>
<td>84.83 (10.56)</td>
<td>78.18 (10.07)</td>
<td>77.78 (10.03)</td>
<td>7.74*</td>
<td>.06</td>
</tr>
</tbody>
</table>

* Significant at p < .001. BRI = Behaviour Regulation Index, MI=Metacognitive Index. Standard deviation in parentheses.

Sample comparison for EFDs.

The average levels of EFDs measured by the BRIEF for the current sample were compared against the sample used by Gioia and colleagues (2000) during the standardization process for the BRIEF. This sample was comprised of children diagnosed with ADHD residing in the USA (Gioia et al., 2000). Independent t-tests were used to compare the T scores from the BRIEF of the current sample with those of the sample recruited by Gioia and colleagues (2000). This comparison was limited to two core EFs, WM and inhibit, as these were the only scores pertaining to an ADHD sample reported by Gioia and colleagues (2000). Table 8 presents the comparison of EFDs for these two samples.

Independent t-tests determine that the parent-reported inhibit scores for the ADHD-I group from Gioia’s sample are significantly higher than the inhibition levels found in the current sample [t(67)=3.53, p =.0008]. Gioia’s sample also has significantly higher scores for
parent-reported levels of inhibit [t(165) = 5.94, \( p < .0001 \)] and teacher-reported inhibit [t(217) = 6.45, \( p < .0001 \)] for children diagnosed with ADHD-C. Following the Bonferroni correction \( (p < .0125) \), ADHD-I no longer differs significantly between the two samples on inhibit [t (82) = 2.4287, \( p = .0173 \)], although it does approach significant levels. The results of the comparison also revealed that parent and teacher reported WM do not differ significantly between the samples for children with ADHD-I. However, Gioia’s sample showed that teacher-reported WM scores for children with ADHD-C differ significantly for teacher reports in relation to the current sample [t(217) = 3.74, \( p = .0002 \)].

Table 8

*Parent and Teacher Reports of Core EFDs for the Current Sample compared to the BRIEF’s Norms*

<table>
<thead>
<tr>
<th></th>
<th>ADHD-I Parent BRIEF Mean T Score</th>
<th>ADHD-I Teacher BRIEF Mean T Score</th>
<th>ADHD-C Parent BRIEF Mean T Score</th>
<th>ADHD-C Teacher BRIEF Mean T Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current Sample n=42</td>
<td>Comp. Sample(^\beta) n=27</td>
<td>Current Sample n=42</td>
<td>Comp. Sample n=42</td>
</tr>
<tr>
<td>Inh*</td>
<td>55.45 (12.00)</td>
<td>67.08* (15.26)</td>
<td>64.95 (16.86)</td>
<td>75.64 (23.01)</td>
</tr>
<tr>
<td>WM(^A)</td>
<td>71.67 (8.77)</td>
<td>76.33 (9.50)</td>
<td>86.19 (12.59)</td>
<td>82.60 (17.49)</td>
</tr>
</tbody>
</table>

\*Inh.= Inhibit; \(^A\) WM= Working Memory; SD=Standard Deviation; \(^\beta\) Comp.= Comparison sample. The comparison sample used the ADHD sample used by Gioia et al. (2000) during the standardization of the BRIEF. *significant difference in scores between groups using two tailed independent t-tests applying the Bonferroni correction procedure to control for Type I error (\( \alpha .05 /10 \) t tests: \( p < .005 \)). Standard deviation in parentheses.

It is unclear why the EFDs, particularly with inhibition, differ between these two samples. It is possible that the sample offered by Gioia and colleagues (2000) established inclusion criteria related to ADHD symptom severity at a higher threshold than the current study (e.g.,
T score > 70), although this is not apparent in their reporting. It is also possible that they did not segregate comorbid ODD from the ADHD-I and ADHD-C, as was done in the current study through the creation of the ADHD/ODD diagnostic grouping variable. Failing to parcel out ODD may explain the greater difficulties with inhibition in Gioia’s sample, as scores related to oppositionality and defiance are strongly correlated with inhibition scores for both ADHD-I (see Table 9) and ADHD-C (see Table 10).

Table 9

**Correlation for Oppositionality and Inhibit for ADHD-I in the Current Sample**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Parent BRIEF Inhibit</th>
<th>Teacher BRIEF Inhibit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPRS-R:L</strong> Oppositionality</td>
<td>.612*</td>
<td>.366*</td>
</tr>
<tr>
<td><strong>CTRS-R:L</strong> Oppositionality</td>
<td>.374*</td>
<td>.682*</td>
</tr>
</tbody>
</table>

*p<.01

Table 10

**Correlation for Oppositionality and Inhibit for ADHD-C in the Current Sample**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Parent BRIEF Inhibit</th>
<th>Teacher BRIEF Inhibit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPRS-R:L</strong> Oppositionality</td>
<td>.484*</td>
<td>.017</td>
</tr>
<tr>
<td><strong>CTRS-R:L</strong> Oppositionality</td>
<td>.037</td>
<td>.358*</td>
</tr>
</tbody>
</table>

*p<.01
Summary of univariate and preliminary statistics regarding EFDs.

Findings from the univariate statistics for the parent and teacher BRIEF provide a consistent picture of the EFD profiles experienced by children with various subtypes of ADHD. Overall, the results from parent and teacher reports on the BRIEF showed that ‘cool’ EFDs, particularly with WM and plan/organization, are the central difficulties experienced by the ADHD-I group. On average, this group of children did not experience concerning levels of ‘hot’ EFDs. Additionally, results for the ADHD-C group reveal that on average these children experienced significant ‘cool’ EFDs with WM and planning and as well as experienced significant ‘hot’ EFDs with inhibit. Children from the ADHD/ODD group were shown to have the highest levels of EFDs, and as a group, had the highest percentage of cases with clinically significant EFDs (T scores > 65). Results for the ADHD/ODD group showed that a key factor distinguishing this group from the ADHD-I group and ADHD-C group is the presence of more severe difficulties with inhibit and the presence of EFDs with emotional control.

Descriptive Statistics Related to Parenting Stress – Dependent Variable

Levels of parenting stress.

Results from the descriptive analysis of the PSI showed that levels of parenting stress on the Child Domain for the current sample (n=243) were considered ‘high’ (T score > 60). High scores on the Child Domain are indicative of stress emanating from the parent’s perception of the child’s characteristics, as well as interactions between the parent and child (Abidin, 1995). In particular, parent reports reveal that respondents were most stressed in relation to the child’s hyperactivity/inattention and demandingness, and the parent’s inability to accept the child. High levels of stress experienced by parents on the acceptability subscale
of the *PSI* reflect the stress arising from the inability of the parent to accept their child’s unique intellectual or emotional characteristics, or special needs.

Findings from the descriptive statistics reveal that stress levels captured by the *PSI* Parent Domain are well within normal ranges. Table 11 presents the results of the parenting stress levels for all *PSI* subscales, organized according to ADHD diagnostic category.

Results for the ADHD-I group showed that on average, parents reported their stress levels on the Child Domain, Parent Domain and Life Stress Index to be well within normal ranges (not exceeding a T score >60). Parents of children in the ADHD-C group reported experiencing high levels of stress on the Child Domain, but within normal ranges for stress levels captured by the *PSI* Parent Domain and Life Stress Index. Findings from the ADHD/ODD group reveal that these parents are the most highly stressed of any ADHD group within the current sample in relation to their child’s characteristics, as measured by the Child Domain of the *PSI*. On average, parents of children diagnosed with ADHD/ODD experience stress levels in the normal range on the Parent Domain and Life Stress Index.

Closer inspection of the *PSI* Child Domain subscales identifies several key areas that contribute to total/overall levels of parenting stress. Only the Child Domain subscales are reported because, on average, all T scores from the subscales of the Parent Domain fell within the normal range. Please refer to Figure 3 and Table 11 for the results of the mean T scores for all *PSI* subscales and composite scales organized according to ADHD.

Overall, the univariate statistics showed that parents of children diagnosed with ADHD, regardless of the subtype, experience high levels of stress on the subscale acceptability. For parents of children in the ADHD-I group, acceptability is the only *PSI* subscale that indicated high levels of parenting stress (T scores > 60). Parents of children in
the ADHD-C group reported high stress levels on the acceptability subscale, as well as high stress levels on the distractibility/hyperactivity subscale. Findings from the ADHD/ODD group showed that, on average, parents reported high levels of parenting stress (T score > 60) on all subscales of the PSI. Parents of children diagnosed with ADHD/ODD were found to experience particularly high levels of parenting stress, possibly considered clinically significant, in the areas of distractibility/hyperactivity, demandingness and acceptability (see Figure 3 and Table 11).

*Figure 3. PSI Child Domain subscales organized by ADHD diagnostic group. Reference lines denote 1 and 1.5 standard deviations above the mean. T scores > 65 are considered ‘high’ parenting stress.*
Table 11

*Average Levels of Parenting Stress for ADHD Diagnostic Categories*

<table>
<thead>
<tr>
<th>PSI Scales</th>
<th>ADHD-I Mean T score n=42</th>
<th>% of cases with T score &gt; 60</th>
<th>ADHD-C Mean T score n=141</th>
<th>% of cases with T score &gt; 60</th>
<th>ADHD/ODD Mean T score n=60</th>
<th>% of cases with T score &gt; 60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distractibility/hyperactivity</td>
<td>52.06 (9.20)</td>
<td>17%</td>
<td>61.34 (10.48)</td>
<td>55%</td>
<td>65.76 (9.45)</td>
<td>67%</td>
</tr>
<tr>
<td>Adaptability</td>
<td>51.09 (10.07)</td>
<td>14%</td>
<td>53.42 (12.45)</td>
<td>28%</td>
<td>62.22 (12.08)</td>
<td>61%</td>
</tr>
<tr>
<td>Reinforces Parent</td>
<td>56.17 (15.00)</td>
<td>36%</td>
<td>57.01 (14.67)</td>
<td>37%</td>
<td>62.76 (14.59)</td>
<td>50%</td>
</tr>
<tr>
<td>Demandingness</td>
<td>56.96 (12.37)</td>
<td>33%</td>
<td>59.08 (13.59)</td>
<td>46%</td>
<td>66.63 (12.95)</td>
<td>72%</td>
</tr>
<tr>
<td>Mood</td>
<td>54.98 (10.51)</td>
<td>26%</td>
<td>56.97 (13.59)</td>
<td>40%</td>
<td>64.48 (11.39)</td>
<td>65%</td>
</tr>
<tr>
<td>Acceptability</td>
<td>63.93 (9.55)</td>
<td>62%</td>
<td>62.15 (12.75)</td>
<td>49%</td>
<td>65.29 (12.63)</td>
<td>62%</td>
</tr>
<tr>
<td>Child Domainβ</td>
<td>57.67 (12.10)</td>
<td>38%</td>
<td>60.67 (11.86)</td>
<td>48%</td>
<td>68.97 (10.91)</td>
<td>78%</td>
</tr>
<tr>
<td>Competence</td>
<td>49.48 (11.18)</td>
<td>12%</td>
<td>47.07 (10.48)</td>
<td>8%</td>
<td>51.50 (11.18)</td>
<td>22%</td>
</tr>
<tr>
<td>Isolation</td>
<td>53.08 (12.18)</td>
<td>29%</td>
<td>49.68 (11.32)</td>
<td>15%</td>
<td>49.37 (12.40)</td>
<td>15%</td>
</tr>
<tr>
<td>Attachment</td>
<td>47.37 (10.20)</td>
<td>14%</td>
<td>46.33 (10.34)</td>
<td>14%</td>
<td>51.15 (12.43)</td>
<td>28%</td>
</tr>
<tr>
<td>Health</td>
<td>52.98 (11.16)</td>
<td>21%</td>
<td>50.15 (12.50)</td>
<td>22%</td>
<td>51.42 (12.32)</td>
<td>24%</td>
</tr>
<tr>
<td>Role Restriction</td>
<td>47.13 (10.71)</td>
<td>12%</td>
<td>45.61 (10.40)</td>
<td>9%</td>
<td>48.99 (11.07)</td>
<td>19%</td>
</tr>
<tr>
<td>Depression</td>
<td>49.28 (11.40)</td>
<td>17%</td>
<td>47.93 (10.31)</td>
<td>15%</td>
<td>51.76 (12.17)</td>
<td>25%</td>
</tr>
<tr>
<td>Spouse</td>
<td>49.45 (9.59)</td>
<td>12%</td>
<td>49.43 (11.66)</td>
<td>19%</td>
<td>51.44 (11.74)</td>
<td>20%</td>
</tr>
<tr>
<td>Parent Domain</td>
<td>51.05 (12.20)</td>
<td>19%</td>
<td>47.72 (12.20)</td>
<td>13%</td>
<td>52.07 (13.24)</td>
<td>20%</td>
</tr>
<tr>
<td>Total Stress Score</td>
<td>52.93 (11.52)</td>
<td>29%</td>
<td>53.28 (12.27)</td>
<td>30%</td>
<td>60.14 (12.23)</td>
<td>48%</td>
</tr>
<tr>
<td>Life Stress</td>
<td>49.75 (11.91)</td>
<td>19%</td>
<td>50.27 (12.36)</td>
<td>15%</td>
<td>53.49 (13.51)</td>
<td>25%</td>
</tr>
</tbody>
</table>

*For increased precision, the PSI offers age norms for the composite scales Child Domain and Parent Domain (Abidin, 1995). Standard Deviations are included in the parentheses.*
Percentage of sample impact by high levels of parenting stress.

Findings from the descriptive analysis indicate that approximately 15% of the current sample experienced “high” levels of parenting stress levels on the Child Domain, Parent Domain, Total Stress scale and Life Stress Scale. Refer to Table 11 for specific percentages of cases exceeding a T score of 60. Inspection of the subscales for the Child Domain of the PSI reveals that more than half of the parents of the ADHD-I group experience high levels of stress related to acceptance. Furthermore, over half of the parents of the ADHD-C group experience high levels of stress related to their child’s characteristics associated with distractibility/hyperactivity. Results for the ADHD/ODD group also showed that over half of the parents in the ADHD/ODD group experience high levels of parenting stress on all subscales associated with the PSI Child Domain. Please refer to Table 11 for the percentage of study participants experienced high levels of parenting stress on the Child Domain.

Abidin (1995) states that parents who report their total/overall levels of parenting stress to exceed a raw score of 260 (i.e., T score > 60) on the PSI Total Stress Domain, “should definitely be offered a referral for professional consultation” (p. 6). This reflection can be interpreted to mean that parents who experience such levels of stress are not simply ‘highly’ stressed, but are experiencing clinical stress levels requiring professional intervention in order to reduce the risk for dysfunctional parent-child interactions, negative parenting and poor developmental outcomes. The results from the current study showed that these clinical levels of parenting stress impact a significant portion of the sample. Specifically, the ADHD-I group and the ADHD-C group are closely matched, with approximately 30% of cases, or 54 families in total, experiencing overall levels of parenting stress that warrant professional
intervention. Furthermore, 29 parents (49%) of the ADHD/ODD group reported experiencing clinical levels of parenting stress.

Summary of parenting stress univariate analyses.

The univariate statistics showed that parents of children diagnosed with ADHD, regardless of the subtype, experience high levels of stress emanating from their difficulties accepting their child in relation to such things as the child’s intellectual and/or emotional special needs. Parents of children with ADHD-C also reported experiencing high levels of parenting stress in relation to their child’s characteristics with distractibility/hyperactivity. Parents of children in the ADHD/ODD group experience similar levels of Child Domain parenting stress in these areas, but also experience elevated Child Domain parenting stress in relation to their perception of their child as demanding. The results showed that the principal sources of parenting stress were the characteristics associated with their children. Few parents experience significant levels of parenting stress arising from their own personality or characteristics (i.e., Parent Domain parenting stress), or with life events, as measured by the Life Stress Index of the PSI. Overall, the findings showed that approximately 30% of parents from the ADHD-I group and the ADHD-C group experience levels of parenting stress that may warrant professional intervention. Parents of the ADHD/ODD group described experiencing the highest rates of parenting stress within the sample, with approximately 55% indicating their total stress level on the PSI to be in the range warranting professional intervention.

Chapter Summary

This chapter presents a description of the sample, descriptive statistics, and preliminary analysis of the independent and dependent measures in order to provide a context
for the main analysis section. The anonymous data set accessed through The ADHD Clinic of
the Scarborough Hospital provides a large sample (n=243) of parent and teacher completed
information related to ADHD symptoms, EFDs and parenting stress. Internal consistency
estimates reveal that the measures employed in the current study are reliable for the current
sample, including the PSI (criterion/dependent measure) and the parent and teacher BRIEF
(predictor/independent measures). The majority of the measures included in the data set were
completed by female teachers (86%) and mothers (89%). The final sample includes 169 boys
and 74 girls, who were on average 8.4 years of age at the time of assessment. The sample was
organized into three ADHD diagnostics categories: ADHD-I (17%), ADHD-C (58%) and
ADHD/ODD (25%). ODD was the most common comorbid diagnosis, affecting 25% of the
sample. Of those children diagnosed with comorbid ODD, 95% had been diagnosed primarily
with ADHD-C.

Findings from the univariate and preliminary statistics with the parent and teacher
BRIEF revealed that significant EFDs exist within a sample and that ADHD subtypes have
unique EFD profiles on the BRIEF. For example, the central deficit for the ADHD-I group
was ‘cool’ EFDs, particularly with the subcomponents WM and plan/organization. Results
also showed that the principal deficits associated with the ADHD-C group are ‘cool’ EFDs
with WM and planning, as well as significant “hot” EFDs with inhibition. As a group,
children from the ADHD/ODD are shown to have the most severe EFDs, with pronounced
deficits with inhibition and emotional control. Among the ADHD groups, the ADHD/ODD
group experience the highest levels of overall stress, as well as the highest levels of stress
pertaining to child related parenting stress. The ADHD/ODD group was the only group
considered to be experiencing overall levels of parenting stress that would warrant a referral
for clinical intervention (i.e., T score > 60) (Abidin, 1995). The findings are mixed in relation to how the EFDs experienced by children from the current sample compare with those reported in normative sample of the BRIEF (see Gioia et al., 2000).

The descriptive statistics related to parenting stress indicated that the vast majority of stress experienced by parents is in relation to the child’s characteristics and parents’ perceptions of their child. Initial results also show that regardless of ADHD subtype, parents had difficulty accepting that their child has intellectual and/or emotional special needs, resulting in elevated levels of parenting stress. The overall results from the ADHD-I group showed that other than high scores on the acceptability scale, parent scores on the PSI are within the normal range (T score < 60). Parent scores on the PSI for the ADHD-C group showed high scores on the acceptability subscale and the distractibility/hyperactivity subscale. Findings from the ADHD/ODD group indicated that these parents experienced the highest rates of parenting stress in the current sample with particularly high scores on the acceptability, distractibility/hyperactivity and demandingness subscales of the PSI. Overall, the results showed that 88 of the 243 families (36%) experience levels of total/overall parenting stress (i.e., PSI Total Stress Domain) elevated to the degree to that professional intervention was warranted to support the parent-child relationship.
CHAPTER VI – MAIN RESULTS

This chapter presents the results from the main analyses, organized according to the objectives of the current study. Specifically, findings from Hierarchical Linear Regressions (HLR) and simple path analyses employing multiple linear regressions (MLR), are discussed in order to articulate the nature of the relationship between EFDs, oppositional behaviour symptoms, and parenting stress. Statistical procedures were employed at the outset to determine if the current sample and the study’s key variables satisfy the statistical assumptions associated with linear regression models.

*Key Statistical Assumptions for Regression Analyses*

MLR and related analyses are robust statistical procedures. Nonetheless, several key assumptions were examined, in order to have confidence in the findings produced using such statistical procedures. Tested assumptions included determining if correlations existed among predictor variables and between predictors and the criterion variable, without the occurrence of multicollinearity (Licht, 2004). Tests were conducted to determine whether the sample was normally distributed, whether there were outliers and whether there were issues of homoscedasticity (Green & Salkind, 2005; Licht, 2004). Furthermore, tests were conducted to ensure that a linear relationship existed among variables and that the variables were independent (Green & Salkind, 2005; Licht, 2004). Theories from the literature on parenting stress, EFDs and childhood ADHD were used to ensure that all relevant variables were included and all unnecessary variables were excluded from the main analyses. A discussion of the findings from these statistical procedures follows.
Variable correlation.

Two correlation matrices were constructed to examine the strength of the relationship between the predictor variables and between the predictor variables and criterion variables utilized within the main analyses of the current study. The first correlation matrix was produced using the composite scores of the PSI, including the Child and Parent Domain scales (see Table 12). This matrix shows that several large, statistically significant, positive correlations exist between several variables including the parent BRIEF BRI and CPRS-R:L oppositionality scale ($r = .741, p < .01$); parent BRIEF BRI and the PSI Child Domain ($r = .705, p < .01$); teacher BRIEF BRI and CTRS-R:L ($r = .680, p < .01$); CPRS-R:L oppositionality scale and the PSI Child Domain ($r = .707, p < .01$); and between the PSI Child Domain and PSI Parent Domain ($r = .575, p < .01$). There were also a number of moderately strong, as well as small, correlations between the key variables (see Table 12). Several variables were shown to be unrelated including, the parent BRIEF BRI and teacher BRIEF MI, parent BRIEF MI and the teacher BRIEF BRI, and the MI subscale of the parent and teacher BRIEF. Correlation analysis also revealed that the teacher BRIEF MI and the PSI Parent Domain scale were unrelated to several of the other variables included in the current study.

A second correlation matrix was produced to show the relationship between the predictor variables and the subscales of the PSI (see Table 13). This additional step was taken to illuminate any potential issues of dependence between the predictor and criterion variable, as this was identified as a key area of concern by Anastopoulos and colleagues (1992) when conducting research with the PSI-Long Form. Large positive correlations were found to exist between the parent BRIEF BRI and the PSI subscales adaptability ($r = .665, p < .01$),
demandingness \((r = .602, p < .01)\) and mood \((r = .557, p < .01)\). Strong relationships were also found to exist between the \textit{CPRS-R:L} oppositionality scale and the \textit{PSI} subscales adaptability \((r = .661, p < .01)\), demandingness \((r = .598, p < .01)\) and mood \((r = .610, p < .01)\). In addition to these large correlations, several other moderate and small correlations were shown to exist between the predictor variables and the subscales of the \textit{PSI}, and among the various subscales of the \textit{PSI}. Please refer to Table 13 for a full list of the correlation values.
Table 12: Pearson r Correlations of T scores for Key Predictor and Criterion Variables

<table>
<thead>
<tr>
<th></th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
<th>7.</th>
<th>8.</th>
<th>9.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Parent BRIEF BRI</td>
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<td></td>
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</tr>
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<td>3. Teacher BRIEF BRI</td>
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<td>-.021</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>4. Teacher BRIEF MI</td>
<td>-.078</td>
<td>.096</td>
<td>.363**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>5. CPRS-RL Oppositionality</td>
<td>.741**</td>
<td>.371**</td>
<td>.242**</td>
<td>-.081</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>6. CTRS-RL Oppositionality</td>
<td>.254**</td>
<td>.099</td>
<td>.680**</td>
<td>.111</td>
<td>.272**</td>
<td></td>
<td></td>
<td></td>
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<td>7. PSI Child Domain†</td>
<td>.705**</td>
<td>.401**</td>
<td>.148*</td>
<td>-.045</td>
<td>.707**</td>
<td>.224**</td>
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<td></td>
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<td>8. PSI Parent Domain‡</td>
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<td>.187**</td>
<td>.071</td>
<td>.002</td>
<td>.396**</td>
<td>.114</td>
<td>.575**</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>9. PSI Life Stress Index</td>
<td>.195**</td>
<td>.101</td>
<td>.187**</td>
<td>.148*</td>
<td>.168**</td>
<td>.130*</td>
<td>.220**</td>
<td>.243**</td>
<td>1</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed). ‡Abidin (1995, pp. 73-75) provided age norms for the PSI Child Domain and Parent Domain. For greatest accuracy these T scores are included rather than T scores corresponding to un normed Domain scores.
Table 13: Pearson $r$ Correlations of T scores for Select Parent Completed Measures including all PSI subscales

|       | 1.   | 2.   | 3.   | 4.   | 5.   | 6.   | 7.   | 8.   | 9.   | 10.  | 11.  | 12.  | 13.  | 14.  | 15.  | 16.  | 17.  | 18.  | 19.  | 20.  |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1.    | 1.00 | .496 | .256 | -.078| .741 | .254 | .456 | .665 | .423 | .602 | .557 | .347 | .385 | .147 | .300 | .200 | .352 | .347 | .187 | .195 |
| 2.    |      | 1.00 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 3.    |      |      | 1.00 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 4.    |      |      |      | 1.00 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 5.    |      |      |      |      | 1.00 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 6.    |      |      |      |      |      | 1.00 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 7.    |      |      |      |      |      |      | 1.00 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 8.    |      |      |      |      |      |      |      | 1.00 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 9.    |      |      |      |      |      |      |      |      | 1.00 |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 10.   |      |      |      |      |      |      |      |      |      | 1.00 |      |      |      |      |      |      |      |      |      |      |      |      |
| 11.   |      |      |      |      |      |      |      |      |      |      | 1.00 |      |      |      |      |      |      |      |      |      |      |      |
| 12.   |      |      |      |      |      |      |      |      |      |      |      | 1.00 |      |      |      |      |      |      |      |      |      |      |
| 13.   |      |      |      |      |      |      |      |      |      |      |      |      | 1.00 |      |      |      |      |      |      |      |      |      |
| 14.   |      |      |      |      |      |      |      |      |      |      |      |      |      | 1.00 |      |      |      |      |      |      |      |      |
| 15.   |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1.00 |      |      |      |      |      |      |      |
| 16.   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1.00 |      |      |      |      |      |      |
| 17.   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1.00 |      |      |      |      |      |
| 18.   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1.00 |      |      |      |      |
| 19.   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1.00 |      |      |      |
| 20.   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1.00 |      |      |

**Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed).**

Legend for Table 13:

1.) Parent BRIEF BRI; 2.) Parent BRIEF MI; 3.) Teacher BRIEF BRI; 4.) Teacher BRIEF MI; 5.) CPRS-R:L Oppositionality; 6.) CTRS-R:L Oppositionality; 7.) PSI Distractibility/Hyperactivity; 8.) PSI Adaptability; 9.) PSI Reinforces Parent; 10.) PSI Demandingness; 11.) PSI Mood; 12.) PSI Acceptability; 13.) PSI Competence; 14.) PSI Isolation; 15.) PSI Attachment; 16.) PSI Health; 17.) PSI Role Restriction; 18.) PSI Depression; 19.) PSI Spouse; 20.) PSI Life Stress scale.
Multicollinearity and independence.

The presence of multicollinearity, a high level of correlation among predictor variables or between predictor and criterion, is highly problematic when attempting to interpret the results from multiple linear regression analyses due to the increased likelihood of committing a Type II error (i.e., believing there is not a significant relationship when in fact one exists [Garson, 2010; Green & Salkind, 2005; Mason & Perreault, 1991]). Licht (2004) indicates that the concern for multicollinearity grows along with the strength of the correlation, with intercorrelations exceeding $r = .8$ considered very problematic. Grewall, Cote and Baumgartner (2004) also state that the possibility of inaccurate estimates of coefficients and inference errors can occur as often as 50-80% of the time when variables are intercorrelated in the range of $r = .6$ to .8, which is the case with several of the variables included in the current study (i.e., BRIEF BRI scale and the CPRS-R:L oppositionality scale) (Grewal et al., 2004).

Concerns regarding inaccurate estimates, standards errors, as well as inference errors can be offset with a high $R^2$ and a large sample size (Mason & Perreault, 1991). The central concern with multicollinearity is that very high correlations suggest that two variables may actually be measuring the same construct (Licht, 2004). Results from the bivariate correlation analyses (see Table 12 and Table 13) revealed that no variables within the current study displayed intercorrelations in excess of $r = .8$. This finding suggests that multicollinearity is not at such a level that variables should be removed from the study. This conclusion was also supported through the use of tolerance estimates, which are considered a more sophisticated way of examining multicollinearity due to the ability of this analysis to take into account interactions among variables in addition to computing simple correlations between predictors (Garson, 2010). Findings from tolerance estimates and Variance Inflation Estimates (VIF)
were well within accepted limits (tolerance scores > .2 and VIF scores ≥ 4), offering further confidence that multicollinearity was unlikely to be a concern in the current study (Garson, 2010).

Although none of the variables included in the current study were found to exhibit intercorrelations above $r = .8$, several variables did yield high correlations. In particular, scores on the parent BRIEF BRI were found to have a large positive correlation with scores on the oppositionality scale of the CPRS-R:L ($r = .741$) and several subscales of the PSI Child Domain. Further inspection of the correlations between the BRIEF BRI and the subscales that comprise the PSI Child Domain (see Table 13) show that the correlations for acceptability ($r = .665$), demandingness ($r = .602$) and mood ($r = .557$), although large, do not unequivocally pronounce the occurrence of multicollinearity. These findings also indicate that the BRIEF BRI and the PSI Child Domain are unlikely to have issues with independence in the current study. Furthermore, these findings indicate that the current study need not replicate the protocol established by Anastopoulos and colleagues (1992) to adjust the PSI by removing subscales to alleviate concerns of dependence between PSI and predictor variables.

Concerns exist, however, that the large correlation between the CPRS-R:L oppositionality scale and the parent BRIEF BRI scale is indicative of these two variables tapping similar constructs. Gioia and colleagues (2000) examined a similar issue during the standardization process of the BRIEF. Using principle factor analysis with oblique rotation, they examined whether the BRIEF measures constructs distinct from those measured by the Child Behavior Checklist (CBCL). Ultimately, they concluded that the parent-reported BRIEF MI and BRI subscales tap different constructs and “were separate and distinguishable from the externalizing and internalizing factors of the CBCL” (Gioia et al., 2000, p. 63).
In an attempt to replicate these findings, a maximum likelihood factor analysis with oblique rotation was performed with the goal of determining if the parent-reported BRIEF BRI was separate and distinguishable from the CPRS-R:L oppositionality scale for the current sample and whether the CTRS-R:L oppositionality scale loaded together with the teacher-reported BRIEF BRI scale. Factor analyses included all subscales of the BRIEF and select subscales from the CPRS-R:L and CTRS-R:L believed to best approximate the CBCL and the Teacher Rating Form (TRF) subscales included in Gioia and colleagues’ factor analyses (2000). Following the methodology of Gioia and colleagues, two separate maximum likelihood factor analyses with fixed four factor solution, were employed.

The results from the first factor analysis on the parent-reported measures (see Table 14) revealed that the BRIEF subscales inhibit and emotional control load together strongly with the oppositionality subscale from the CPRS-R:L. Please see Table 14 for the structure matrix showing the factor loading scores pertaining to the parent BRIEF and CPRS-R:L. Therefore, contrary to Gioia and colleagues’ (2000) findings, the results of the factor analysis related to parent-reported measures shows the BRIEF BRI and the CPRS-R:L oppositionality scales loading together, which suggests that they may be tapping similar constructs. These findings are consistent with the theory proffered by Barkley (2006) that ‘hot’ EFDs, in particular with emotional regulation, likely underpin oppositional behaviours. This warrants the examination of a possible mediator relationship when these two variables are examined in relation to other variables.
### Table 14

*Factor Loadings for Structure Matrix-Maximum Likelihood Factor Analysis of Parent BRIEF and CPRS-R:L with Direct Oblim Rotation of the Parent-reported BRIEF and the CPRS-R:L*

<table>
<thead>
<tr>
<th>Scale</th>
<th>% of variance explained</th>
<th>% of variance explained</th>
<th>% of variance explained</th>
<th>% of variance explained</th>
</tr>
</thead>
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<tr>
<td><strong>Factor Loadings</strong></td>
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<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Scale</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BRIEF Inhibit</strong></td>
<td>.641</td>
<td></td>
<td>.520</td>
<td></td>
</tr>
<tr>
<td><strong>BRIEF Shift</strong></td>
<td>.535</td>
<td>.445</td>
<td>.753</td>
<td></td>
</tr>
<tr>
<td><strong>BRIEF Emotional Control</strong></td>
<td>.737</td>
<td>.416</td>
<td>.664</td>
<td></td>
</tr>
<tr>
<td><strong>BRIEF Initiate</strong></td>
<td>.744</td>
<td>.489</td>
<td>.799</td>
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</tr>
<tr>
<td><strong>BRIEF Working Memory</strong></td>
<td></td>
<td></td>
<td></td>
<td>.867</td>
</tr>
<tr>
<td><strong>BRIEF Plan/Organize</strong></td>
<td></td>
<td></td>
<td>.611</td>
<td></td>
</tr>
<tr>
<td><strong>BRIEF Organization of</strong></td>
<td></td>
<td></td>
<td></td>
<td>.758</td>
</tr>
<tr>
<td><strong>Materials</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BRIEF Monitor</strong></td>
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<td></td>
<td>.984</td>
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<td>.584</td>
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<td>.749</td>
<td>.693</td>
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<tr>
<td>Problems/Inattention</td>
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<td><strong>CPRS-R:L Perfectionism</strong></td>
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<td>.572</td>
<td>.453</td>
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<tr>
<td><strong>CPRS-R:L Social Problems</strong></td>
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<td>.422</td>
<td>.572</td>
<td>.453</td>
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<tr>
<td><strong>CPRS-R:L Psychosomatic</strong></td>
<td>.409</td>
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</tbody>
</table>

*Note: Only factor loadings greater than .40 are retained on a factor.*

The findings from this factor analysis (see Table 15) related to teacher-reported measures were contrary to the findings of Gioia and colleagues (2000, p. 65). The results from the current study showed that the BRIEF scales related to inhibit and emotional control load together strongly with the CPRS-R:L oppositionality scale. These findings show that teacher-reported oppositionality and emotional control also load together more strongly with the
CTRS-R:L scales, tapping into internalizing symptoms (e.g., anxious-shy, perfectionism, social problems). These findings suggest that teachers likely consider emotional control difficulties and oppositional behaviours to overlap and that anxious behaviour patterns may also overlap with behaviours related to oppositionality and emotional control difficulties.

Table 15

Factor Loadings for Structure Matrix-Maximum Likelihood Factor Analysis of Parent BRIEF and CPRS-R:L with Direct Oblim Rotation of the Teacher-reported BRIEF and the CTRS-R:L

<table>
<thead>
<tr>
<th>Scale</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
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<td>% of variance explained</td>
<td>% of variance explained</td>
<td>% of variance explained</td>
<td>% of variance explained</td>
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<td>Shift</td>
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<tr>
<td>Emotional Control</td>
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<td></td>
<td></td>
<td></td>
<td>.426</td>
</tr>
</tbody>
</table>

*Note: Only factor loadings greater than .40 are retained on a factor.*
Normalcy of distribution and outliers.

Establishing whether each of the study’s key variables is normally distributed was necessary due to the fact that the study’s sampling procedures and inclusion criteria likely contributed to non-normal distributions. For example, using a secondary data set that sampled exclusively from a clinical population likely created a pool of children with extreme scores on ADHD and ADHD/ODD symptomatology. Furthermore, the study’s inclusion criteria further heightened the possibility of a skewed sample by including only those children prototypical of extreme behavioural, cognitive, emotional and social problems. Due to anticipated extreme scores, box plots were produced (not reported in the current study) for the variables used in the main analyses to determine the presence of outliers. No outliers were found to exist.

As a first step to determining normalcy of distribution, histograms were produced (not shown in the current study) for each predictor variable included in the main analyses (i.e., parent BRIEF BRI, MI; teacher BRIEF BRI, MI; CPRS-R:L oppositionality; and CTRS-R:L oppositionality, PSI Life Stress Index and criterion variables (i.e., PSI Child Domain and Parent Domain). Histograms revealed that each of the aforementioned variables had unimodal distributions somewhat approximating normal distributions. As a second step, the Shapiro-Wilks test was used as a more precise means of determining normalcy of distribution. Findings from this test confirmed that the key variables included in the current study deviate from a normal distribution (i.e., W scores ranged from $p < .036$ to $p < .0001$). P-P Plots were conducted on each variable, confirming that they are not normally distributed.

Tests for skewness revealed that the majority of the measures were positively skewed, with the exception of the parent BRIEF MI, which had a negative skew to its distribution. Skewness statistics ranged from -.497 to .682; within the acceptable limits for psychometric
purposes (-1 to +1) (Garson, 2010). The exception was the Life Stress Index of the PSI, which had a positive skewness statistic of 1.21. Kurtosis statistics revealed a mix of platykurtic distributions (parent BRIEF BRI, CPRS-R:L oppositionality, CTRS-R:L oppositionality and PSI Child Domain) and leptokurtic distributions (parent BRIEF MI, teacher BRIEF BRI and MI, and PSI Parent Domain).

Kurtosis statistics for the majority of variables were also within accepted limits for psychometric purposes (-1 to +1), ranging from -.698 to .559. The distribution for the PSI Life Stress Index was more highly leptokurtic with a Kurtosis statistic of 1.66. Therefore, with the exception of the PSI Life Stress Index, the key variables were shown to be only modestly skewed from a normal distribution. Minor deviations from a normal distribution, such as those discovered within the current sample, should not pose a problem to the current study’s analyses. This is because these deviations are modest and the relatively large sample size upholds the central limit theorem. This theorem stipulates that the coefficients produced through the analyses will still be normally distributed because the sample is sufficiently large (Witte & Witte, 2004).

*Linearity.*

There was a need to determine if linear relationships existed among the variables because the normality assumption was not fully established in the previous section (Green & Salkind, 2005). Linear relationships between the study’s predictor and criterion variables were determined in part through the use of scatterplots. Visual inspection of the scatterplots revealed that the PSI Child Domain had a clear linear relationship with the parent BRIEF BRI and MI, as well as with the oppositionality scale of the CPRS-R:L. The scatterplots for these relationships depicted a clear clustering-together of the cases in a loose but linear form.
moving from the lower left-hand corner of the plot to the upper right corner, consistent with a linear relationship. Scatterplots showed a less clear linear relationship existing between these parent-reported predictor variables and the Parent Domain of the *PSI*. Findings from the scatterplots revealed that a non-linear relationship existed between the Parent Domain of the *PSI* and teacher *BRIEF* MI and BRI, as well as with the oppositionality scale of the *CTRS-R:L*. The scatterplots depicted randomness to the plotted cases, resembling a cloud with little to no linear orientation.

ANOVA tests of linearity were also used as follow-ups to the scatterplots in order to determine the statistical significance of the linear relationship between the criterion and predictor variables. Findings from this procedure are presented in Table 16. The lack of a linear relationship between the *PSI* Child Domain and the teacher *BRIEF* BRI, as well as between the *PSI* Parent Domain and teacher *BRIEF* MI and BRI, suggests that it is unlikely these variables are significantly related, which is consistent with this dissertation’s hypotheses.
Table 16

*Linearity Status for Predictor and Criterion Variables Using ANOVA Procedures*

<table>
<thead>
<tr>
<th>Predictor Variable</th>
<th>Criterion Variable</th>
<th>$F$ (Linearity)</th>
<th>Linearity Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSI Child Domain</td>
<td>Parent $BRIEF$ BRI</td>
<td>223.84*</td>
<td>Linear</td>
</tr>
<tr>
<td></td>
<td>Parent $BRIEF$ MI</td>
<td>45.44*</td>
<td>Linear</td>
</tr>
<tr>
<td></td>
<td>Teacher $BRIEF$ BRI</td>
<td>5.35*</td>
<td>Linear</td>
</tr>
<tr>
<td></td>
<td>Teacher $BRIEF$ MI</td>
<td>.508</td>
<td>Non-linear</td>
</tr>
<tr>
<td></td>
<td>$CPRS-R:L$ Oppositionality</td>
<td>279.56*</td>
<td>Linear</td>
</tr>
<tr>
<td></td>
<td>$CTRS-R:L$ Oppositionality</td>
<td>12.03*</td>
<td>Linear</td>
</tr>
<tr>
<td>PSI Parent Domain</td>
<td>Parent $BRIEF$ BRI</td>
<td>36.12*</td>
<td>Linear</td>
</tr>
<tr>
<td></td>
<td>Parent $BRIEF$ MI</td>
<td>8.43*</td>
<td>Linear</td>
</tr>
<tr>
<td></td>
<td>Teacher $BRIEF$ BRI</td>
<td>1.15</td>
<td>Non-linear</td>
</tr>
<tr>
<td></td>
<td>Teacher $BRIEF$ MI</td>
<td>.001</td>
<td>Non-linear</td>
</tr>
<tr>
<td></td>
<td>$CPRS-R:L$ Oppositionality</td>
<td>47.72*</td>
<td>Linear</td>
</tr>
<tr>
<td></td>
<td>$CTRS-R:L$ Oppositionality</td>
<td>2.96</td>
<td>Non-linear</td>
</tr>
</tbody>
</table>

* $p < .05$

*Homoscedasticity.*

Tests of homoscedasticity, including the use of scatterplots, were used to gauge the degree to which the variance of the criterion scores (i.e., Child and Parent Domains of the $PSI$) were the same or different across the various values of the predictor variables (i.e., parent $BRIEF$ MI and BRI, teacher $BRIEF$ MI and BRI) (Licht, 2004). Scatterplots (not included as figures in the current study) were checked to determine the equality of distribution, and findings showed that overall the variables were homoscedastic for the Child Domain of the $PSI$ in relation to the parent $BRIEF$ MI and BRI and $CPRS-R:L$ oppositionality scale. The
distribution was more heteroscedastic for the PSI Child Domain in relation to the CTRS-R:L. The distribution of the Parent Domain of the PSI revealed it to be fairly heteroscedastic in relation to the parent BRIEF MI, the teacher BRIEF MI and BRI, and for the oppositionality scale of the CTRS-R:L. The lack of homoscedasticity for several predictor variables is not a significant concern for the main analysis section as regression analyses are robust in relation to small or moderate violations of homoscedasticity (Licht, 2004).

Summary Regarding the Statistical Assumptions

Findings from the correlation analyses revealed that by and large, the predictor variables were linearly related and intercorrelated. The same was true for the relationship between the majority of predictor variables and criterion variables. An exception was the relationship between teacher-reported items and the Parent Domain of the PSI, which were either weakly related or not at all related. In particular, the teacher-reported scores on the BRIEF MI and BRI were found to have no relationship with any of the subscales associated with the Parent Domain of the PSI.

The correlations also showed that there is little concern for multicollinearity, other than between the parent BRIEF BRI and the CPRS-R:L oppositionality scale. Tolerance estimates and Variance Inflation Estimates (VIF) also confirmed that multicollinearity is unlikely a concern in the current study (Garson, 2010). Results from factor analyses were unable to replicate similar efforts of Gioia and colleagues (2000). These findings indicated that the BRIEF BRI and, in particular, the emotional control scale of the BRIEF were likely tapping a similar construct to the oppositionality scales, as measured by the CPRS-R:L. The statistical overlap between these variables lends support for the hypothesis that the BRIEF BRI and the oppositionality scale of the CPRS-R:L are likely engaged in a mediator
relationship. Findings also revealed that there is moderate concern about multicollinearity or issues of independence (overlapping variance) between the BRIEF and subscales of the PSI, but there is no need to follow the extreme protocol established by Anastopoulos and colleagues (1992) to adjust the PSI by removing subscales.

Generally, the variables included in the study approximated a normal distribution with a few minor deviances. Minor skewness and kurtosis of the variables’ distributions were explained as artefacts of sampling from a clinical setting. The relatively large sample size of the current study, in accordance with the central limit theorem, affords protection to the current study that minor departures from normal distributions will have little impact on the main analyses. There were no outliers found within the sample and there were few concerns with homoscedasticity, with the exception of the heteroscedastic relationship between the Parent Domain of the PSI and teacher-reported predictors.

Overall, the vast majority of the assumptions associated with MLR procedures were met. The few minor deviations from a normal distribution and small violations of homoscedasticity were deemed inconsequential to the robust nature of the linear regression. The key area of concern presenting a potential limiting factor to the current study is the moderate to high intercorrelations of several key variables. This concern is noted within the limitation section. The main analyses follow.
Main Analyses and Findings

Predicting Parenting Stress with Parent/Teacher Reports of Childhood EFDs (Objective 1)

The first objective of this dissertation is to determine whether parent and teacher reports of ‘hot’ or ‘cool’ EFDs are associated with elevated levels of parenting stress for parents of children diagnosed with ADHD. A series of hierarchical linear regression (HLR) were conducted to investigate this objective. Predictor variables included the MI subscale of the BRIEF to measure ‘cool’ EFDs and the BRI subscale of the BRIEF to measure ‘hot’ EFDs. In accordance with the conceptual model for this dissertation (see Figure 1 on page 29), parenting stress is measured via its two component parts: Child Domain stress and Parent Domain stress. The PSI Child Domain and Parent Domain composite scales are alternately used as criterion variables in separate HLR procedures to provide the greatest clarity about their relationship with parent and teacher reported EFDs. Additional HLR procedures were conducted to explore the sub-objective related to determining what, if any, particular EFD subcomponents (e.g., difficulties with WM, planning, inhibit, emotional control) best predict parenting stress.

EFDs Predicting Child Domain Stress.

Parent reported ‘hot’ EFDs, measured by the BRIEF BRI, are hypothesized to be the most significant predictor of child-related parenting stress, as measured by the PSI Child Domain. To a lesser degree, parent reported ‘cool’ EFDs, measured by the BRIEF MI are hypothesized to be a significant predictor of Child Domain stress, followed by teacher-reported ‘hot’ EFDs; and teacher-reported ‘cool’ EFDs. Scores from the Child Domain of the PSI, converted to T scores, represented the criterion variable. T scores for the predictor variables were entered in four separate steps into the HLR to provide a clear picture of the
unique contribution, while controlling for common variance. T scores pertaining to the teacher BRIEF MI scale were entered in the first step. The second step of the HLR was composed of T scores from the BRI scale of the teacher BRIEF. T scores from the MI scale of the parent BRIEF were entered next in the third step. The fourth step of the HLR represented T scores from the BRI scale of the parent BRIEF.

The results of the HLR (see Table 17) indicate that, on their own, scores from the MI scale of the teacher BRIEF were not significantly related to child-related parenting stress. Findings from the second step revealed that scores from the teacher BRIEF BRI were significantly related to parenting stress, accounting for a small but significant amount (3%) of the variance in child-related parenting stress (i.e., PSI Child Domain) within the current sample. When controlling for the influence of the teacher-reported scores on the BRIEF MI and BRI, scores on the parent BRIEF MI were significantly related to levels of parenting stress on the PSI Child Domain.

Parent-reported scores on the BRIEF MI, measuring ‘cool’ EFDs, were found to uniquely account for approximately 17% of the variance in child-related parenting stress within the sample when controlling for scores on the teacher BRIEF MI. The parent BRIEF BRI scale was entered in the fourth and final step of the regression to control for common variance shared with the other predictor variables. The results reveal that, over and above the influence of scores on the teacher BRIEF and the parent BRIEF MI, scores on the parent BRIEF BRI were significantly related to levels of parenting stress on the PSI Child Domain. These findings show that when all other measures of EFD were controlled for, scores on the parent BRIEF BRI uniquely accounted for approximately 29% of the variance of child-related parenting stress experienced within the current sample. Overall, the linear combination of
childhood EFDs measured by the teacher BRIEF BRI, parent BRIEF MI and parent BRIEF BRI account for approximately 50% of the variance in child-related parenting stress experienced within the current sample. Table 17 provides a summary of the results for the HLR examining whether parent/teacher reported EFDs, as measured by the BRIEF MI and BRI subscales predict parenting stress as measured by the PSI Child Domain (age normed).

Table 17

Hierarchical Linear Regression for EFDs Predicting Scores on PSI Child Domain Stress Scale (criterion variable)

<table>
<thead>
<tr>
<th>Variables</th>
<th>β</th>
<th>R²</th>
<th>Adjusted R²</th>
<th>ΔR²</th>
<th>FΔ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 Teacher BRIEF MI</td>
<td>-.045</td>
<td>.002</td>
<td>-.002</td>
<td>.002</td>
<td>F(1, 241) = .488</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(p = .486)</td>
</tr>
<tr>
<td>Step 2 Teacher BRIEF BRI</td>
<td>.189</td>
<td>.033</td>
<td>.025</td>
<td>.030</td>
<td>F(1, 240) = 7.71</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(p = .006)</td>
</tr>
<tr>
<td>Step 3 Parent BRIEF MI</td>
<td>.422</td>
<td>.209</td>
<td>.199</td>
<td>.176</td>
<td>F(1, 239) = 53.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(p &lt; .0001)</td>
</tr>
<tr>
<td>Step 4 Parent BRIEF BRI</td>
<td>.686</td>
<td>.501</td>
<td>.492</td>
<td>.292</td>
<td>F(1, 238) = 139.21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(p &lt; .0001)</td>
</tr>
</tbody>
</table>

EFDs Predicting Parent Domain Stress.

Another HLR was conducted, replacing the PSI Child Domain stress score with the PSI Parent Domain stress score as the criterion variable. The procedures from the first HLR were replicated in order to determine whether parent and teacher reported ‘hot’ and ‘cool’ EFDs predict Parent Domain stress. Parent and/or teacher reported EFDs are hypothesized to have no significant predictive relationship with Parent Domain stress.
The results of this HLR (see Table 18) indicated that EFDs reported by teachers on the
*BRIEF MI* (step 1) and BRI (step 2) were not significantly related to scores on the Parent
Domain of the *PSI*. There was, however, a small but significant relationship between scores
on the parent *BRIEF MI* and Parent Domain stress, accounting for approximately 4% of the
variance in Parent Domain parenting stress (i.e., *PSI Parent Domain*) within the current
sample. When scores on the parent *BRIEF MI* were controlled for, parent-reported scores on
the *BRIEF BRI* were significantly related to scores on the *PSI Parent Domain*, uniquely
accounting for approximately 9.5% of the variance in parenting stress levels on the *PSI Parent
Domain* in the current sample. Table 18 provides a summary of the results for the HLR
examining whether parent/teacher reported EFDs, as measured by the *BRIEF MI* and BRI
subscales predict parenting stress as measured by the *PSI Parent Domain* (age normed).

Table 18

*Hierarchical Linear Regression for EFDs Predicting Scores on PSI Parent Domain Stress
Scale (criterion variable)*

<table>
<thead>
<tr>
<th>Variables</th>
<th>β</th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>$\Delta R^2$</th>
<th>$F_{\Delta}$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher <em>BRIEF MI</em></td>
<td>.002</td>
<td>.000</td>
<td>-.004</td>
<td>.000</td>
<td>$F(1, 241) = .001$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$(p = .970)$</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher <em>BRIEF BRI</em></td>
<td>.081</td>
<td>.006</td>
<td>-.003</td>
<td>.006</td>
<td>$F(1, 240) = 1.36$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$(p = .507)$</td>
</tr>
<tr>
<td><strong>Step 3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent <em>BRIEF MI</em></td>
<td>.194</td>
<td>.043</td>
<td>.031</td>
<td>.037</td>
<td>$F(1, 239) = 9.24$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$(p = .003)$</td>
</tr>
<tr>
<td><strong>Step 4</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent <em>BRIEF BRI</em></td>
<td>.391</td>
<td>.138</td>
<td>.123</td>
<td>.095</td>
<td>$F(4, 238) = 26.20$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$(p &lt; .0001)$</td>
</tr>
</tbody>
</table>
What Specific EFD Subcomponents Best Predict Parenting Stress (Sub-objective 1)

The results from the first HLR reveal the importance of scores on the teacher BRIEF BRI and parent BRIEF MI and BRI in predicting levels of parenting stress on the PSI Child Domain. However, this analysis did not identify which particular BRIEF subscales, or which EFDs subcomponents (e.g., emotional control, WM, plan/organize) act as significant predictors of parenting stress. To determine which subscales of the BRIEF act as significant predictors of Child domain parenting stress and Parent Domain parenting stress, HLR procedures were again used to determine the presence of significant prediction while controlling for the common variance among these intercorrelated measures of EFD.

Specific EFD Subcomponents Predicting Child Domain Stress.

The first step of the HLR comprised subscales corresponding to the teacher BRIEF BRI (i.e., inhibit, shift and emotional control), the second step included subscales associated with the parent BRIEF MI (i.e., initiate, WM, plan/organize, organization of materials and monitor), and the third step included subscales linked with the parent BRIEF BRI (i.e., inhibit, emotional control and shift). There was no fourth step because the teacher BRIEF MI did not significantly predict Child Domain parenting stress (see Table 16). Findings from the HLR revealed that when controlling for common variance, only a few of the subscales across the three steps were significantly related to Child Domain parenting stress. After systematically removing non-significant subscales, the subscales that remained in the HLR included teacher-reported emotional control (beta = .208) in the first step, parent-reported initiate

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48 Non-significant subscales were removed one at a time, beginning with the least significant until only significant predictors remained in each step/block.
and monitor (beta=.294) in the second step, and parent-reported inhibit (beta=.219), shift (beta=.245) and emotional control (beta=.313) in the third step.

The HLR was re-run (see Table 19) as a three step model with these statistically significant subscales. Findings from the first step of the HLR show that teacher-reported EFDs with emotional control were significantly related to Child Domain parenting stress. This result indicated that teacher-reported difficulties with emotional control account for approximately 3% of the variance of the child-related parenting stress in the sample. These results should be interpreted with caution because this modest relationship also includes error variance.

Findings from the second step of the HLR revealed that, over and above the influence of teacher-reported EFDs with emotional control, the linear combination of parent-reported EFDs with initiate and monitor were significantly related to Child Domain parenting stress. Approximately 22% of the variance in child-related parenting stress (i.e., PSI Child Domain) in the sample can be uniquely accounted for by the linear combination of parent-reported difficulties with initiate and monitoring. The third step of the HLR controlled for the influence and common variance associated with teacher-reported difficulties with emotional control and parent-reported EFDs with initiate and monitor. The results show that when controlling for these influences, the linear combination of parent-reported EFDs with inhibit, shift and emotional control were significantly related to Child Domain parenting stress. Together, scores on these subscales of the BRIEF BRI uniquely account for approximately 25% of the variance in child-related parenting stress in the current sample.

Consistent with the findings pertaining to the first objective of this study, the overall linear combination of teacher-reported EFDs with emotional control, parent-reported EFDs
with initiate and monitor and parent-reported EFDs with inhibit, shift and emotional control
account for 51% of variance in Child Domain parenting stress levels within the current
sample. Overall, these findings indicate that teacher-reported EFDs with emotional control
and parent-reported EFDs with initiate, monitor, inhibit, shift and emotional control are the
key predictors of Child Domain parenting stress accounting for approximately 50% of the
variance parenting stress within the current sample. Table 19 provides a summary of the
results for the re-run HLR examining the specific EFD subcomponents measured by
parent/teacher _BRIEF_ predict parenting stress, as measured by the _PSI_ Child Domain (age
normed).

Table 19

_Hierarchical Linear Regression for EFDs Subcomponents Predicting Scores on PSI Child
Domain Stress Scale (criterion variable)_

<table>
<thead>
<tr>
<th>Variables</th>
<th>( \beta )</th>
<th>( R^2 )</th>
<th>Adjusted ( R^2 )</th>
<th>( \Delta R^2 )</th>
<th>( F_{\Delta} )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong> Teacher BRIEF:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>emotional control</td>
<td>.194</td>
<td>.037</td>
<td>.033</td>
<td>.037</td>
<td>( F(1, 241) = 9.39 )</td>
</tr>
<tr>
<td><strong>Step 2</strong> Parent BRIEF:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>initiate</td>
<td>.287</td>
<td>.256</td>
<td>.246</td>
<td>.218</td>
<td>( F(2, 239) = 35.01 )</td>
</tr>
<tr>
<td>monitor</td>
<td>.243</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 3</strong> Parent BRIEF:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inhibit</td>
<td>.232</td>
<td>.508</td>
<td>.496</td>
<td>.253</td>
<td>( F(3, 236) = 40.41 )</td>
</tr>
<tr>
<td>shift</td>
<td>.225</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>emotional control</td>
<td>.326</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Specific EFD Subcomponents Predicting Parent Domain Stress.

Contrary to the hypothesis, EFDs measured by the parent BRIEF MI and BRI were significantly related to scores on the PSI Parent Domain. Further analyses were required to determine which particular subscales of the BRIEF, or which particular EFDs (e.g., emotional control, WM, plan/organize) acted as significant predictors of scores on the PSI Parent Domain. To examine the predictive ability of the individual subscales of the BRIEF, HLR procedures were employed to determine the presence of significant prediction while controlling for the common variance among these intercorrelated measures of EFD.

The first step of the HLR was comprised of subscales corresponding to the parent BRIEF MI (i.e., initiate, WM, plan/organize, organization of materials and monitor), and the second step included subscales comprised by the parent BRIEF BRI (i.e., inhibit, emotional control and shift). Scores pertaining to the teacher BRIEF MI and BRI were not included as these subscales were shown to have no significant relationship to scores on the PSI Parent Domain (see Table 18). The results from the HLR indicated that by controlling for common variance only a few subscales across the two steps significantly predicted parenting stress. After systematically removing the non-significant subscales, the remaining parent-reported EFDs with initiate (beta = .235) were entered in the first step, followed by parent-reported EFDs with inhibit (beta = .162) and shift (beta = .237) in the second step.

The HLR was re-run as a two step model with the three significant predictors. Parent-reported difficulties with initiate were entered into the first step, followed by parent reported inhibit and shift which were entered into the second step of the HLR. The results of the HLR (see Table 20) reveal that parent-reported EFDs with initiate were significantly related to

---

49 Non-significant subscales were removed one at a time, beginning with the least significant until only significant predictors remained in each step/block.
scores on the PSI Parent Domain accounting for 5.5% of the variance in parent-related parenting stress within the sample. The results from the second step showed that the linear combination of EFDs with inhibit and shift, over and above the influence of EFDs with initiate, were significantly related to scores on the PSI Parent Domain. The linear combination of parent-reported difficulties with inhibit and shift uniquely account for 8.5% of the variance in the scores on the PSI Parent Domain within the current sample. Table 20 provides a summary of the results for the re-run HLR examining the specific EFD subcomponents measured by parent/teacher BRIEF predict parenting stress, as measured by the PSI Parent Domain (age normed).

Table 20

*Hierarchical Linear Regression for EFDs Subcomponents Predicting Scores on PSI Parent Domain Stress Scale* (criterion variable)

<table>
<thead>
<tr>
<th>Variables</th>
<th>β</th>
<th>( R^2 )</th>
<th>Adjusted ( R^2 )</th>
<th>ΔR²</th>
<th>( F )Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong> Parent BRIEF:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>initiate</td>
<td>.075</td>
<td>.055</td>
<td>.051</td>
<td>.055</td>
<td>F(1, 241) = 14.14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>( p &lt; .0001 )</td>
</tr>
<tr>
<td><strong>Step 2</strong> Parent BRIEF:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inhibit</td>
<td>.069</td>
<td>.140</td>
<td>.130</td>
<td>.085</td>
<td>F(2, 239) = 11.81</td>
</tr>
<tr>
<td>shift</td>
<td>.075</td>
<td></td>
<td></td>
<td></td>
<td>( p &lt; .0001 )</td>
</tr>
</tbody>
</table>

*Does Childhood ODD Mediate ‘Hot’ EFDs and Child Domain Stress (Objective 2)*

The second objective of this dissertation is to determine whether reports of childhood oppositionality/defiance mediate the relationship between parent-reported EFDs and levels of child related parenting stress. To achieve this second objective, simple path analysis employing a series of multiple linear regression (MLR) procedures was used to statistically
verify the presence of a mediator relationship between EFDs, oppositionality and child-related parenting stress. Parent-reported oppositionality scores on the CPRS-R:L were hypothesized to mediate the relationship between ‘hot’ EFDs measured by the parent BRIEF BRI and child-related parenting stress, as measured by the PSI Child Domain.

Essential to establishing the presence of this mediation relationship is the notion that difficulties with ‘hot’ EFDs underpin the occurrence of oppositional defiant behaviours (Baron & Kenny, 1986). Theory pertaining to ADHD suggests that ‘hot’ EFDs, including difficulties with emotional control/regulation, likely underpin the behavioural symptomatology displayed by this population (Barkley, 2006). Research has established a somewhat tenuous link between oppositionality/defiance and the general construct of EFDs within ADHD populations, with some studies affirming a relationship (Aronowitz et al., 1994; Hurt & Naglieri, 1992; Pennington & Ozonoff, 1996; Séguin et al., 1999) and perhaps a greater number disavowing any signification relationship (Barnett et al., 2009; Bedard et al., 2003; Brocki et al., 2007; Clark et al., 2000; Geurts et al., 2004; Klorman et al., 1999; Loo et al., 2007; Oosterlaan et al., 1998; Sarkis et al., 2005; Schacher et al., 2000; Scheres et al., 2001; Thorell & Wahlstedt, 2006; Wahlstedt, 2009; Wahlstedt et al., 2008; Wodka et al., 2007). However, research specifically investigating the subcomponent of emotional control/regulation, has shown a strong relationship between EFDs in this area and oppositional/defiance (Maedgen & Carlson, 2000; Martel, 2009; Melnick & Hinshaw, 2000; Morrell & Murray, 2003; Wahlstedt et al., 2008; Walcott & Landau, 2004). Research harnessing the BRIEF has established a strong union between these constructs for childhood ADHD population (Gioia, Isquith, Retzlaff et al., 2002; Jarrat et al., 2005; McCandles & O’Laughlin, 2007).
Results from preliminary analyses revealed that ‘hot’ EFDs, as measured by the parent BRIEF BRI (e.g., inhibit, shift and emotional control) are strongly related to oppositionality levels as measured by the CPRS-R:L oppositionality subscale (see Table 13). Using principle factor analysis with oblique rotation, the current study finds that contrary to Gioia and colleagues’ (2000, p. 63) results, parent-rated scores of opposition tended to load together with ‘hot’ EFDs. Oppositionality, emotional control and inhibition scores are the key variables which load together into the single construct (see Table 14). Similar results were found when examining the teacher-rated scores of opposition and ‘hot’ EFDs, such as emotional control (see Table 15). Consistent with theory and research, this finding suggests that the oppositionality subscale of the CPRS-R:L/CTRS-R:L, as well as the BRIEF’s BRI subscale, and in particular, the emotional control subscale, are tapping a closely-related construct. These results, in conjunction with the findings from the research literature, provide confidence that the proposed mediation model is theoretically sound and that the results of the mediation model are meaningful.

According to Baron and Kenny (1986), several additional conditions must be met to establish the existence of a mediator relationship. One precondition is that the independent/predictor variable, in this case the BRIEF BRI, and the mediator variable, in this case the oppositionality scale of the CPRS-R:L, need to be correlated. Results from the bi-variate correlation analysis (see Table 12) indicate that this pre-condition is met, with these two variables being highly correlated ($r = .741, p < .01$). The first condition for mediation requires that the independent/predictor variable significantly affect the mediator variable (i.e., $R^2 \geq .01$) after the mediator is regressed onto the independent/predictor variable (Baron & Kenny, 1986). The results of the first MLR confirm that the first condition for mediation is
established with scores on the parent *BRIEF* BRI predicting scores on the oppositionality scale of the *CPRS-R:L* (see Table 21 step 1).

The second condition to establish mediation requires the independent/predictor variable to affect the dependent variable after the dependent variable is regressed onto the independent variable (Baron & Kenny, 1986). Results from the MLR confirm that this second condition had been met with scores on the parent *BRIEF* BRI predicting scores on the Child Domain of the *PSI* (see Table 21 step 2 and Figure 4 part a).

The third condition to establish the existence of a mediator relationship requires the mediator to affect the dependent variable after the dependent variable has been regressed on both the independent and mediator variables (Baron & Kenny, 1986). Results show this condition was met as the linear combination of the parent *BRIEF* BRI and the oppositionality scale of the *CPRS-R:L* predicted scores on the *PSI* Child Domain (see Table 21 step 3).

A final step to establish the existence of a mediation relationship requires that the effect of the independent variable on the dependent must be less, in the third condition, than its influence in the second condition. This condition is satisfied by the results showing that the parent *BRIEF* BRI (beta = .400) had substantially less influence on the *PSI* Child Domain with the addition of the oppositionality scale of the *CPRS-R:L* as the mediating variable, compared to the direct influence of the *BRIEF* BRI (beta = .705) on the Child Domain of the *PSI*. Figure 4 presents the mediator model for the relationship between parent-reported oppositionality/defiance, ‘hot’ EFDs, and parenting stress (see Figure 4 part a and part b).
Goodness-of-fit indicators for the mediator model (Figure 4 part b) can not be directly produced by SPSS 17. However, root mean square error (RMSE) values were calculated\textsuperscript{50} for each of the three steps of the mediator model calculation (see Table 21). In addition to RMSE values, coefficients of multiple determination ($R^2$ and adjusted $R^2$) provide insight into whether the amount of variance explained by the model depicted in Figure 4a (i.e., parent-reported \textit{BRIEF} BRI regressed upon Child Domain scores of the \textit{PSI}) is improved by the addition of the parent-reported ODD variable as a mediator, as depicted in Figure 4b. The drop in the RMSE value in Table 21 from stage two to stage three suggests that the addition of the mediator variable (parent-reported ODD) improves the goodness-of-fit of the model. The change in adjusted $R^2$ values between stage two and three also provides for the conclusion that the model is improved with the addition of the mediator variable (Figure 4b). Specifically, the addition of the mediator variable resulted in a larger adjusted $R^2$ value (see Table 21), which accounted for an additional 7.5% of the variance in Child Domain parenting stress within the current sample, thus suggesting an improved fit for the model. However, such a conclusion should be made with caution as it is possible that the high correlation (see Table 12) between parent-reported ODD and parent-reported \textit{BRIEF} BRI scores could contribute to a multicollinearity effect that may also explain increases in adjusted $R^2$ values.

Partial correlations were used as follow-up procedures to the mediator model to determine which of the parent-reported \textit{BRIEF} BRI subscales (e.g., inhibit, shift, emotional control) was most strongly related to oppositionality scores on the \textit{CPRS-R:L}. Partial correlation analyses indicate that after parcelling out the influence of emotional control and inhibit, oppositionality and shift has a very weak relationship ($r = .098$). A significant \textsuperscript{50} RMSE values were calculated by taking the square root of the residual sum of squares divided by n-2 where smaller values represent a better goodness-of-fit.
correlation was found to exist between oppositionality and inhibit \((r = .322)\), after controlling for the influence of emotional control and shift. The relationship between oppositionality and parent-reported EFDs with emotional control was the largest \((r = .467)\) when the influence of inhibit and shift were partialled-out. These findings suggest that all subscales associated with the parent-reported BRIEF BRI underpin the mediating relationship between ‘hot’ EFDs and parenting stress, but emotional control likely contributes the most to this relationship.

Table 21

*Hierarchical Linear Regression for Determining a Mediation Relationship for Parent Reported BRIEF BRI, CPRS-R: L, and the PSI Child Domain Parenting Domain Scale*

<table>
<thead>
<tr>
<th>Criterion Variable</th>
<th>Predictor Variable</th>
<th>(\beta)</th>
<th>(R^2)</th>
<th>Adjusted (R^2)</th>
<th>(F)</th>
<th>RMSE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1 CPRS-R: L</strong></td>
<td>Parent BRIEF BRI</td>
<td>.741</td>
<td>.549</td>
<td>.547</td>
<td>293.47*</td>
<td>9.39</td>
</tr>
<tr>
<td><strong>Step 2 PSI Child Domain</strong></td>
<td>Parent BRIEF BRI</td>
<td>.705</td>
<td>.496</td>
<td>.494</td>
<td>237.61*</td>
<td>8.44</td>
</tr>
<tr>
<td><strong>Step 3 PSI Child Domain</strong></td>
<td>Parent BRIEF BRI</td>
<td>.400</td>
<td>.572</td>
<td>.569</td>
<td>160.69*</td>
<td>7.77</td>
</tr>
<tr>
<td></td>
<td>CPRS-R: L Oppositionality</td>
<td>.411</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*\(p < .0001\)
a) Direct Pathway between the Parent-Reported BRIEF BRI Scale and the PSI Child Domain Scale

b) Mediated Pathway Including the Addition of CPRS-R:L Oppositionality Scale

Figure 4. Mediation model for CPRS-R:L oppositionality mediating the relationship between parent-reported BRIEF BRI and the Child Domain of the PSI. The mediation model is based on the mediation model proposed by Baron & Kenny (1986).
Potential Moderators of EFDs and Parenting Stress (Objective 3)

The third objective of the current study is to determine whether factors such as child age, child gender, child ADHD diagnostic category, or life stress (as measured by the Life Stress index of the PSI) moderate the relationship between parent-reported and/or teacher-reported EFDs and levels of Child Domain parenting stress. A series of simple path analyses using HLR, were used to investigate potential moderating forces acting on the relationship between EFDs and Child Domain parenting stress.

Child Age as a Potential Moderator.

A simple path analysis, using HLR was used to investigate whether the age of the child moderates the relationship between childhood EFDs and parenting stress. According to Baron and Kenny (1986), a moderator relationship can be established through the use of simple path analysis, given that the interaction of a predictor and moderator variable are found to be significant, when controlling for the predictor and moderator variables in a HLR. These authors also state that it is “desirable that the moderator variable be uncorrelated with both the predictor and the criterion variable” (Baron & Kenny, 1986, p. 1174). Determining the relationship among these variables is important because a true moderator relationship is one where the moderator variable acts only on the relationship between the predictor and criterion variables and not directly on either of the predictor or criterion. Figure 5 depicts a sample of the moderator models employed to investigate the third objective of this dissertation.
The parent *BRIEF* Global Executive Composite (GEC) was selected as the predictor variable due to its capacity to provide an overall indication of EFDs. The Child Domain of the *PSI* was selected as the criterion variable because it is believed to offer the clearest picture of the stress associated with child characteristics. Due to the ongoing development of the EFs throughout childhood and into adolescence (Anderson, Anderson, & Lajoie, 1996; Anderson et al., 2000; Becker, Isaac, & Hynd, 1987; Brocki & Bohlin, 2006; Espy, 1997; Huizinga, Dolan, & van der Molen, 2006; Passler, Isaac, & Hynd, 1985; Romine & Reynolds, 2005; Tsujimoto, Kuwajima, & Sawaguchi, 2007), and due to the assertion that parenting stress accumulates over time (Abidin, 1995; Crnic et al., 2005; Crnic & Greenberg, 1990), it is hypothesized that age moderates EFDs and parenting stress.

As a precondition of testing the presence of a moderating relationship, bi-variate correlations were conducted to determine the correlations between the predictor variable,
parent BRIEF GEC, the moderator variable, child age, and the criterion variable, Child Domain of the PSI. Table 22 shows that age was uncorrelated with either the predictor or criterion variable.

Table 22

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Parent BRIEF GEC</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. PSI Child Domain</td>
<td>.618*</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3. Child Age</td>
<td>.114</td>
<td>-.046</td>
<td>1</td>
</tr>
</tbody>
</table>

*\(p<.01\)

A HLR model with three steps was used to determine whether child’s age moderated the relationship between EFDs and parenting stress. Scores on the parent BRIEF GEC were entered in the first step, child age was entered into the second step, and an interaction term, age X parent BRIEF GEC, was entered into the third step of the HLR. Results from the HLR indicate that the regression coefficient for age X parent BRIEF GEC was not significant, nor was age X BRIEF GEC significantly related to parenting stress when controlling for age and parent-reported scores on the BRIEF GEC, \(F(1,239) = .107, p = .301\). These findings indicate that the Child Domain stress levels of parents associated with EFDs do not differ significantly as a factor of the child’s age. However, due to this study’s cross-sectional nature which captures only a single point in time in each child’s life, it can only make inferences about the role child age/aging plays on parenting stress. A cohort study/longitudinal design would be required to effectively study the influence of age/aging on the relationship between EFDs and
parenting stress. The inability to address change over time is a shortcoming of the cross-sectional method, which will be further addressed in the limitations section.

**Child Gender as a Potential Moderator.**

A simple path analysis was conducted to determine whether child gender moderated the relationship between Child Domain parenting stress and EFDs. This model was developed in a manner similar to the previous example exploring child age as a potential moderator. Bivariate correlations could not be conducted between the variables in this moderator model due to the dichotomous nature of the gender variable. Scores from the parent BRIEF GEC were entered as the independent/predictor variable in the first step of the HLR. The second step of the HLR included the moderator variable gender, which was dichotomized into male and non-male (female) conditions. An interaction term was created for male X BRIEF GEC, and entered into the third step of the HLR. Research with ADHD populations suggests that EFDs may interact with child gender (Gioia et al., 2000) and levels of parenting stress may, or may not, be moderated by gender (Bussing, Zima et al., 2003; Breen & Barkley, 1998; Harrison & Sofronoff, 2002; Johnson & Reader, 2002; Podolski & Nigg, 2001). In the current study, gender is hypothesized to have no interaction with EFDs and not to function as moderator for EFDs and parenting stress. The results of the HLR show that the regression coefficient for gender X BRIEF GEC is not statistically significant, nor is the interaction term significant when controlling for gender and scores on the parent BRIEF GEC [\(F(1, 239) = 0, p = .991\)]. These findings indicate that the Child Domain stress levels of parents associated with EFDs do not differ significantly as a factor of the child’s gender.
Stressful Life Events as Potential Moderators.

A simple path analysis was also conducted using HLR to determine whether Life Stress, as measured by the Life Stress Index of the PSI, moderated the relationship between EFDs and Child Domain parenting stress. Bi-variate correlations between the potential moderator, predictor and criterion variables revealed a weak correlation between the moderator variable and both the predictor and criterion (see Table 23). Interpreting the results of the path analysis may be more difficult due to this correlation (Baron & Kenny, 1986), because the moderator acts directly on the predictor and criterion, rather than influencing how these variables interact. Consistent with Abidin’s (1995) assertion that factors measured by the PSI Life Stress Index can serve as potential moderating forces, it is hypothesized that parents who report experiencing more stressful life events (on the PSI Life Stress Index) will be more stressed by children’s EFDs compared to parents who experience fewer stressful life events.

Scores from the parent BRIEF GEC were entered as the independent/predictor variables in the first step of the HLR. Rather than enter the PSI Life Stress Index as a continuous moderator variable, the moderator term was dichotomized into high and low stress groups. This action was in keeping with the belief that any moderating role played by Life Stress would likely take the form of a step-function with a distinct high and low grouping, as opposed to a linear function where changing levels of Life Stress would steadily influence the relationship between EFDs and parenting stress. The way in which the PSI measures life stress was more consistent with a high/low grouping, as families either experienced death or divorce and the subsequent stress, or they did not. Consistent with the suggestion by Baron and Kenny (1986), the moderator was dichotomized at the point where the step was likely to
occur, which in this case would be at a T score of 60, the threshold Abidin (1995) identified as demarcating high and low stress scores.

Scores on the parent BRIEF GEC were entered into the first step of the HLR, followed by scores on the dichotomized Life Stress Index in the second step, and the interaction term dichotomized Life Stress X parent BRIEF GEC in the third step. The results of the HLR reveal that the regression correlation for the interaction term Life Stress X BRIEF GEC was not significantly related to Child Domain parenting stress when the independent and moderator variables were controlled for \( F(1, 239)=1.09, p = .297 \). These findings indicated that the relationship between EFDs and Child Domain parenting stress do not differ significantly between parents who experienced “high” and “low” Life Stress conditions. Therefore, scores on the Life Stress Index of the PSI do not moderate the relationship between EFDs and Child Domain parenting stress.

Table 23

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Parent BRIEF GEC</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. PSI Child Domain</td>
<td>.618*</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3. Life Stress Index</td>
<td>.173*</td>
<td>.220*</td>
<td>1</td>
</tr>
</tbody>
</table>

\*p<.01

Follow-up HLR models were also conducted to determine whether moderator status was achieved by any particular stress factor (e.g., divorce, separation, household move, school move, trouble with teacher, death of a family member, family debt) measured by the Life Stress Index of the PSI. Results from HLR suggest that the relationship between parent-reported EFDs (i.e., scores on the BRIEF GEC) and levels of Child Domain parenting stress
do not differ significantly for any of the stress factors measured by the Life Stress Index, with one exception: whether or not a child has entered a new school appears to influence how parents experience the child’s EFDs. Results showed that the interaction term created for child EFDs X dichotomous new school status was significantly associated with parenting stress when controlling for EFDs and moving [$R^2=.394$, adjusted $R^2 = .386$, $F(1, 236) = 4.10, p = .044$].

**ADHD Diagnostic Subtypes as Potential Moderators.**

To determine whether parenting stress levels differ significantly across the three ADHD diagnostic groups included in the current study (i.e., ADHD-I, ADHD-C and ADHD/ODD), a series of multiple linear regressions (MLR) was conducted. Rather than conduct regression equations for each of the three ADHD diagnostic groups, and risk losing statistical power (Garson, 2010), dummy variables were created for the ADHD diagnostic groups and regression coefficients were compared across the ADHD diagnostic groups for the entire sample ($n=243$). It was hypothesized that the regression coefficients would not differ significantly across the three levels of the ADHD diagnostic grouping, indicating that levels of parenting stress occur in a manner relative to the severity of the child’s behavioural disruption, rather than stress being present only in relation to ADHD/ODD symptoms and absent in relation to ADHD-I or ADHD-C. The IMS and parenting stress theory predict that Child domain parenting stress levels will occur as a factor of the demands placed on the parent and the perceived ability to cope.

ADHD subtypes are not considered a true moderating relationship, according to Baron and Kenny (1986), because the subtypes are strongly associated with both parenting stress and EFDs. Nonetheless, it is helpful to examine these subgroups in relation to parenting stress and
EFDs in order to identify any possible patterns of risk that could influence outcomes (Hinshaw, 2007). For example, it is helpful from an assessment and treatment perspective to identify whether children with ADHD/ODD and their parents are at particular risk for Child Domain parenting stress due to experiencing specific patterns of EFDs. It is equally helpful to determine if the risk for parenting stress is simply incremental, rising in relation to the increasing severity of EFDs. Research conducted by Johnston (1996) found that levels of parenting stress exist on a continuum with low levels associated with ADHD only groups, moderate levels of parenting stress occurring for parents of children with ADHD and mild ODD behaviours, and elevated levels of parenting stress for ADHD groups with high levels of comorbid ODD. Descriptive statistics suggest that this may also be the case in the current dissertation (see Figure 3).

Four separate MLR models were conducted to examine whether regression coefficients differed between the Child Domain of the PSI and each of the parent BRIEF BRI, parent BRIEF MI, teacher BRIEF BRI and teacher BRIEF MI, for the three ADHD diagnostic groups. Results from these four separate MLR models revealed that no significant differences exist for the regression coefficients for ADHD diagnostic groupings in relation to the PSI Child Domain and any of the parent BRIEF BRI \( F(2, 237) = 1.03, p = .359 \), parent BRIEF MI \( F(2, 237) = 1.02, p = .361 \), teacher BRIEF BRI \( F(2, 237) = .185, p = .831 \) and teacher BRIEF MI \( F(2, 237) = .885, p = .414 \). The above procedures were repeated replacing the Child Domain of the PSI with the Parent Domain of the PSI as the criterion variable. Findings from these MLR models produced similar results suggesting that ADHD diagnostic groupings do not differentially influence the relationship between the PSI Parent Domain and any of the parent BRIEF BRI \( F(2, 237) = 1.23, p = .295 \), parent BRIEF MI \( F(2, 237) = 1.14, p = .321 \),
teacher BRIEF BRI \( F(2, 237) = 1.49, p = .226 \) and teacher BRIEF MI \( F(2, 237) = 1.09, p = .337 \). Overall, these findings support the hypothesis that the severity of childrens’ behaviours is directly related to the severity of Child Domain parenting stress. Simply stated, children who are inclined towards more severe behavioural disturbances will have a greater impact on parents’ coping abilities likely contributing to more severe levels of Child Domain parenting stress.
CHAPTER VII – DISCUSSION

The present study demonstrates an association between parent/teacher-reported EFDs, and Child Domain parenting stress for children diagnosed with ADHD and ADHD/ODD. To date, few studies have used parent and teacher versions of the *BRIEF* to study EFDs with a sample of children diagnosed with ADHD (Blake-Greenberg, 2003; Gioia, Isquith, Retzlaff et al., 2002; McCandles & O’Laughlin, 2007; Riccio et al., 2006). Only one study is known to this author that used the *BRIEF* to examine the relationship between EFDs and parenting stress (Joyner et al., 2009). This dissertation extends the work of Joyner and colleagues (2009) and bridges the disparate bodies of research that have established relationships between ADHD and EFDs, and between ADHD and parenting stress.

A review of the descriptive findings related to childhood EFDs are discussed first, followed by a discussion of the descriptive findings pertaining to parenting stress. These findings are organized according to the ADHD diagnostic groups used in the current study. This chapter concludes with an in-depth discussion related to the main objectives of the current dissertation. Due to the lack of direct research examining the relationship between EFDs and parenting stress for children with ADHD, this discussion draws upon, and makes connections to, the research literature that has examined EFDs in relation to ADHD and parenting stress in relation to ADHD.

Discussion of Preliminary and Descriptive Analyses

*Summary of the Descriptive Findings Related to EFDs*

Consistent with the literature (Sergeant et al., 2002; Willcutt, Doyle et al., 2005), the current study revealed that parents and teachers reported children with ADHD to experience severe behavioural manifestations associated with EFDs. Parents and teachers identified the
majority of children within the current study to experience some form of significant EFD. Difficulties with WM, planning, inhibit, shift and emotional control differed in intensity within the sample, depending on the child’s ADHD diagnosis. Parents reported that clinically significant levels of EFDs were experienced by almost half (45%) of the children diagnosed with ADHD-I, 64% of children with ADHD-C and 83% of the children diagnosed with ADHD/ODD. Teachers reported overall levels of EFDs that were even higher for all three ADHD groups.

Parents and teachers agreed that ‘cool’ EFDs were the key difficulties for children with ADHD-I. Consistent with previous studies utilizing the BRIEF, this study showed that in relation to the ‘cool’ EFDs, difficulties with WM and planning were most commonly reported by parents (Gioia, Isquith, Retzlaff et al., 2002; McCandles & O’Laughlin, 2007; Riccio et al., 2006). This could mean that behaviours associated with WM and planning difficulties are more obvious to parents than other ‘cool’ EFDs or alternately, that difficulties with WM and planning are central to ADHD-I, as has been suggested by Castellanos and colleagues (2006).

Teacher reports on the BRIEF showed that difficulties with WM were reported as the most pronounced ‘cool’ EFD for children with ADHD-I, as was found by Blake-Greenberg (2003) and McCandles & O’Laughlin (2007). This could mean that something about the teaching role or some aspects of the teaching environment makes difficulties with WM more obvious to teachers relative to other ‘cool’ EFDs, or that WM is central to ADHD-I. However, in contrast to findings from Blake-Greenberg (2003) and McCandles and O’Laughlin (2007), the current study revealed that children with ADHD-I experienced a wide range of serious EFDs, beyond difficulties with WM. In fact, teachers reported that the vast majority of these children experienced clinically significant difficulties with all of the ‘cool’ subcomponents
(i.e., WM, initiate, plan/organize, organization of materials and monitor). It is unclear why children with ADHD-I in the current sample were reported to have a wider range of ‘cool’ EFDs. One possibility is that the current sample was drawn from a child psychiatric clinic specializing in ADHD that serviced children with more serious difficulties. Another is that children with learning disabilities were not excluded, potentially influencing the severity of the EFDs identified by teachers.

Parent and teacher reports showed that children with ADHD-C did not differ appreciably in relation to EFDs compared to children with ADHD-I, with the exception that they were described as experiencing clinically significant difficulties with inhibition. These results are consistent with prior studies utilizing the BRIEF (Gioia, Isquith, Retzlaff et al., 2002; McCandles & O’Laughlin’s, 2007; Riccio et al., 2006). Framing ADHD-C as a disorder primarily affiliated with ‘cool’ EFDs with some contribution of ‘hot’ EFDs, converges with research findings from Chhabildas and colleagues (2001) and Brocki and colleagues (2010), as well as with theoretical positions proffered by Tannock (see Rucklidge & Tannock, 2002).

This study, believed to be the first to use the BRIEF to examine ADHD/ODD as a unique diagnostic grouping variable, found that children with ADHD/ODD experienced patterns of ‘cool’ EFDs similar to those found in children within the ADHD-I and ADHD-C groups but children with ADHD/ODD experienced significantly higher levels of ‘hot’ EFDs compared to these other groups. In particular, children with ADHD/ODD were reported by parents to experience severe difficulties with inhibition and were the only group reported by parents to experience clinically significant EFDs with emotional control (i.e., T score > 65 on the BRIEF). Consistent with Martel’s (2009) findings, parents and teachers in the current
study identified difficulties with emotional control as a possible telltale sign distinguishing children with ADHD/ODD from children with ADHD-C.

In summary, the findings from the descriptive statistics related to parent and teacher reports of EFDs suggest that ‘cool’ EFDs are more pronounced in the school environment and that ‘hot’ EFDs are of the greatest concern to parents. Difficulties with WM were reported to be the most pronounced EFD for children with ADHD-I, while difficulties with inhibition displayed by children with ADHD-C distinguished these children from those with ADHD-I. Children diagnosed with ADHD/ODD were reported to experience more severe EFDs than the other diagnostic groups, with emotional control difficulties being the most pronounced area of difficulty.

Summary of the Descriptive Findings Regarding Parenting Stress

Findings from the present study revealed that the majority of parents of children with ADHD do not experience elevated or clinically significant levels of parenting stress. Approximately two-thirds of parents raising children with ADHD-I and ADHD-C and approximately half of parents raising children with ADHD/ODD reported experiencing overall parenting stress levels that were within normal parameters on the PSI. However, the results also showed that clinically significant levels of total/overall parenting stress (i.e., Total Stress Domain of the PSI, a composite scale combining the scores on the PSI Child Domain and PSI Parent Domain) are reported by between 30-50% of parents, depending on their child’s specific ADHD diagnosis. Abidin (1995) suggests that these families are likely to benefit from a referral to a helping professional. In accordance with the IMS (Lazarus, 1966; Lazarus & Folkman, 1984) and leading models of parenting stress (Abidin, 1995; Mash & Johnston, 1990), this finding can be interpreted to mean that some parents experience a
mismatch between the demands of raising a child with ADHD and EFDs and their perceived availability of resources to cope with this role.

Findings from the univariate statistics are consistent with parenting stress theory (Abidin, 1995; Mash & Johnston, 1990) and research related to childhood ADHD (Baker & McCal, 1995; Breen & Barkley, 1988; Goldstein et al., 2007; Mash & Johnston; 1983; Vitanza & Guarnaccia, 1999), showing that parenting stress is elevated in relation to child characteristics (i.e., PSI Child Domain stress) and lower in relation to parental characteristics (i.e., PSI Parent Domain stress). The majority of parents, regardless of their child’s ADHD diagnosis, reported normal levels of stress related to their own characteristics on the PSI Parent Domain (e.g., health, spousal relation, social isolation, parenting competence) and high levels of stress in relation to their child’s characteristics (e.g., distractibility/hyperactivity, demandingness, mood).

Parents of children with ADHD/ODD reported the highest levels of Child Domain parenting stress, with more than 78% reporting high levels of stress in relation to their child’s characteristics. Interestingly, parents raising children often considered to display less behavioural disturbance (i.e., ADHD-I and ADHD-C) also reported elevated levels of Child Domain parenting stress. Almost half (48%) of the parents of children with ADHD-C reported high stress levels specifically in relation to child characteristics, as did more than a third (38%) of parents raising children with ADHD-I. These findings partially agree with Johnston’s (1996) research suggesting that parenting stress occurs on a continuum that corresponds to the severity of childhood behavioural disturbance, with low stress being more closely associated with ADHD only groups, moderate parenting stress more closely linked to ADHD and mild ODD behaviours, and elevated stress of parenting levels associated with
ADHD groups with high levels of comorbid ODD. These findings also suggest that elevated levels of Child Domain parenting stress may not occur only as a by-product of the severity of the child’s behavioural disturbance, because sizable numbers of parents of children with ADHD-I and ADHD-C reported clinically significant levels of Child Domain parenting stress.

The descriptive results indicated that parental acceptance of the child was a key area of stress contributing to the overall level of Child Domain parenting stress. Specifically, the descriptive results showed that parents of children with ADHD-I, ADHD-C, and ADHD/ODD who were highly stressed in relation to their child reported a lack of acceptance of their child, as measured by the $PSI$ subscale acceptability. The contribution of this subscale closely rivalled or surpassed the stress associated with all other child-related stressors (i.e., $PSI$ subscales), including the stress measured by the subscale for child distractibility/hyperactivity. The association between parental acceptance of the child and heightened parenting stress has been noted by Kadesjo and colleagues (2002). Further implications of parental acceptance of the child are examined in relation to the main findings of the dissertation in the following section.

In summary, the findings from the descriptive statistics pertaining to parenting stress revealed that a sizable subgroup of parents reported elevated levels of Child Domain parenting stress to the point of requiring professional intervention (see Abidin, 1995), but most reported overall/total levels of parenting stress$^{51}$ to be within normal parameters. This finding conforms with the literature on parenting stress which shows that high levels of parenting stress are strongly associated with parenting children with ADHD (Baker & McCal, 1995; Beck et al., 1990; Breen & Barkley, 1988; Byrne et al., 1998; DuPaul et al., 2001; Goldstein

$^{51}$ Total Parenting Stress, as measured by the $PSI$, is a composite score that combines the scores from the Child Domain and the Parent Domain into one overall score of parenting stress.
et al., 2007; Kadesjo et al., 2002; Johnson & Reader, 2002; Mash & Johnston, 1983) and ADHD/ODD (Anastopoulos et al., 1992; Bussing, Gary et al., 2003; Bussing, Zima, 2003; Evans et al., 2009; Harrison & Sofronoff, 2002; Kadesjo et al., 2002; Podolski & Nigg, 2001; Ross et al., 1998). The findings from the main analyses, including HLR, may provide insight as to why some parents report higher levels of Child Domain parenting stress in relation to their children with ADHD and EFDs, while other parents report lower levels.

Discussion of the Main Analyses

The overall aim of this dissertation was to examine whether a relationship exists between parent-reported/teacher-reported EFDs and parenting stress (i.e., Child Domain and Parent Domain parenting stress) for parents raising children with various types of ADHD. This study is believed to be the first to use inferential statistics, including HLR, to examine the objectives of determining whether elevated scores on the parent and/or teacher BRIEF (i.e., elevated EFDs) predict elevated scores on the Child Domain and Parent Domain of the PSI, and, if so, which specific EFD subcomponents are the strongest predictors. The overarching hypothesis for the current study is that elevated levels of parent-reported and teacher-reported EFDs are associated with elevated levels of Child Domain parenting stress. Specifically, the central hypothesis tested was that elevated levels of parent-reported ‘hot’ EFDs would best predict elevated levels of Child Domain parenting stress, followed by difficulties with parent-reported ‘cool’ EFs, and then teacher-reported ‘hot’ and ‘cool’ EFDs. Elevated levels of EFDs were not expected to significantly predict elevated levels of Parent Domain parenting stress. The secondary hypothesis tested was that elevated levels of parent-reported and teacher-reported difficulties with emotional control, shift, inhibit, WM and planning would act as significant predictors of elevated levels of Child Domain parenting stress.
This study is also believed to be the first to examine whether symptoms of parent-reported oppositionality mediate the relationship between parent-reported ‘hot’ EFDs and Child Domain parenting stress. The hypothesis tested was that oppositional/defiant behaviours reported by parents on the CPRS-R:L oppositionality scale would mediate the relationship between parent-reported scores on the BRIEF BRI and scores on the Child Domain of the PSI.

Moderating factors, such as child gender, child age, ADHD diagnostic groups and stressful life events were also examined to determine their potential influence on the relationship between childhood EFDs and Child Domain parenting stress. Life stress factors and child age were hypothesized to moderate the relationship between childhood EFDs and Child Domain parenting stress, while child gender was not expected to significantly influence this relationship. No interaction effects for EFDs and Child Domain parenting stress in relation to ADHD diagnostic group (i.e., ADHD-I, ADHD-C, ADHD/ODD) were anticipated.

Predicting Parenting Stress with Parent/Teacher Reports of Childhood EFDs

Parenting Stress Specific to Child Characteristics

Results of the HLR analyses related to this dissertation’s first objective partially supported the stated hypothesis by revealing that elevated levels of parent-reported ‘hot’ EFDs best predicted the occurrence of elevated levels of Child Domain parenting stress. Elevated levels of parent-reported ‘cool’ EFDs also predicted elevated levels of Child Domain parenting stress, as did elevated levels of teacher-reported ‘hot’ EFDs, but both of these predictor variables explained a much smaller portion of the variance in Child Domain parenting stress within the sample. The combined influence of these variables accounted for approximately 50% of the variance in Child Domain parenting stress within the sample. Consistent with the stated hypothesis, elevated levels of parent-reported ‘hot’ EFDs, including
difficulties with shift, inhibit and emotional control were the largest predictors of Child Domain parenting stress, accounting for approximately 30% of the variance in Child Domain parenting stress, when controlling for the influence of parent-reported ‘cool’ EFDs (17% of variance) and teacher-reported ‘hot’ EFDs (3% of variance). Contrary to the hypothesis, results showed that teacher-reported ‘cool’ EFDs were unrelated to Child Domain parenting stress. Thus, beyond the effects of parent-reported ‘cool’ EFDs and teacher-reported ‘hot’ EFDs, parent reports of greater severity of childhood behavioural disruptions related to ‘hot’ EFDs were strongly associated with Child Domain parenting stress. These findings closely align with ADHD research which reveals that childrens’ externalizing and aggressive behaviours account for a significant percentage of variance in parenting stress (Anastopoulos et al., 1992; Baker, 1994; Harrison & Sofronoff, 2002). These findings showed that the severity of scores on the BRIEF, particularly parent-reported scores related to ‘hot’ EFDs, were potent predictors of elevated levels of child-related parenting stress, as measured by the PSI Child Domain.

Due to the fact that global impairments with EFs are rare in childhood (Anderson, 2002), the influence of EFD subcomponents on parenting stress was also examined using HLR. The results, consistent with the stated hypothesis, showed that parent-reported difficulties with emotional control, shift and inhibition were significant predictors of Child Domain parenting stress. Difficulties with emotional control were the most significant predictors of Child Domain stress among the ‘hot’ EFD subcomponents. This finding is consistent with prior research that showed parents of children with ADHD to be particularly stressed by their childrens’ oppositional, hostile and aggressive behaviours (Anastopoulos et
al., 1992; Baldwin, Brown, & Milan, 1995; Harrison & Sofronoff, 2002; Podolski & Nigg, 2006; Ross et al., 1998).

These findings lend support to the conceptual model offered by this dissertation (Figure 1 on page 29); in that the severity of child behaviours affiliated with ‘hot’ EFDs (i.e., difficulties with emotional control, shift and inhibition) did predict high levels of Child Domain parenting stress. From a theoretical perspective, applying the IMS (Lazarus, 1966; Lazarus & Folkman, 1984) and Abidin’s (1995) model of parenting stress to interpret these findings suggests that the behavioural difficulties related to emotional control, inhibition and shift may impose demands on parents and/or the parenting role that likely exceed their ability to cope. As Mash and Johnston (1990) assert, the behaviours of children with ADHD are the most probable source of parenting stress. However, the current findings revealed that it is not simply any behavioural difficulties associated with ADHD that contribute to high levels of parenting stress, but rather those behavioural difficulties that are associated with regulating and controlling emotions, regulating and controlling inhibitions and shifting between tasks or activities. Simply stated, children with ADHD who are prone to emotionally volatile, unrestrained, unpredictable and/or rigid behaviour patterns are, in all likelihood, highly stressful to parents.

In addition to elevated levels of ‘hot’ EFDs predicting elevated levels of Child Domain parenting stress, the results of the current study showed that parent-reported ‘cool’ EFDs accounted for a meaningful amount of variance (17%) in Child Domain parenting stress. In terms of the subcomponents driving this association, contrary to the stated hypothesis, difficulties with WM and planning were not related to Child Domain parenting stress, whereas difficulties with initiation and monitor (i.e., subscales contained in the BRIEF) were related.
These findings are somewhat perplexing considering that research has indicated that WM and planning are central to ADHD theory (Barnett et al., 2009; Brocki et al., 2008; Brocki et al., 2010; Castellanos et al., 2006; Chhabildas et al., 2001; Goldberg et al., 2005; Martinussen et al., 2005; McCandles & O’Laughlin, 2007; Pasini et al., 2007; Re et al., 2010; Riccio et al., 2006; Rucklidge & Tannock, 2002; Sergeant et al., 2002; Toplak et al., 2009; Wahlstedt et al., 2009; Willcutt, Doyle et al., 2005), and given that research has shown ADHD to be strongly related to parenting stress (Anastopoulos et al., 1992; Baker & McCal, 1995; Baldwin et al., 1995; Breen & Barkley, 1988; Goldstein et al., 2007; Harrison & Sofronoff, 2002; Kadesjo et al., 2002; Mash & Johnston, 1983; Podolski & Nigg, 2001; Theule et al., in press). Further obfuscating this interpretation is the fact that difficulties with WM and planning were among the most pronounced EFDs reported by parents across all three ADHD grouping variables (see Table 5), as was found in other studies using the BRIEF (Gioia, Isquith, Retzlaff et al. 2002; McCandles & O’Laughlin, 2007; Riccio et al., 2006).

These findings suggest that despite being visible to parents, behaviours related to WM and planning difficulties do not always translate into parenting stress. It seems that there is a distinct difference between noticing potentially stressful behaviours (e.g., behaviours arising from EFDs) and being stressed by these behaviours. This finding underscores a major tenet of the IMS (Lazarus, 1966; Lazarus & Folkman, 1984) and of leading models of parenting stress (Abidin, 1990; Mash & Johnston, 1990) that parenting stress/psychological stress is likely mediated by the appraised mismatch between demands and available resources. Simply stated, difficulties with WM and/or planning may not be appraised as demanding or exceeding parents’ abilities to cope, as may be the case with ‘hot’ EFDs, such as emotional control difficulties.
Theories of appraisals/attributions offered by Weiner (1985) and Lazarus (1966; Lazarus & Folkman, 1984) may provide a lens through which to interpret the current findings. Weiner (1985) theorized that increased helping behaviours should be expected in situations where the difficulty is attributed to factors beyond the individual’s control. In relation to attributions within ADHD populations, research shows that inattentive symptoms are considered to be outside of the child’s control (Freeman, Johnston, & Barth, 1997; Johnston & Freeman, 1997). As theory and research have established a strong link between ‘cool’ EFDs and inattentive symptoms (Castellanos et al., 2006; Chhabildas et al., 2001; Willcutt, Doyle et al., 2005), it is reasonable to surmise that parents also consider EFDs with WM and planning to lie outside of the child’s control.

If parents are able to cope effectively with WM and planning difficulties, why then would difficulties with initiate and monitor predict increased levels of Child Domain parenting stress? This presents a challenge in the interpretation of findings which showed elevated levels of parent-reported difficulties with initiate and monitor as significant predictors variables explaining a meaningful amount of Child Domain parenting stress. The answer may lay in part with Gioia and colleagues’ (2000) description of the behaviours captured by these two BRIEF subscales. The authors suggest that difficulties with initiate encapsulate problems getting started on activities such as household chores, homework or getting off to school in the morning. These childhood behaviours often coincide with the need for parents to engage in “extensive prompts or cues in order to begin a task or activity” (Gioia et al., 2000, p. 18). Further, the monitor subscale of the BRIEF captures the child’s abilities in such areas as accuracy and completion rates for homework and household chores, as well as
self-awareness of their impact on others (e.g., failing to effectively self-monitor their noise level while the caregiver is on the phone, or attempting to nap).

Different from coping with WM and planning difficulties, behaviours associated with initiation and monitoring may have more potential to contribute to stressful interactions between the parent and child, best described by Lazarus and Cohen (1977) as daily hassles. Daily hassles have been theorized to play a meaningful role in the occurrence and maintenance of parenting stress levels (Mash & Johnston, 1990). A credible explanation for why elevated levels of ‘cool’ EFDs, such as initiate and monitor, predict elevated levels of Child Domain parenting stress may be found by conceptualizing these behaviours as daily hassles.

By interpreting behaviours associated with initiate and monitor to correspond with the concept of daily hassles, the current study’s findings are consistent with conclusions of other researchers examining daily hassles. These researchers found that daily stressful occurrences (i.e., daily hassles) for parents are not merely related to the child’s ADHD symptomatology, but are also affiliated with the overall practice of providing specialized care for their child which can meaningfully contribute to parenting stress levels (Cronin, 2004; Theule et al., in press; Johnson & Reader, 2002). For parents of children with initiation difficulties and/or self-monitoring difficulties, engaging in the daily grind of ‘getting kids going’ or the need for a constant shepherding role to ‘keep kids on task’ may lead to stress levels that explain the current findings, which show a small but significant amount of the variance in Child Domain parenting stress was due to ‘cool’ EFDs. This interpretation is congruent with findings from qualitative research by Firmin and Philips (2009) and Segal (1998) who noted that parents found getting children going in the morning (e.g., preparing children for school) and dealing
with homework to be the most stressful times for parents. Viewing difficulties with initiation and monitoring as contributing to daily hassles may also explain why research finds that mothers, and not fathers, experience elevated parenting stress in relation to inattentive symptoms (Podolski & Nigg, 2001), as mothers have been shown to bear more responsibility for the hassles of day-to-day child care duties (Lee, Vernon-Feagans, Vazquez, & Kolak, 2003; Harvey, 1998). In sum, the current findings from parent reports showed that in addition to Child Domain parenting stress being associated with ‘hot’ EFDs, initiation and monitoring difficulties also contribute to the occurrence of Child Domain parenting stress, likely due to the role that these ‘cool’ EFDs play in the daily hassles experienced by parents.

**Parenting Stress and EFDs as Rated by Teachers**

The results of this study indicated that teacher-reported ‘hot’ EFDs only accounted for a small portion (less than 3%) of the variance in Child Domain parenting stress within the current sample. The strength of this relationship may be further reduced by the presence of error variance within this step of the HLR. The limited association between teacher-reported ‘hot’ EFDs and Child Domain parenting stress and the absence of a significant relationship between teacher-reported ‘cool’ EFDs and Child Domain parenting stress indicates that parents may not experience significant levels of Child Domain parenting stress in relation to the behaviours displayed within the school environment (i.e., teacher-reported ‘hot’ and ‘cool’ EFDs).

The findings that teacher-reported ‘hot’ EFDs explains little of the variance associated with Child Domain parenting stress (3%), and the finding of an outright lack of relationship between ‘cool’ EFDs and Child Domain parenting stress run somewhat contrary to the stated hypothesis; that teacher-reported EFDs would contribute significantly to Child Domain
parenting stress. These findings further contradict previous research showing that parenting stress levels are significantly higher for parents whose children display difficulties in multiple settings (e.g., school and home) related to ADHD (Anthony et al., 2005; Beck et al., 1990; Breen & Barkley, 1988; Mash & Johnston, 1983). The finding that is most relevant to the objectives of the current study is that teachers reported that all of the EF subcomponents measured by the BRIEF (i.e., WM, planning, initiate, plan/organize, organization of materials and monitor) to be clinically significant (i.e., all scores were in excess of two standard deviations above the mean or T score > 70) for ADHD-I, ADHD-C and ADHD/ODD groups (see Table 6). Therefore, teachers in the current study were well-aware of the behavioural manifestations that their students displayed in relation to ‘hot’ and ‘cool’ EFDs. As a result, it can be concluded that difficulties with ‘cool’ EFDs, and for the most part difficulties with ‘hot’ EFDs reported by teachers do not readily translate into elevated levels of Child Domain parenting stress.

From a theoretical perspective, these findings suggest that childrens’ difficulties in school related to EFDs, as noted by teachers, pose less demands on parents and/or parents perceive themselves as having the necessary resources to cope with these difficulties. Alternately, these findings can be interpreted to mean that teaching staff are coping effectively with ‘cool’ EFDs, thereby involving parents less in relation to their concerns surrounding WM and planning as they might in relation to the occurrence of ‘hot’ EFDs and behavioural problems. In essence, teachers may act as a coping resource for parents by addressing the difficulties related to ‘cool’ and ‘hot’ EFDs. In as much as schoolwork may be the ideal scenario to evoke or highlight the difficulties with WM or initiation, teachers, by way of their
professional training and their professional support network within the school, may be well-equipped to cope with these challenges.

Teachers may, however, perceive some children’s EFDs as too demanding in their role or beyond their resources/capacities to address these difficulties. Findings from the current study show that teacher-reported ‘hot’ EFDs were significantly related to Child Domain parenting stress, albeit at low levels. Specifically, the results revealed that difficulties with emotional control were the lone teacher-reported predictor to account for variance in Child Domain parenting stress. This can be interpreted to mean that teaching staff are less able or less willing to tolerate the child’s display of ‘hot’ EFDs without involving parents then they might in relation to children’s difficulties with ‘cool’ EFDs. As noted in research by Riley and colleagues (2006), demands on parents have grown in relation to supporting the unique needs of ADHD children to include organizing and managing school-based interventions. To fulfill the role of ‘good parent,’ parents of children with special needs, such as ADHD, often perceive that they must actively engage the school system in meeting the child’s needs (McKeever & Miller, 2004). This may be especially true in Ontario, where children diagnosed with ADHD are not universally entitled to special education programming (e.g., accommodations or modifications) (Bernhardt, Personal Communication, 2010). Parents of children with ADHD may feel indirectly responsible for the child’s success in the school (Bendell et al., 1989) and even link their sense of pride and competency in their parenting role to these successes or failures (Cronin, 2004). As a result, parents may be more likely to engage in problem-focused coping procedures which see them working hard on their child’s behalf to improve the child’s learning and social experience.
If parents of children with emotional control difficulties become more involved with the school in an attempt to maximize the child’s academic (and possibly social) success by addressing the fallout of behavioural difficulties, the child may be perceived as more demanding, more difficult to cope with and more stressful (Bendell et al., 1989; Cronin, 2004; Johnson & Reader, 2002). Many parents raising children with ADHD report perceiving the school as a recurrent source of frustration and exhaustion (Cronin, 2004). Increased contact with the schools may contribute to elevated parenting stress as a result of the demands placed on the parent’s schedule to engage with the school (Cronin, 2004), and through “frequent distressful communication with frustrated teachers who are having difficulty managing the child” (Webster-Stratton, 1990, p. 306). A parent’s sense of competency in his or her parenting role may also be negatively affected during these interactions, which may leave many parents feeling judged or criticized by teachers for an inability to resolve the child’s difficulties (Brook & Boaz, 2005). In sum, the findings involving teacher-reported EFDs show that a greater severity of child emotional control difficulties were directly associated with small but meaningful elevations in Child Domain parenting stress, over and above the stress attributed to parent-reported EFDs.

Parenting Stress Specific to Parental Characteristics

Results of the HLR examining the relationship between parent-reported and teacher-reported EFDs and Parent Domain stress were somewhat mixed with regard to the stated hypothesis. Consistent with the hypothesis and the conceptual model (see Figure 1 on page 29), teacher-reported EFDs were not significantly associated with Parent Domain parenting stress. However, contrary to the hypothesis, the results revealed that parent-reported ‘cool’ and ‘hot’ EFDs were associated with Parent Domain parenting stress. Specifically, the results
showed that ‘cool’ EFDs accounted for approximately 3.7% of the variance in Parent Domain parenting stress.

Closer examination of this relationship using a subcomponents approach revealed difficulties with initiation as the key predictor of Parent Domain parenting stress. As discussed in the previous section, this finding may be interpreted to mean that childrens’ difficulties with initiation can contribute to parents’ daily hassles, and ultimately higher levels of Parent Domain parenting stress. This finding is consistent with prior research revealing that parents of children with ADHD experienced significant levels of parenting stress in relation to their own characteristics (i.e., Parent Domain parenting stress), including depression, role restriction and their spousal relationship (Breen & Barkley, 1988; Mash & Johnston, 1983; Theule et al., in press; Webster-Stratton & Hammond, 1988). Over and above the influence of initiation, ‘hot’ EFDs displayed by the child accounted for an additional 9.5% of the variance in Parent Domain parenting stress. Examination of the ‘hot’ subcomponents showed that difficulties with inhibition and shift were the two key predictors of this stress.

In sum, the findings of the HLR show that a small but meaningful relationship exists between parent-reported EFDs (‘hot’ and ‘cool’) and elevated levels of Parent Domain parenting stress. Overall, the results from this dissertation paint a positive picture of the functioning of parents. Between 13-20% of the sample experienced clinically significant scores on the PSI Parent Domain. Consistent with Abidin’s (1995) findings pertaining to ADHD populations, the majority of parents in the current study reported Parent Domain stress levels well within the normal range on the PSI.
Summarizing the Prediction of Parenting Stress with EFDs

Results from parent reports showed that severity of children’s EFDs were primarily associated with elevated levels of Child Domain parenting stress. Elevated levels of parent-reported ‘hot’ EFDs were the clearest predictor of elevated levels of Child Domain parenting stress and a stronger predictor than parent-reported ‘cool’ EFDs. However, results showed that elevated levels of Child Domain parenting stress may not simply arise as a consequence of the demands placed on the parenting role by behavioural disturbances related to difficulties with emotional control, shift and/or inhibition (i.e., emotional blow-ups, impulsive actions, rigid behavioural patterns). ‘Cool’ EFDs with initiate and monitor are also shown to be linked to elevated levels of Child Domain parenting stress, likely due to the role they play in the daily hassles and intense day to day grind of care-giving for a child with special needs (Crnic et al., 2005; Johnson & Reader, 2002; Lee et al., 2003).

Current findings also showed that, for the most part, parents coped well with the challenges they faced outside of the parenting role and in relation to their own characteristics. A particularly interesting finding that emerged from the descriptive statistics was that, regardless of the child’s ADHD diagnosis, parents experienced difficulty accepting their child. Difficulties accepting the child, or more particularly the child’s special needs, were largely unrelated to the intensity of the child’s EFDs and acted as key contributors to the total level of parenting stress. The parent’s ability to cope with the child’s distractibility/impulsivity and demandingness was also key to determining the overall level of parenting stress. Consistent with Johnston’s (1996) work, the current results suggested that although parenting stress is most extreme for those raising children with ADHD/ODD, parents of children with moderate

52 The overall level of parenting stress is calculated by combining the scores on the PSI Child Domain with the scores on the PSI Parent Domain.
levels of ‘hot’ EFDs (e.g., children with ADHD-C) may encounter similar difficulties with their children and experience similar stressors within the parenting role, albeit at slightly lower levels.

Overall, the findings concur with Harrison and Sofronoff’s (2002) conclusion that heightened levels of parenting stress correspond to a greater severity of childhood behavioural disturbances, which in the case of the current study, are behaviours pertaining to ‘hot’ EFDs. The findings pertaining to this dissertation’s first objective (and sub-objective) represent a new contribution to the field. Building on the lone study in this area (see Joyner et al., 2009), the current findings showed that elevated scores on the BRIEF BRI (i.e., ‘hot EFDs) are not just correlated with elevated levels of scores on the Child Domain of the PSI, but elevated scores on the BRIEF BRI act as a potent predictor for elevated scores on the Child Domain of the PSI.

Oppositional/Defiance as a Mediator of EFDs and Parenting Stress

The second objective of this dissertation was to determine whether child oppositional/defiant behaviours (parent-reported) mediated the relationship between parent-reported ‘hot’ EFDs and Child Domain parenting stress. The current study is believed to be the first to examine the existence of such a mediator relationship. Examining the presence of this mediator relationship involved the use of simple path analysis, employing MLR procedures.

Findings from the simple path analysis provided statistical support for the mediation model (see Figure 4) and confirmed the hypothesis that parent-reported oppositionality scores partially mediated the relationship between parent-rated ‘hot’ EFDs and Child Domain parenting stress. Difficulties with emotional control followed by difficulties with inhibition
control were found to be the main forces driving the relationship between ‘hot’ EFDs and oppositionality. The current results show that much of the reason ‘hot’ EFDs (i.e., emotional control and inhibition difficulties) are associated with Child Domain parenting stress is because of the influence of the child’s oppositional/defiance. The fact that oppositional/defiance only partially mediated the relationship between ‘hot’ EFDs and Child Domain parenting stress suggests that the presence of oppositional/defiance is not required for elevated levels of ‘hot’ EFDs to predict increased levels of Child Domain parenting stress.

These findings provide support for this dissertation’s conceptual model (Figure 1 on page 29) and are consistent with prior research showing that elevated levels of oppositional/defiant behaviours comorbid to ADHD are a particularly potent predictor of elevated levels of parenting stress (Anastopoulos et al., 1992; Baldwin et al., 1995; Harrison & Sofronoff, 2002; Podolski & Nigg, 2001). Research studies conducted by Anastopoulos and colleagues (1992) and Podolski and Nigg (2001) are especially relevant to the current dissertation because of their use of HLR procedures which allowed for the statistical control of oppositionality/defiance and ADHD symptoms to determine their unique relationship with parenting stress. The current mediation model extends this research by moving beyond parcelling out the influence of ADHD and ODD on parenting stress to provide preliminary support and valuable insight into the possible existence of a causal chain between these variables.

Overall, the findings from the simple path analysis revealed that elevated levels of parent-reported oppositionality is a potent predictor of Child Domain parenting stress. The current mediation model articulates that symptoms of childhood oppositionality/defiance explain a significant portion of the relationship between Child Domain parenting stress and
the behaviours related to ‘hot’ EFDs. Alternately, and perhaps conforming more truly to mediation models, the results of the path analysis can be framed as follows: much of the reason parents are stressed by their child’s ‘hot’ EFDs is because of (or largely due to) the influence of the child’s oppositional/defiance. This dissertation interprets this finding in two different ways, both of which are explored in-depth below.

The first interpretation builds on the previously described HLR results showing elevated levels of ‘hot’ EFDs to be a potent predictor of elevated levels of Child Domain parenting stress. The mediation model can then be interpreted to mean that much of the reason that children prone to emotional volatility, impulsivity and behavioural rigidity (i.e., ‘hot’ EFDs) are stressful to parents is because these characteristics tend to manifest as oppositionality, defiance, hostility and aggression within parent-child interactions. Simply stated, a significant portion of why parents are stressed by these children is not only because of their child’s difficulties with emotional control, inhibition and shift, but due to the oppositionality/defiance that goes along with these ‘hot’ EFDs. This finding is consistent with research conducted by Ross and colleagues (1998) with ADHD populations which showed that it is not ODD in isolation that predicts elevated parenting stress, but it is the occurrence of these oppositional/defiant behaviours within a relationship context already impacted by ADHD symptoms that predicts elevated levels of parenting stress.

This interpretation of the mediation model (Figure 4) is consistent with theory and research indicating that oppositionality/defiance and ‘hot’ EFDs are closely related but distinct constructs (Loeber et al., 2000; Martel, 2009; Melnich & Hinshaw, 2000; Schachar & Tannock, 1995). This point was demonstrated in the current dissertation through the use of principle factor analysis with oblique rotation (see Table 14) which showed that considerable
overlap existed between child oppositionality (measured by the CPRS-R:L oppositionality scale) and inhibition, emotional control and shift (measured with the corresponding BRIEF subscales).

This first interpretation of the mediation model may, however, oversimplify the complexity of the relationship between ODD and parenting stress, explaining only the child’s contribution to the ODD behaviour pattern (i.e., ‘hot’ EFDs establish a vulnerability to ODD and ODD leads to elevated levels of Child Domain parenting stress) while failing to address possible parental contributions. Green and Doyle (1999) caution against such an oversimplification, stating that it is imperative when attempting to understand the nature of childhood ODD to consider how both children’s characteristics, such as EFDs, and parent characteristics, such as attributions, combine to create and maintain this behavioural pattern. The conceptual model of this dissertation (Figure 1 on page 29) states that parental factors, such as high levels of parenting stress and parent appraisal/attribution processes, may play a role in this complex interaction, therefore necessitating an alternate interpretation of the mediation model which accounts for parent appraisal/attribution processes.

From a theoretical perspective, Lazarus (1966) and Abidin (1995) posit that psychological stress/parenting stress is contingent on how the parent appraises their interactions with the child. Lazarus and Folkman (1984) suggest that primary and secondary appraisal processes are fundamental for people to determine why, and to what extent, a particular transaction with the world is stressful, and help determine what coping resources will be brought to bear against the stressor. Therefore, the second interpretation of the mediation model (Figure 4) is informed by the IMS, including key concepts such as primary and secondary appraisal, along with Weiner’s (1985) concept of attribution.
Primary Appraisal: Threats to Parental Control and Parenting Stress

The second interpretation of the findings related to the mediation model (see Figure 4) incorporates principles from the IMS (Lazarus, 1993a) regarding the importance of parental appraisal to the occurrence of parenting stress. Parents may engage a primary appraisal process to determine whether interactions with their child are threatening in some manner (Lazarus, 1993a). By applying the principle of primary appraisal, the mediation model can be reinterpreted and re-expressed in the following manner: the reason parents are stressed by their child’s ‘hot’ EFDs is largely due to parents perception of these characteristics and behaviours as oppositional/defiant, which is experienced as threatening and stressful to the parent.

The IMS suggests that in situations where a parent appraises their child’s characteristics as threatening in some manner, parents may be at risk to experience elevated stress levels. It is highly likely that parents raising children with ‘hot’ EFDs and oppositional/defiant behaviour patterns may feel threatened by a perceived loss of ‘control’ or ‘authority’ (Johnston & Ohan, 2005). They may also feel threatened when they experience hurt or anger during interactions with their child. Threat can also be experienced as worries about the occurrence of an event based on historical interactions with the child, such as worrying about feeling angry or hurt in future interactions. Research also suggests that when parents attribute causes for their child’s worst behaviours (e.g., oppositionality, defiance, or aggression) they often slip into patterns of thinking that their child is not trying hard enough, or that he or she is being manipulative (Baden & Howe, 1992; Jenson et al., 1998). Parents who are unable or unwilling to ‘let go’ of these negative thought patterns or historical interactions may perpetuate the negativity of parent-child interactions involuntarily, as
parents’ appraisal process relies heavily on past experiences (Johnston & Ohan, 2005). For example, parents may continue to feel under threat by worrying about getting hurt or becoming angry in future interactions with the child, which may contribute to the cycle of ODD and elevated levels of Child Domain parenting stress (see Figure 1 on page 29).

This interpretation conforms to Mash and Johnston’s (1990) theory that parent-child conflicts are reciprocal in nature (see Figure 1). Although it is difficult to determine the starting point of this negative pattern, Mash and Johnston (1990) propose that the reciprocity between parent and child is asymmetrical in influence. They suggest that it is most likely the child’s characteristics associated with ADHD/ODD that drives this negative dynamic. This theoretical position has been largely substantiated through causal research showing that parents’ negative behaviours change in response to the child’s behavioural change (Barkley, 1988; Barkley & Cunningham, 1979; Barkley & Cunningham, 1980; Barkley et al., 1985; Humphries et al., 1978).

Ultimately, parental appraisals of their child’s characteristics/behaviours as threatening may increase parent anger (Lazarus & Folkman, 1984; Seipp & Johnston, 2005; Whalen et al., 2006), heighten parenting stress, and add to negative parent-child dynamics (Befera & Barkley, 1985; Edwards et al., 2001; Rogers, Wiener, Marton, & Tannock, 2009a), which in turn exacerbate childhood oppositional/defiant behaviours (Cnic & Greenberg, 1990). Consistent with theories of parenting stress (Abidin, 1990; Mash & Johnston, 1990), the findings from the current study revealed that for children diagnosed with ADHD, the presence of childhood oppositional/defiant behaviours is directly associated with elevated levels of Child Domain parenting stress. Further, this is likely a large part of the reason why parents experience these children as highly stressful.
Secondary Appraisal: Balancing Controlling the Child with Parental Self-Control

From a theoretical perspective, the results of the mediation model (Figure 4) may be partly explained as parental difficulties coping with severe child behaviour disruptions. The IMS (Lazarus, 1993) stipulates that parents impacted by threatening behaviours, such as oppositionality/defiance, and/or parents who appraise children’s behaviour as threatening often attempt to use problem-focused and/or emotion-focused coping processes. In problem-focused coping, parents perceive that they are capable of controlling the person-environment transaction (i.e., alter the child’s behaviour through parenting strategies such as behaviour modification), or effect change on the environment (i.e., address barriers impeding the success of the child in the home and school environments). Conversely, if parents perceive that they are unable to influence their external environment, they may take a different tack and utilize emotion-focused coping, emphasizing self-control processes governing which stimuli they attend to, how they appraise these stimuli, and perhaps most importantly, how they feel in response to these appraised stimuli (e.g., angry and/or stressed) (Menaghan, 1983).

Parenting a child with ADHD/ODD and EFDs may be a fine balance between appropriately engaging problem-focused coping or emotion-focused coping. A multiple pathways orientation towards ADHD (Nigg, 2006; Sonuga-Barke, 2002) suggests that children who are primarily challenged with ‘hot’ EFDs may struggle from birth to down-regulate (i.e., quash) their emotional reactive processes. These emotionally dominated ‘hot’ behavioural systems can quickly intensify as parents struggle to cope with their child’s behavioural reactivity. Without appropriate professional supports, parents of children with severe difficulties with emotional regulation and inhibition control, typical of ADHD/ODD (see Table 5 and 6), often have difficulties coping with their child’s behaviour (Green &
Doyle, 1999; Nigg, 2006). Parenting strategies used regularly by parents of typically developing children to effectively address child behavioural difficulties frequently fail with children with ‘hot’ EFDs and/or ADHD/ODD. In many cases, problem-focused coping efforts can become confrontational and aggressive (Folkman et al., 1986) as parents attempt to effect change in their child’s behaviour or ‘take control.’ These coping approaches may exacerbate the conflict within the parent-child relationship and escalate the severity of the child’s behavioural disruption, and ultimately the levels of parenting stress (Green & Doyle, 1999; Nigg, 2006). This pattern is borne out in research with ADHD populations which reveals that highly stressed parents are often controlling and angry in their parenting practices (Befera & Barkley, 1985; Edwards et al., 2001; Rogers et al., 2009a; Seipp & Johnston, 2005; Whalen et al., 2006) which may contribute to the negative cycles of parent-child conflict predicted by models of parenting stress (Mash & Johnston, 1990). Although not measured directly in the current dissertation, this cycle is depicted in the conceptual model for this dissertation (see Figure 1 on page 29).

Acceptance and Attributions of Controllability

Results of the path analysis showed that parent reports of heightened child oppositional/defiant behaviours partially mediated the relationship between parent-reported ‘hot’ EFDs and Child Domain parenting stress (see Figure 4). As noted, this result can be interpreted to mean that the reason some parents of children who have difficulties with emotional control, shift and inhibition are highly stressed is due in part to their perception of these characteristics and behaviours as oppositional/defiant. Emphasizing the potential role of parental perceptions in this process does not imply that the oppositionality/defiant behaviours are merely imagined by parents. Rather, highlighting the potential role of parental
perspectives is consistent with fundamental concepts of the IMS (Lazarus, 1966), which underline the importance of parental appraisals to determine whether a threat exists, whether sufficient coping resources are accessible, and ultimately, whether the child’s behaviour patterns will be experienced as stressful within the parenting role.

Accepting the Child’s Special Needs.

It may be very difficult for parents to accept that children with EFDs and/or ADHD have legitimate special needs that pose barriers for the child to control certain behavioural patterns (e.g., difficulties with impulsivity and emotional control) in a manner consistent with developmental norms and parental expectations. Results from the descriptive analysis (see Figure 3, Table 11) showed that the majority of the parents in this study, regardless of their child’s ADHD diagnosis, experienced stress in relation to their inability to accept their child as having special needs (i.e., PSI subscale for acceptability). Accepting the legitimacy of these special needs and adjusting parental expectations and supports accordingly may be difficult for parents because of the non-obvious nature of the impairment, fluctuating symptomatology, and societal aspersions regarding the legitimacy of these children’s special needs.

Often described as an ‘invisible’ or hidden disability/impairment (Matthews, 1994 as cited in Matthews & Harrington, 2000; Miller & Sammons, 1999; Ryan & Runswick-Cole, 2008; Warshaw, 2004; Wolf, 2001), a diagnosis of ADHD may be difficult for parents to accept. This is due in part to the absence of physical indicators (i.e., child has no physical deformities or indicators of disability as is the case with a child with Down’s Syndrome or in the case of a child confined to a wheelchair), and due to the fact that ADHD, like most psychiatric conditions, lacks a concrete diagnostic indicator (e.g., blood test, CT scan, MRI) to ‘prove’ its existence within an individual child (Fox & Kim, 2004). The fact that ADHD
symptoms and EFDs can be reminiscent of behaviours typical of younger children may lead parents to believe that their child is merely immature or experiencing a delay that they will ‘outgrow’ (Byrne et al., 1998) rather than a difficulty that will persist into adulthood (Biederman et al., 2007). Due to a difficult temperament or a positive family history for ADHD (e.g., parent, uncle or aunt who were diagnosed with ADHD), some parents may be aware early in their child’s development of the risk for the child having ADHD. More typically, however, parents are confronted with the issue of needing to accept that their child has EFDs and/or ADHD later in the child’s development (Nelson, 2002), often when behavioural and learning problems surface at school.

Doubts about the legitimacy of this disorder can be further fuelled by the fluctuating nature of symptomatology that is highly context specific and variable within the child (Dane et al., 2000; Stefanatos & Baron, 2007). Parents can become particularly doubtful when the child’s symptoms fluctuate in a manner where they are able to concentrate on video games and activities of interest, but are unable to sustain their focus on homework (Barkley & Edelbrock, 1987; Kendall, 1998). Compounding this problem is the fact that behaviours associated with EFDs and ADHD lack bizarre qualities that are grossly atypical, such as those associated with Autism or Schizophrenia. The symptoms commonly displayed within ADHD populations are often recognizable to parents as everyday behaviours, albeit in an extreme form (Peris & Hinshaw, 2003).

Doubts regarding the legitimacy of ADHD and the need for specialized supports or treatments (e.g., medications or school accommodations) are also nurtured within a culture of scepticism that Ross and Ross (1982) describe as unique among all other paediatric health concerns. The legitimacy of non-obvious disorders such as ADHD and neurological
imperfections such as EFDs are seldom free of debate within society or within family systems (Brook & Boaz, 2005; Blum, 2007; Cronin, 2004; Olney & Brockelman, 2003; Portway & Johnson, 2005; Shapiro, 1988), leading ADHD to be frequently discredited. If parents have difficulties accepting their child’s ADHD, as is suggested by the findings of the current study (see Figure 3 Table 11), it may be that these parents are more likely to view their child’s behaviours as controllable rather than viewing these behaviours as indicative of underlying difficulties with EFDs.

**Attributions of Controllability.**

From a theoretical perspective, Weiner’s (1985) theory of attribution predicts that parents may be more likely to experience their child’s behaviour as a threat to emotional well-being and become angry if the parent attributes the cause of the child’s behavioural difficulties to a factor within the child’s control. For example, parents of children with ‘hot’ EFDs and/or a diagnosis of ADHD/ODD may misattribute the child’s behavioural difficulties to ‘laziness’ and/or intentional or wilful misbehaviour (e.g., ‘seeking attention’ or attempting to ‘grab control’ from parents), rather than see these behaviours as indicative of underlying difficulties with emotional control, shift and inhibition (Green & Doyle, 1999). If parents perceive their child as being able to start or stop these behaviours at will because they are intentional (i.e., within their control), Weiner’s (1985) theory predicts that parents are less likely to provide support or assistance compared to situations where the child does not have control. Johnston, Hommersen and Seipp (2009) concur with this theoretical viewpoint, suggesting that attributions likely play a critical role in childhood oppositionality and parent-child conflict. Research also supports this position, by showing that a strong association exists between parental attributions for controllability and child behavioural disorders (Baden,
Howe, 1992; Bickett, Milich, & Brown, 1996; Freeman et al., 1997; Grace, Kelly, & McCain, 1993; Jenson et al., 1998; Johnston et al., 2006). Research also shows that parents may be especially prone to view behavioural disturbances by boys, rather than girls, as purposeful or willful (Maniadaki, Sonuga-Barke, & Kakovros, 2005). This finding is of particular interest considering that 82% of those diagnosed with ADHD/ODD in the current study are male and the higher rates of ADHD/ODD for males (APA, 2000).

Weiner’s (1985) theory of controllable attribution may be useful to explain in part why childhood oppositionality/defiance partially mediates the relationship between ‘hot’ EFDs and Child Domain parenting stress. ‘Invitations’ to attribute controllability for the child’s oppositionality/defiance may be built into the DSM-IV-TR diagnostic criteria, as well as within the oppositionality subscale of the CPRS-R:L, the independent/predictor measure used to examine the mediation relationship depicted in Figure 4. Perhaps the clearest example of this ‘invitation’ to attribute controllability for oppositionality in the CPRS-R:L is item 67, which asks parents whether the child “deliberately does things to annoy other people” (Conners, 2001, p.88). Item A-4 of the DSM-IV-TR is similarly phrased, asking whether the child “often deliberately annoys people” (APA, 2000, p. 94). Rather than asking parents whether the child’s behaviours annoy people or whether people are annoyed by the child’s behaviours, these statements explicitly query whether these annoying behaviours are ‘deliberate’. In light of theories of controllability offered by Weiner (1985) related to the importance of appraisals/attributions to parenting stress (Abidin, 1995) and the results of the presented mediator model (Figure 4), the findings from the current study suggest that such differences in language are not merely semantic.
In relation to the mediation model, it is likely that parents who perceive their child as ‘deliberately’ engaging in annoying behaviours are more likely to endorse greater severity on item 67 of the CPRS-R:L relative to parents who do not view their child’s behaviours as ‘deliberate’. Statistically and theoretically, this could explain a portion of why oppositionality/defiance mediates the relationship between ‘hot’ EFDs and Child Domain parenting stress. Although parental attributions are not measured within the current dissertation, the findings of this dissertation indicate that parental attributions regarding controllability may play an important role in the occurrence of parenting stress for children with ‘hot’ EFDs: a position consistent with the theories proffered by Johnston and Ohan (2005).

Summary of Oppositional/Defiance as a Mediator

The current dissertation is believed to be the first study that examined whether childhood oppositional/defiant behaviours (parent-reported) mediate the relationship between parent-reported ‘hot’ EFDs and Child Domain parenting stress. Results from the simple path analysis revealed that ODD partially mediated this relationship. This is consistent with previous research with childhood ADHD populations showing that ADHD/ODD is a particularly potent predictor of elevated parenting stress (Anastopoulos et al., 1992; Podolski & Nigg, 2001). The presence of a partial mediator relationship suggests that much of the reason parents are stressed by their child’s ‘hot’ EFDs is because of (or largely due to) the influence of the child’s oppositional/defiance. At the most basic level of interpretation this could mean that much of the reason children with EFDs (i.e., with difficulties with emotional regulation) are so stressful to parents, is because these difficulties manifest as oppositional/defiance during parent-child interactions. Findings from the mediator model
were also interpreted using concepts from the IMS (Lazarus & Folkman, 1984), suggesting that parents may feel threatened by their child’s oppositional/defiant/aggressive behaviours and/or characteristics. Therefore, the mediator model was re-expressed to state that the reason parents are stressed by their child’s ‘hot’ EFDs is largely due to parental appraisals of these characteristics as threatening and difficult to cope with, resulting in heightened levels of Child Domain parenting stress. This chapter advanced the suggestion that if parents experience their child as threatening to their sense of control, authority or emotional well-being, and they have difficulty accepting that their child has special needs (i.e., EFDs) because they perceive their child as purposefully disobedient or wilfully misbehaving, these parents may be less likely to respond to their child’s needs in a positive supportive manner. A misappraisal/misattribution of this nature may contribute to negative parenting practices that lead to increased childhood ODD. Negative parenting in turn may contribute to elevated levels of Child Domain parenting stress, thereby fuelling the negative spiral of parent-child interactions common to this population.

Moderators of EFDs and Parenting Stress

The third objective of this dissertation sought to determine whether the variables child age, child gender and stressful life events moderated the relationship between overall levels of parent-reported EFDs and levels of Child Domain parenting stress. Child age and stressful life events were hypothesized to moderate the relationship between EFDs and Child Domain parenting stress, while child gender and ADHD diagnostic categories were not.

*Child Age as a Moderator*

Results of the simple path analysis examining the presence of an interaction effect for child age revealed that, contrary to the stated hypothesis, child age did not moderate the
relationship between EFDs and Child Domain parenting stress. The failure to detect an interaction effect for age was somewhat surprising considering a review of the research related to the development of EFs and the emergence of EFDs among ADHD populations suggests that child age may function as a possible source of influence (Brocki & Bohlin, 2006; Wahlstedt, 2009; Welsh et al., 1991). That being said the current study showing age to be inconsequential as a moderator aligns with prior ADHD research which has examined the influence of child age on the occurrence of parenting stress (Baker, 1994; Costa et al., 2006; Deater-Deckard & Scarr, 1996; Johnson & Reader, 2002; Harrison & Sofronoff, 2002).

It is possible that the inability of the current study to detect a moderating effect for age resulted from the study’s inclusion criteria. To conform to the age parameters of the PSI, only parents of children 12 years of age or younger were included. As adolescence is a critical period for EF development and because development is believed to occur in a stage-like fashion (Stuss, 1992; Welsh et al., 1991), it is possible that the age range of the current study was too narrow to identify an interaction effect for age.

**Child Gender as a Moderator**

The results of the current study revealed that the association between Child Domain parenting stress levels and the severity of EFDs did not differ significantly in relation to child gender (i.e., between males and females). Consistent with the stated hypothesis, child gender did not moderate the relationship between overall levels of parent-reported EFDs and levels of Child Domain parenting stress. This finding is consistent with results from parallel research examining parenting stress in relation to childhood behavioural disorders and ADHD (Breen & Barkley, 1998; Deater-Deckard & Scarr, 1996; Harrison & Sofronoff, 2002; Johnson & Reader, 2002; Mash & Johnston, 1983). Although these studies did not investigate gender in
terms of a potential moderator, they concluded that there is little or no significant relationship between child gender and Child Domain parenting stress for children diagnosed with ADHD. The current findings contrast with the findings offered by Bussing, Gary and colleagues (2003) and Bussing, Zima and colleagues (2003) which indicated that parenting stress was significantly higher for parents raising boys. This conclusion may be due to the over-representation of males in the ADHD/ODD diagnostic groups used within these samples (Bussing, Gary et al., 2003; Bussing, Zima et al., 2003). This finding was not replicated in the current study despite the fact that approximately 80% of the ADHD/ODD group was male. In sum, child gender did not moderate the relationship between EFDs and Child Domain parenting stress in the current study.

Stressful Life Events as Moderators

Results from the moderator analyses using the continuous Life Stress Index of the PSI revealed that the relationship between EFDs and Child Domain parenting stress does not differ significantly between parents who also report experiencing either ‘high’ or ‘low’ stressful life conditions. Therefore, contrary to the stated hypothesis, stressful life events, measured by the PSI Life Stress Index, did not moderate the relationship between overall levels of parent-reported EFDs and levels of Child Domain parenting stress. The results of the follow-up analyses examining the 19 stressful events as dichotomous indicators of stress (e.g., divorce did or did not occur, a death in the family did or did not occur, a parent did or did not recently lose their job) revealed only a slightly different finding: the only stressful event that moderated the relationship between parent-reported EFDs and Child Domain parenting stress
was the child entering a new school within the year preceding their psychiatric assessment.\textsuperscript{53}

The findings from the current study showed that the majority of children and families who moved schools were in grade three, suggesting that these children were moving schools rather than entering a new school (i.e., entering school in Kindergarten). The results of this moderator model can be interpreted to mean that parents of children who entered a new school were more likely to experience elevated levels of Child Domain parenting stress in relation to the child’s EFDs compared to parents whose children did not enter a new school within the last year.

Entering a new school may be particularly difficult for parents raising children with ADHD and ADHD related difficulties, amplifying an already stressful situation. The literature suggests that parents can become stressed in their interactions with school personnel for several reasons. Parents may become stressed due to the added hassles of attending frequent meetings regarding their child’s unique learning or behavioural needs (Johnson & Reader, 2002; McKeever & Miller, 2004; Riley et al., 2006). They may also become stressed by what they perceive as negative relationships with school personnel (Brook & Boaz, 2005; Cronin, 2004). Parents also experience stress due to feeling judged by the school as responsible for the child’s difficulties or as failing to adequately rectify these behaviours (Brook & Boaz, 2005). What might be most surprising about the current finding, which identifies the child’s entering a new school as a moderator, was that parent-teacher problems were not implicated as a moderating relationship for EFDs and Child Domain parenting stress. Although 22\% of the current sample reported entering a new school in the last year, and 22\% of the sample

\textsuperscript{53} Parents completing the \textit{PSI} during the child’s initial psychiatric assessment were prompted within the \textit{PSI} to complete the Life Stress Index based on events that had occurred for the child or family within the last year. Therefore, a window of 1 year was established in which children from the current sample did or did not enter a new school.
experienced parent-teacher difficulties, there was no interaction effect found for parent-teacher problems.

These findings somewhat contrast with established parenting stress theories offered by Webster-Stratton (1990), who proposed that stressful events that occur in the broader environment are likely to have a meaningful impact on the functioning of the parent-child relationship. This theoretical position was also endorsed by Abidin (1995), who hypothesized that the 19 items comprising the *PSI* Life Stress likely act to moderate parenting stress levels. The lack of a moderating relationship beyond ‘new school’ also contrasts with parenting stress research that suggests that stressful life events, such as job loss, reduced income and lower socio-economic status may play an influential role in the occurrence of parenting stress (Baker, 1994; Baldwin et al., 1995; Conger, McCarty, Yang, Lahey, & Kropp, 1984; Deater-Deckard & Scarr, 1996; Deater-Deckard, Pinkerton, & Scarr, 1996).

Mash and Johnston’s (1990) model of parenting stress offers a potential explanation for why stressful life events did not significantly moderate the relationship between EFDs and Child Domain parenting stress. Their model agrees with the models offered by Abidin (1995) and Webster-Stratton (1990), which posit that stressful life events have an important role in parenting stress. However, their model stipulates that stressful life events act upon the functioning of the parent-child relationship and cause Child Domain parenting stress via the parent. This may mean that when parents are overwhelmed by the demands of the environment and cannot cope, stressful life events typically mediated by the parent are more likely to influence child-parent interactions (Mash & Johnston, 1990). Simply stated, in all but the most overwhelming or extreme situations, parents are able to buffer their child from these environmental stressors (Mash & Johnston, 1990; Sparrow, 2007). Therefore, considering that
the majority of parents in this dissertation reported experiencing low levels of stress (see Table 11) in relation to their own characteristics (i.e., Parent Domain stress) it is hypothesized that parents were able to buffer their child from the influences of stressful life events, resulting in no meaningful influence on the relationship between EFDs and Child Domain parenting stress, with the exception of all but one (i.e., ‘entering a new school’).

Interaction Effects of ADHD Subtypes on EFDs and Parenting Stress

The results revealed that the regression coefficients pertaining to the relationship between parent-reported EFDs and Child Domain parenting stress did not differ significantly in relation to ADHD diagnostic subtypes (ADHD-I, ADHD-C or ADHD/ODD). In conformation with the stated hypothesis, there was no interaction for the ADHD diagnostic subtypes, indicating that although absolute levels of Child Domain parenting stress differ between subtypes (see Table 11), no one subtype interacts with the relationship between EFDs and Child Domain parenting stress in a manner that differs significantly from the other two ADHD subtypes. This finding concurs with research conducted by Harrison and Sofronoff (2002), who showed that greater severity of child behavioural disturbances were directly related to elevated levels of parenting stress.

By comparing the slopes of the regressions (i.e., regression coefficients), the results revealed that there was no interactive effect for ADHD subtypes on the relationship between ‘hot’ EFDs and Child Domain parenting stress. This can be interpreted to mean that Child Domain parenting stress is not just predicted by a child’s diagnosis of ADHD/ODD, or, more simply stated; parents can be stressed in relation to their children by other subtypes of ADHD, although their respective stress levels may differ. This finding is consistent with the research conducted by Johnston (1996), who found that levels of parenting stress exist on a continuum.
with low levels associated with ADHD only groups, moderate levels of parenting stress for parents of children with ADHD and mild ODD behaviours, and elevated levels of parenting stress for ADHD groups with high levels of comorbid ODD. In sum, these findings suggest that although parents of children with ADHD/ODD may be at greater risk for more severe levels of Child Domain parenting stress, due in part to the greater severity of their child’s behavioural disturbance, parents of children with ‘hot’ EFDs who are diagnosed with ADHD-I or ADHD-C may also experience meaningful levels of Child Domain parenting stress that warrant assessment and possibly treatment.

Summary: Moderators of EFDs and Parenting Stress

Several potential moderating factors on the relationship between EFDs and Child Domain parenting stress were examined. The variables child age and child gender did not moderate this relationship although the age range of the current study may have been too narrow to identify an interaction effect for age. With the inclusion of an adolescent population, it is possible that a moderating relationship may be uncovered. This suggests that parents may be equally at risk to experience elevated levels of Child Domain parenting stress regardless of the child’s age or gender, particularly if the child displays behaviours associated with ‘hot’ EFDs and ODD. Furthermore, there was no interaction effect for ADHD diagnostic subtypes on the relationship between EFDs and Child Domain parenting stress. This suggests that elevated levels of Child Domain parenting stress likely correspond to elevated levels of child behavioural difficulties.

The only variable that emerged as a moderating influence on the relationship between EFDs and Child Domain parenting stress was whether the child had entered a new school.

54 The use of the Stress Index for Parents of Adolescents (SIPA), the adolescent version of the PSI, would be required to include youth over 12 years of age.
within the year preceding their psychiatric assessment. For children with EFDs, entering a new school likely presents a range of unique hassles and stressors not encountered by parents whose children are continuing at the same school. Considering that the data used in the current dissertation reflects children and families engaged in a first psychiatric assessment, it is less likely that parents would be experiencing difficulties and added stress related to feeling judged for their use of medication or encountering teaching staff who did not ‘believe’ in ADHD. Most likely the differences in Child Domain parenting stress reported by parents whose children entered a new school are linked to needing to deal with hassles directly corresponding to the child’s EFDs, including getting the child off to school on time, receiving phone calls from new teachers regarding the child’s behavioural and/or learning difficulties, and dealing with social challenges (fights and isolation) that often arise for children with ADHD.
CHAPTER VIII – LIMITATIONS AND CONCLUSIONS

The current study was undertaken to address the gap in knowledge as to whether severity of childhood EFDs (parent-reported and teacher-reported) is associated with elevated levels of parenting stress (Child Domain and Parent Domain). There is only one study known to this author that has examined this area (Joyner et al., 2009). It is somewhat surprising that more research has not been conducted in this area considering the substantive body of knowledge linking EFDs and childhood ADHD and the growing body of research connecting parenting stress with childhood ADHD. The failure to examine this important topic may be due to the dominance of bio-medical epistemologies within ADHD research that commonly de-prioritize, if not devalue, the importance of researching the impact of childhood mental disorders on parental and family functioning (Sroufe, 1997). By utilizing parent-reported and teacher-reported measures of EFDs, rather than measures of ADHD behavioural symptoms, this study offered an alternate route to explore how children’s symptoms of ADHD and ADHD/ODD might influence levels of Child Domain parenting stress. Mining more deeply into the possible sources of parenting stress associated with childhood ADHD, such as EFDs, will provide a more precise picture of why parents feel highly stressed raising children with ADHD. Gaining such insight is vital to the design or redesign of programming and services for this population. The current study produced a number of important findings that have numerous implications for social workers and mental health professionals working with young people and parents impacted by EFDs, ADHD, ODD and parenting stress. Prior to drawing conclusions from these findings, the strengths and limitations of this dissertation are examined below.
Strengths and Limitations of the Current Study

Strengths of the Study

The present study represents a newly developing area of research within the field of parenting stress. The primary strength of this dissertation was the use of a sizable cross-sectional sample of children attending a clinic specializing in ADHD assessment. Garnering input from both parents and teachers regarding each child in the sample helped to ensure the veracity of the ADHD diagnosis and was instrumental in identifying the range of EFDs displayed by children in the home and school environments. Using parent and teacher reports helped to show that Child Domain parenting stress is best predicted by parent-reported observations of children’s behaviour and/or by the behaviours children display in the environment under the purview of parents (e.g., the home environment or community settings).

The use of a relatively large sample provided sufficient statistical power to employ advanced multivariate statistical analyses, including HLR. The use of inferential statistics builds on the analyses conducted by Joyner and colleagues (2009) which were limited to correlation analyses. Ample statistical power also enabled the examination of ADHD subtypes (i.e., ADHD-I, ADHD-C and ADHD/ODD) in relation to EFDs and parenting stress, as well as examination of the individual subscales of the BRIEF and the PSI. Ostberg and colleagues (2007) recommended the examination of PSI subscales, as these were found to differ in predictive ability. Examining the PSI subscales proved to be particularly important in the current study, as this allowed for the identification of acceptance of the child as an important factor in parenting stress among ADHD populations, an area not well explored in the literature on parenting stress.
Conducting analyses on the distinct diagnostic grouping category of ADHD/ODD was a further strength, as this made it possible to distinguish between children formally diagnosed with comorbid ODD (i.e., ADHD/ODD) and those children with sub-clinical levels of oppositionality/defiance in other diagnostic groups (e.g., ADHD-C). This distinction is important because parents raising children with ADHD and moderate levels of oppositionality/defiant behaviours (i.e., oppositional/defiant behaviours that are problematic but fall shy of a formal diagnosis of ODD) may experience many of the same difficulties as parents raising children with ADHD/ODD, including worrisome levels of parenting stress (Johnston, 1996). Findings from the current study showed this to be true, as a small group of parents raising children with ADHD-I and ADHD-C reported elevated levels of Child Domain parenting stress (see Table 11). Furthermore, ‘cool’ EFDs, associated with ADHD-I and ADHD-C also explained a small but meaningful amount of the variance in Child Domain parenting stress within the current sample.

An additional strength of this dissertation was the ‘moment-in-time’ captured within the cross-sectional data set. This data set comprised materials pertaining to children’s initial psychiatric assessments for ADHD. It is common in research studies to recruit from multiple sources (e.g., mental health programs, family physicians, schools, community centres, newspapers), which often leads to children at various stages of diagnosis and treatment. By taking a cross-section of the initial psychiatric assessment this dissertation was able to evaluate a common point in time to measure the perspectives of parents and teachers related to EFDs and parenting stress, providing increased assurance that the children were at similar stages of assessment and treatment. This is important because there is some indication that the time between the point of assessment, the receipt of a formal diagnosis, and the initiation of
treatment may influence parental attributions and stress levels and child behaviour patterns (Johnston & Freeman, 1997).

A final strength of the current study was its firm theoretical grounding, theoretical transparency, and theoretical congruence. Theoretical congruence between theories and measures was achieved through the congruence between the IMS (Lazarus, 1966), Abidin’s model of parenting stress (Burke & Abidin, 1978 as cited in Abidin, 1990; 1995) and the PSI. The emphasis on person-environment transactions within the IMS (Lazarus & Folkman, 1984) and a multiple pathways orientation to ADHD and EFDs (Nigg, 2006; Sonuga-Barke, 2002, 2005) is also theoretically congruent with the core social work value that upholds the importance of a person-in-environment approach to social work practice (Bogo, 2006; Germain, 1994; Germain, & Bloom, 1999; Germain & Gitterman, 1996; Mattaini & Meyer, 2002; Payne, 2005).

The grounding of the current dissertation’s conceptualization of ADHD and EFDs within a multiple pathways orientation (Nigg, 2006; Sonuga-Barke, 2002, 2005) to the disorder, along with the transparent use of this theoretical framework helped to more clearly position the results, discussion and conclusions in the broader ADHD literature. It also helped convey the study’s key assumptions regarding etiology (i.e., genetic and gene X environment correlation) and the neuropsychological contribution to ADHD symptomatology (i.e., EFDs), which are not necessarily conveyed through the use of DSM-IV-TR diagnostic criteria alone (APA, 2000). Grounding the current dissertation’s conceptualization of stress in the IMS (Lazarus, 1966) was a key strength because Abidin’s theory of parenting stress (Abidin, 1978 as cited in Abidin, 1990; 1995), and by extension the PSI, are largely atheoretical in nature (McCleary, 2002), drawing heavily on the core principles of the IMS. Despite the influence of
the IMS (Lazarus, 1966) on aspects of Abidin’s model, few if any core elements of Lazarus’ model (i.e., appraisal and coping) are prominently positioned within the parenting stress literature with few exceptions (see McCleary, 2002).

Limitations of the Current Study

The present study offers several new and provocative findings related to EFDs, parenting stress and childhood ADHD, but is not without its limitations. The possible limitations of this study arise in relation to sampling issues; measurement issues; possible covariates and/or confounding agents; and the directionality of the relationship between EFDs and parenting stress (i.e., correlation versus causation). A review of these potential areas of limitation follows.

Possible Sample-Related Limitations

The generalizability of the results of the current study may be limited due to the clinical nature of the sample and inclusion criteria used restricting participation to children diagnosed with ADHD and their parents. Furthermore, this sample was derived from a children’s mental health program specializing in the assessment and treatment of ADHD, for which a physician’s referral was required. Morgan, Robinson and Aldridge (2002) suggest that the process of seeking a referral to a children’s mental health clinic may actually reinforce parents’ views that their child has a behavioural disorder that warrants a diagnosis such as ADHD or ODD, possibly resulting in higher ratings of their child’s behavioural issues on intake measures. However, the rate of comorbid ODD in the sample (25%) is roughly half of what is expected among clinical samples of children with ADHD (Acosta et al., 2004; August et al., 1999; Biederman et al., 1991; Lalonde et al., 1998), suggesting that the current sample may have less severe comorbid externalizing disorders than other clinical groups. Therefore,
the results of the current study may not generalize beyond clinical samples of children at risk for ADHD. Furthermore, due to the lack of children with ADHD-HI in the study, the findings related to EFDs and parenting stress may not apply to children with this particular diagnosis.

In relation to the levels of parenting stress reported within this dissertation, several factors should be considered when attempting to generalize from the current findings. The levels of parenting stress were provided by parents who have accessed a psychiatric assessment for their child, suggesting the possibility that these parents may be coping less well and experiencing more stress than other parents who did not pursue this type of assessment. Furthermore, the fact that they pursued an assessment with a psychiatrist suggests that these parents may have a particular view of their child’s learning/behavioural difficulties which can influence how they cope with parenting stress (i.e., problem-focused coping). Alternately, it is worth considering that the data used in the current study reflects a point-in-time when the family was pursuing an initial assessment and the majority had not yet engaged in treatment programming. Therefore, it is possible that the levels of childhood behavioural disruption and Child Domain parenting stress may actually increase over time, if treatment is unsuccessful and/or negative patterns of parent-child interaction become entrenched, as often happens with ADHD/ODD (Mash & Johnston, 1990). Therefore, one should also consider the length of time the parent-child relationship has been experienced as stressful by the parent. This may be especially important given that parenting stress may be cumulative over time (Crnic, Gaze, & Hoffman, 2005) and given that ADHD and EFDs are believed to be highly stable across development (Biederman et al., 2007; Biederman et al., 2008).
Possible Measurement Related Limitations

There are several potential limitations associated with measurement issues, including the conceptual overlap between testing items on the CPRS-R-L, the BRIEF and the PSI; the use of a single reporter for parenting stress; and the cultural applicability of the testing measures.

Shared variance & multicollinearity.

Chief among the potential measurement limitations are the related concepts of shared method variance and multicollinearity. The current study uses a single method of data collection (i.e., parent-reported and teacher-reported questionnaires) and relies heavily on parent information as the lone source of information for some questions, although teacher input was included. Kendall and colleagues (2005) warn against this, as it is possible that this common methods bias could inflate the significance of the relationships between childhood behaviour problems, such as EFDs, and parenting stress. Doty and Glick (1998) refute these concerns, however, stating that common methods variance account for relatively small covariation among variables. Although several of these measures (or at least several subscales of these measures) used in the current study are highly intercorrelated and appear to tap similar constructs, none of the intercorrelations were considered at extreme risk for multicollinearity (Grewal et al., 2004; Licht, 2004).

The risk of having highly intercorrelated variables was not unexpected, as a central tenet of the current research is that EFDs underpin ODD and are linked in a causal chain to child-related parenting stress (i.e., the second study objective). By hypothesizing that 'hot' EFDs (e.g., difficulties with inhibition and emotional control) underpins oppositionality/defiance, it is expected that high levels of intercorrelations will exist between
these variables, and in fact is a requirement to substantiate the presence of a mediation
relationship (Baron & Kenny, 1986). The current study does not appear highly vulnerable to
Type II errors due to multicollinearity, because the highly intercorrelated variables were found
to be significant predictors of Child Domain parenting stress (i.e., parent BRIEF BRI
predicting onto the Child Domain of PSI), while non-significant predictor variables were
those that were not highly intercorrelated (i.e., parent BRIEF WM scale and PSI child
domain). Both of these scenarios are largely inconsistent with committing a Type II error. It is
likely that the high level of reliability within the current sample (i.e., Cronbach’s alpha) along
with the sizable sample lowered the risk for Type II error due to multicollinearity (Grewal et
al., 2004).

*Use of a lone rating measure of parenting stress.*

A potential limitation associated with using a lone measure of parenting stress arises
from the inherent difficulty of unravelling whether the parent is accurately reporting the
occurrence of stress with respect to the parenting role or parent-child interactions. Morgan and
colleagues (2002) suggest that as levels of parenting stress increase, the accuracy of parental
reporting of child behavioural difficulties may decline and may be more likely to accentuate
negative child behaviours. McCleary (2002) disagrees however, stating that “regardless of
their stress level, mothers are good informants about their children’s behaviour and about their
stress” (p. 289).

This is not to say, however, that parental psychological factors do not influence or
potentially distort the accuracy of parental reports related to parenting stress. For example,
research suggests that parental depression may influence the reporting of parenting stress,
with depressed parents reporting higher levels of stress (Chi & Hinshaw, 2002; Gelfand, Teti,
& Fox, 1992). It should be noted that the validity of depression distortion hypothesis has been challenged (Richters, 1992). The theoretical approach applied in the current dissertation renders the use of an objective third party comparison of stress incompatible and arguably meaningless. It is therefore an accepted limitation that this study relied on a single rating for parenting stress.

*Cultural relevance of measures.

The sample used in the current dissertation was drawn from a highly diverse multicultural community. Although almost half of the sample declined to report their cultural background on the *PSI*, at least 15% of the sample reported being from diverse cultural backgrounds. These self-identified ethno-cultural backgrounds were described as South Asian, Filipino, East Indian, Asian, Chinese, Black, African, and Caribbean. A culturally heterogeneous sample may pose a potential limitation because the standardized behavioural rating scales employed in this dissertation may, or may not, be sensitive to diverse ethno-cultural backgrounds. Understanding the ethno-cultural diversity of the normative groups used to develop these measures is vital because culture may influence parents’ interpretations of the assessment questionnaires or the assessment process (Rousseau, Measham, & Bathiche-Suidan, 2008).

The *PSI* and the *BRIEF* were both standardized in a mix of urban and rural centres across the USA, while the *CPRS-R:L/CTRS-R:L* was developed throughout the USA and Canada. The normative data for these measures comprised of parents from a diverse range of ethno-cultural backgrounds including African-American/Black parents, Hispanic parents, Asian/Pacific-Islander parents, Caucasian parents, and Native-American parents. The *PSI* did not include parents of Native-American heritage. Overall, the samples used to develop the *PSI*
and the BRIEF were heavily-weighted towards Caucasian families. When combined, the ethno-cultural groups (other than Caucasian) represented approximately 25% of the normative sample of each of these measures. This suggests that the ethno-cultural sensitivity of these measures was less than ideal and the findings of the current sample may be less meaningful for children and parents from non-Caucasian backgrounds and therefore the findings from the current study may not necessarily generalize to a culturally diverse sample.

**Validity of the BRIEF as a measure of EFs/EFDs.**

With the focus of the current study on EFDs, a possible limitation arises from the reliance on the BRIEF as the only measure of EFDs, due to fact that the validity of the BRIEF as a measure of EFDs has yet to be fully established. Research findings are somewhat inconclusive in this regard, with some studies showing the BRIEF to have little or no relationship with established performance-based measures of EFs/EFDs (Bodnar et al., 2007; Mahone et al., 2002; McAuley et al., 2010), while other studies show a poor to modest relationship (Anderson, 2002; Toplak et al., 2009). Methodological issues arise in a few of these studies that challenge the validity of the BRIEF which must also be considered. For example, the recent study conducted by McAuley and colleagues (2010) concludes that there is no significant relationship between the BRIEF MI and BRI composite scales and performance-based measures of EFs/EFDs. The methodological problem specific to this study stems from the comparison between the BRIEF’s composite scales (e.g., BRI and MI) that measure several specific EFDs (i.e., planning and WM or inhibition, shift and emotional regulation) and performance-based measures that evaluate specific EFs/EFDs (i.e., the N-back task measures WM while the Stop-signal task measures inhibition). It may have been preferable to directly compare the WM subscale of the BRIEF with the N-back task and the
BRIEF inhibit subscale with the Stop-signal task in order to avoid unnecessarily mudding the waters. Despite this indirect comparison, the authors found a significant relationship between the MI scale and the N-Back test \((r = .26, p < .05)\), contrary to their report that “neither [the MI nor the BRI] was associated with youth’s scores on the performance-based tasks of executive function” (McAuley et al., 2010, p. 495). Regardless, criticisms and debate regarding the BRIEF’s validity exist and must be recognized as a central limitation of this paper.

Nonetheless, there may be several benefits to using the BRIEF. Firstly, the BRIEF appears to be an effective screening tool for EFDs that compliments the use of conventional performance-based measures (McAuley et al., 2010; Toplak et al., 2009). Although some authors (Anderson, 2002; Biederman et al., 2004; Denckla, 2002; Donders, 2002; Jurado & Rosselli, 2007; Isquith et al., 2004; Riccio et al., 2006) suggest that the BRIEF provides good ecological validity compared to performance-based measures of EFDs, what may be more consistent with the objectives of the current research is that the BRIEF provides mental health professionals and educators with an expedient, cost effective and direct source of feedback from parents and/or teachers regarding children’s difficulties that may be indicative of EFDs. This information may prove beneficial to help identify children who could benefit from a more thorough assessment for EFDs using performance-based measures. For example, the BRIEF may be well-suited to report on the presence of behaviours indicative of ‘hot’ EFDs (e.g., emotional regulation) that could otherwise go unnoticed by the more common performance-based measures of EFDs, which typically render findings only for ‘cool’ EFDs (Anderson, 2002; Anderson, Anderson et al., 2002; Jurado & Rosselli, 2007; Stuss & Alexander, 2000).
Secondly, the BRIEF is used as a complimentary means of measuring the functional impairments associated with ADHD (Gioia, Isquith, Kenworthy et al., 2002; Jarratt et al., 2005; McAuley et al., 2010; Toplak et al., 2009). The BRIEF is not designed to measure ADHD per se, and although is sensitive to ADHD, appears to be best used as an adjunct to DSM-IV-based measurement scales of ADHD, such as the ADHD Rating Scale IV (DuPaul et al., 1998). Using the BRIEF in this manner may circumvent a potential confound that arises when using DSM-IV-based ADHD measures to predict Child Domain parenting stress on the PSI-LF. As originally articulated by Anastopoulos and colleagues (1992), a confound of shared variance arises in regression analyses when predictor variables derived from DSM-based ADHD diagnostic criteria (such is the case with the ADHD Rating Scale-IV) are regressed onto the distractibility/hyperactivity scale of the PSI-LF. This is because several items of the distractibility/hyperactivity subscale of the PSI also draw upon DSM-IV ADHD criteria. A tautology is established where scores on ADHD items of the predictor variable strongly predict scores on ADHD items of the criterion variable.

Research conducted by Gioia and colleagues (2000) and Mahone and colleagues (2002) suggests that scores on the BRIEF may serve as an effective proxy measure for ADHD, but tap into a different, but significantly related, phenomenon from ADHD (Mahone et al., 2002). Toplak and colleagues (2009) also concluded that the BRIEF was a very effective measure for identifying ADHD and ADHD subtypes. Therefore, although future research is needed to resolve the validity debate surrounding the BRIEF’s ability to measure EFs/EFDs, this measure offers the current study and future researchers an alternate tool to examine parenting stress in the context of childhood ADHD.
Limitations Arising from Unmeasured Confounding Variables

**Intelligence (IQ).**

Due to the nature of the secondary data set, it was not possible to measure, or control for, the influences of child intelligence, as is commonly measured by such psychological tests as the WISC. Intelligence and IQ are believed to be distinct from EF processes (Pennington & Ozonoff, 1996), but children with ADHD are known to experience, on average, lower IQs than typically developing children (Biederman et al., 2004; Toplak et al., 2005). The central issue is whether IQ influences the relationship between EFDs and ADHD and whether parents may be experiencing elevated levels of stress in relation to intellectual difficulties, rather than EFDs.

Some research suggests that IQ has no significant influence (Martinussen et al., 2005; Schuck & Crinella, 2005) while other research finds that when IQ is controlled for, there is no longer a meaningful relationship between EFDs and ADHD (Jonsdottir et al., 2006; Mullane & Corkum, 2007; Scheres et al., 2004). To address this issue, some research protocols suggest controlling for IQ level (Denckla, 1996b), while others suggest that this may remove some of the variance attributable to ADHD (Nigg, 2001; Willcutt, Doyle et al., 2005). Willcutt, Doyle and colleagues (2005) address this ideological stalemate by indicating that the optimal methodological approach may be to conduct the analysis both controlling and not controlling for IQ, thereby allowing for richer insight into the potential role that IQ plays in EFDs for children with ADHD and how this influences levels of parenting stress. Because the current research did not control for child IQ, caution should be exercised when interpreting the results linking EFDs with Child Domain parenting stress, as the child’s IQ may play an unknown moderating or mediating role in this union.
Learning disabilities/disorders.

In addition to being unable to control for child IQ level, the limitations posed by the secondary data set did not allow for the control of child learning disabilities/disorders (LD). The high rates of comorbid LD within the current sample (18% confirmed and an additional 24% suspected) are consistent with the estimates of rates for LD among childhood ADHD populations (Acosta et al., 2004; August et al., 1999; Biederman et al., 1991). Due to the overlaps between LD and ADHD, it is possible that the presence of LD may influence the relationship between EFDs and Child Domain parenting stress. This overlap diminishes the level of confidence in the current results affirming a relationship between EFDs and child-related parenting stress and should be controlled for in future studies.

Direction of the Relationship between EFDs and Parenting Stress

The use of cross-sectional data limits the current study to understanding the relationship between EFDs and parenting stress in terms of a correlation, rather than a causal relationship. The current study is therefore not able to determine the direction or temporality with regards to the relationship between EFDs and Child Domain parenting stress. This limitation prevents the current study from attesting to whether high levels of Child Domain parenting stress are cause or consequence of childhood EFDs. The current study has operated under the premise that EFDs contribute to Child Domain parenting stress, consistent with established theories of parenting stress that implicate child characteristics as the major source of parenting stress (Abidin, 1990; Mash & Johnston, 1990). Considering the inverse as an equally plausible alternative, the findings of the current dissertation could be interpreted to mean that high levels of parenting stress contribute to the manifestation of childhood EFDs for children diagnosed with ADHD and ADHD/ODD. Such an interpretation would remain consistent
with parenting stress theories (Mash & Johnston, 1990; Webster-Stratton, 1990) which posit that the parent-child relationship among ADHD populations is bi-directional in nature, with parents influencing the child’s behaviours through parenting and the child influencing the parent through their behaviour. However, Mash and Johnston (1990) theorize that the child’s characteristics and behaviours fuel the reciprocal exchange between parent and child, a view that has been largely substantiated through causal research showing that the parents’ negative behaviours change in response to the childrens’ behavioural changes (Barkley, 1988; Barkley & Cunningham, 1979; Barkley & Cunningham, 1980; Barkley et al., 1985; Humphries et al., 1978). Although EFDs and Child Domain parenting stress are only associated via correlational data in the current study, it is theoretically sound to conclude that children with EFDs likely influence their parents’ stress levels ($PSI$ Child Domain), rather than stressed parents influencing the level of childrens’ EFDs.

Conclusions: Clinical Implications and Relevance to Social Work

The current study produced a number of important findings; key of which was the finding that a strong association exists between parent-reported EFDs and Child Domain parenting stress. Specifically, elevated levels of parent-reported ‘hot’ EFDs were more potent predictors of elevated levels of Child Domain parenting stress than ‘cool’ EFDs, and parent-reported EFDs were more closely associated with Child Domain parenting stress than teacher-reported EFDs. Difficulties with emotional control and inhibition were found to be particularly potent predictors of Child Domain parenting stress, which is consistent with prior research on ADHD/ODD (Anastopoulos et al., 1992; Harrison & Sofronoff, 2002; Podolski & Nigg, 2001; Ross et al., 1998; Theule et al., in press; Vitanza & Guarnaccia, 1999). Parental acceptance of the child’s characteristics or special needs was found to be a key contributor to
the levels of Child Domain parenting stress closely matching the stress associated with child characteristics related to hyperactivity/inattention and demandingness. Acceptance has not been well-explored within the parenting stress literature pertaining to childhood ADHD.

Also important were the findings that difficulties with initiation and monitoring were associated with Child Domain parenting stress. This low level, but omnipresent stress, likely arises from the daily hassles parents face by helping monitor their child’s completion of such things as homework or household chores, and parents’ efforts to help their child overcome initiation difficulties by imposing routine, reminders and prompting to get their child to get going on tasks and activities, such as getting off to school. The stress arising from the daily hassles of helping children overcome or offset these difficulties likely compounds with the stress, corresponding to the negative interactions fuelled by the child’s EFDs with emotional control and inhibition. Extending the extensive body of research linking ADHD/ODD and parenting stress, the current study found that parent-reported oppositionality/defiance partially mediated the relationship between parent-reported ‘hot’ EFDs and Child Domain parenting stress. It can be concluded from this that more severe child behavioural disruptions and/or increased parental perceptions of the child being ‘deliberately’ oppositional/defiant explain a significant portion of why parents are stressed by their child’s difficulties in the areas of emotional control, inhibition and shift.

By and large, teacher-reported EFDs were not significantly associated with Child Domain stress, although difficulties with emotional control did explain a small amount of the variance in Child Domain parenting stress. The lack of a substantive relationship between teacher-reported EFDs and Child Domain parenting stress was somewhat surprising considering that teacher reports on the BRIEF indicated that children with ADHD experienced
clinically significant EFDs in multiple areas at a level that exceeded the concerns reported by parents. It is possible to conclude that teachers cope effectively with ‘cool’ EFDs displayed in the school but are less able or willing to meet the demands of children displaying behaviour patterns consistent with emotional control difficulties. Parents of children who were attending a new school were more likely to report elevated levels of Child Domain parenting stress in relation to their child’s EFDs, relative to parents of children who were not attending a new school. This was likely due to the added burden faced by parents (e.g., parent-teacher meetings) of working closely with schools to support the child’s unique learning or behavioural needs (Johnson & Reader, 2002; McKeever & Miller, 2004; Riley et al., 2006). It is less likely that this moderating effect arises through parent-teacher conflict, as has been suggested elsewhere (Brook & Boaz, 2005; Cronin, 2004), as parent-teacher conflicts reported by a minority of parents did not significantly impact the relationship between EFDs and Child Domain parenting stress.

Overall, the majority of parents reported experiencing ‘normal’ levels of stress in relation to their own characteristics or facets of life unrelated to parenting (i.e., Parent Domain parenting stress). However, many parents reported experiencing high levels of Child Domain parenting stress in relation to the stress specifically associated with raising a child, including the influence of the child’s characteristics and behaviours. In particular, the majority of parents (78%) of children with ADHD/ODD reported experiencing clinically significant levels of stress, suggesting that these children and their parents are particularly ‘at-risk’ and should be prioritized for access to professional intervention. It is important to note, however, that the results showed that over one-third (38%) of parents of children with ADHD-I and almost half (48%) of parents of children with ADHD-C also experienced elevated levels of
Child Domain parenting stress in relation to their child. From a theoretical perspective, these findings suggest that parenting stress does not just occur as a by-product of the severity of the child’s behavioural disturbance, but it occurs as a result of the perceived mismatch between the demands placed on the parenting role and the parent’s perception of the available resource to cope with these demands. The finding that parents of children with ADHD-I and ADHD-C experienced stress in relation to ‘cool’ EFDs suggests that, although children displaying ‘hot’ EFDs and ODD and their families may be a priority population for mental health service provision, due to significant behaviour problems and elevated levels of parenting stress, other segments of the ADHD population may also benefit from social work intervention. The current dissertation bridges the research examining EFDs in relation to childhood ADHD and the research examining parenting stress related to childhood ADHD.

**Role of Social Work**

Social work has an important role to play in the field of children’s mental health. The profession’s commitment to a person-in-environment orientation (Bogo, 2006; Germain & Gitterman, 1996; Mattaini & Meyer, 2002) equips social workers to engage as clinicians and researchers with young people, parents and families impacted by ADHD and EFDs. Today, clinical social work represents one of the largest providers of mental health support and treatment in North America (Cunningham & Booth, 2008). Considering that ADHD is one of the most commonly diagnosed and treated children’s mental health issues in North America (Barkley, 1998; Cantwell, 1996; Dulcan, 1997; Pliszka, 2000; Pliszka et al., 2007; Waschbusch, 2002), it is highly likely that clinical social workers are, and will continue to be, in frequent contact with children impacted by ADHD, EFDs, ODD and parents struggling to cope with high levels of Child Domain parenting stress. Clinical social work has the
opportunity to play a leading role in the direct assessment and treatment of children and families impacted by ADHD and can make an important contribution to ADHD research and the design or redesign of programming, services and policy for this population. Despite being active in direct practice with children and families, authors such as McCleary (2002) have been critical of the lack of attention paid to this population within the social work literature, which is in strong contrast to the voluminous research published on ADHD within the fields of medicine and psychology. If ADHD is left strictly to the purview of medicine/psychiatry, it is possible that biologically oriented approaches to conceptualizing and treating this neurodevelopmental disorder will continue to dominate the professional discourse to the exclusion of social work congruent approaches that seek to understand the role of environmental/experiential factors, such as family functioning and the importance of gene X environment correlations.

The current dissertation underscored that to work effectively in a clinical or research capacity with childhood ADHD, it is important for social workers to be well-informed about the neurobiological and neuropsychological issues experienced by their client (e.g., EFDs) and the implications this may have for the family system (e.g., high levels of parenting stress). The current study challenges the viewpoint proffered by Germain and Bloom (1999) that social workers require little understanding of a person’s biological makeup and should instead inform their everyday practice with “psychosocial, cultural, economic, and political information” (p. 190). In contrast, the current study lends support for Cunningham and Booth’s (2008) position that clinical social workers specializing in working with children and families must possess detailed knowledge of the “biological, emotional, psychological, cognitive and behavioural processes” (p. 350) that affect childrens’ functioning and the
functioning of families. Too often, clinicians working with children’s mental health issues, such as ADHD, overemphasize interpersonal or family dynamics as the source of childhood behavioural problems and fail to recognize, or disregard outright, the importance of the neurological underpinnings or biological challenges fuelling the behavioural difficulties (Bernier & Siegel, 1994).

Clinical social workers are beginning to recognize the importance of informing their therapeutic practice with neurobiological theory and research (Applegate & Shapiro, 2005; Miehls, 2011). In fact, Applegate and Shapiro (2005) suggest that neurobiological-informed clinical social work is a newly emerging specialization within the field. Early writers in the field of neurobiology and social work challenged the profession to consider knowledge of the biological facets of mental disorders/neurodevelopmental disorders not as a departure from our profession’s theoretical roots or core values and an aligning with bio-medical traditions, but rather as a means to be more empathic with our client systems (Applegate & Shapiro, 2005; Miehls, 2011).

To hold a leadership position in the provision of effective, efficient and ethical service within children’s mental health, the social work profession must continue to update its theoretical base to account for advances in contemporary research, including recognizing the importance of genetics and biology to mental and neurodevelopmental disorders. For example, as a profession we can follow the lead of Bronfenbrenner (see Bronfenbrenner, 2005; Bronfenbrenner & Ceci, 1994) and update our often practiced ecological-systems perspective (Bogo, 2006; Germain & Bloom, 1999; Hartman, 1994) to include a stronger biological understanding of the realities experienced by the individuals and families with whom we engage. Shifting our model of practice from an ecological-systems perspective
(Bronfenbrenner, 1979) to what Bronfenbrenner and Ceci (1994) currently describe as a bioecological model of practice would retain the core principles of Bronfenbrenner’s (1979) original ecological-systems model, while incorporating the biological influences necessary to work clinically with children and families impacted by ADHD and EFDs.

In the current study the importance of genetic heritability for the onset of ADHD is acknowledged. However, by drawing upon a multiple pathways orientation to ADHD, the importance of gene X environment correlations to the occurrence of childhood ‘hot’ EFDs and oppositional/defiant behaviours was also recognized; childhood characteristics and behaviour patterns were key to the occurrence of elevated levels of Child Domain parenting stress. Sroufe (1997) warned that absolute views of EFDs and ADHD as endogenous pathogens will significantly curtail research efforts to understand how environmental/experiential risk factors contribute to this phenomenon. This dissertation heeds Sroufe’s warning and suggests that clinical social workers are ideally positioned to play a leading role as clinician-researchers in future research that examines the possible gene X environment correlations that may give rise to comorbid oppositionality/defiance and clinically significant levels of parenting stress, which are linked to negative developmental outcomes (Lahey, Loeber, Burke, Rathouz, & McBurnett, 2002; Loeber et al., 2000; Steiner et al., 2007; van Lier et al., 2007; Waschbusch, 2002). Understanding the contribution that neurobiological/neuropsychological factors, such as EFDs, make to ADHD symptomatology and the onset and maintenance of oppositional/defiant behaviour patterns may help social workers to inform their clinical practice in the areas of assessment, treatment and early intervention.
Working with Children and Parents Impacted by ADHD

Assessment.

The current study has direct relevance for clinical social workers and mental health professionals working with children and families impacted by ADHD. It is likely that different ADHD diagnostic subgroups experience unique challenges, have different treatment needs and will likely be responsive to different treatment interventions (Cunningham, 1999). It is also likely that the experience of parenting stress is different for parents. This may depend on their child’s ADHD subtype (Johnson & Reader, 2002; Yang et al., 2007), whether comorbid behavioural issues are present (Anastopoulos et al., 1992; Baldwin et al., 1995; Evans et al., 2009; Harrison & Sofronoff, 2002; Podolski & Nigg, 2001; Ross et al., 1998; Vitanza & Guarnaccia, 1999), or be simply due to the unique appraisal/attribution patterns of that parent (Harrison & Sofronoff, 2002; Mc Cleary, 2002). A growing body of research (Baker, 1994; Baker & Mc Cal, 1995; Baldwin et al., 1995; Breen & Barkley, 1988; Mash & Johnston, 1983; Goldstein et al., 2007; Theule et al., in press) implicates child characteristics as the major source of total levels of parenting stress for childhood ADHD populations, a finding confirmed by the current dissertation. What is lacking, however, is a more precise understanding of what in particular it is about the child’s characteristics that makes a child with ADHD and ADHD/ODD so stressful the parent.

Findings from the current dissertation indicate that there may be utility within clinical assessments with childhood ADHD populations to move beyond assessing for the child’s ADHD diagnostic subtype (e.g., ADHD-I, ADHD-C) to also understand what EFDs the child may experience, if any. Results from the current study showed that a questionnaire, such as the BRIEF, can provide clinicians with an efficient screening tool to identify behaviour
patterns suggestive of particular EFDs (e.g., difficulties with WM, inhibition, shift, planning, emotional control). Although assessing for the presence of EFDs is not indicated as a standard component of ADHD assessments by the American Academy of Child or Adolescent Psychiatry (see Pliszka et al., 2007) or the Canadian ADHD Resource Alliance (2011), such information may be highly beneficial to (a) understand with more depth what facets of the child’s behaviour predict elevated levels of Child Domain and Parent Domain parenting stress; and (b) develop and/or implement treatment programming that is more precisely tailored to the needs of the child and the parent, rather than continuing to implement one-size-fits-all psychosocial interventions. By using the BRIEF, clinicians may be able to identify which children should be referred for more comprehensive neuropsychological screening for EFDs, as is currently the protocol when a learning disability/disorder is suspected.

Including screening and assessment for EFDs within ADHD assessment protocol may also help to identify children and families that are at particular risk for the onset of ODD. Findings from the current sample revealed that EFDs with emotional control were strongly related to comorbid ODD, as well as to elevated levels of Child Domain parenting stress. Obtaining an accurate assessment prior to treatment is particularly important when working with children with ADHD/ODD because successful treatment of ODD is influenced by the degree to which “the child and parent characteristics contributing to the child’s oppositional behavior are comprehensively assessed and well understood” to allow for “treatment [to] match the specific needs of individual children and their families” (Green & Doyle, 1999, p. 138). Findings from the current dissertation concur with other research showing that ODD is a risk factor for negative outcomes for children and families (Lahey et al., 2002; Loeber et al., 2000; Steiner et al., 2007; van Lier et al., 2007; Waschbusch, 2002), thereby making the
identification of ODD and its underlying mechanisms a focal point of the assessment process. Specifically, findings from the current study showed that ODD partially mediated the relationship between ‘hot’ EFDs (i.e., difficulties with emotional control, shift and inhibition) and Child Domain parenting stress, indicating that parents were largely stressed due to their child’s oppositional/defiant behaviour patterns. Furthermore, parents of children with ADHD/ODD in the current sample reported experiencing the highest levels of Child Domain parenting stress, largely due to the child’s difficulties with emotional regulation.

Green and Doyle (1999) state that it is also imperative for clinicians working with children at risk for ADHD and ODD to conduct a full assessment with parents to determine whether any parental characteristics may be contributing to the child’s manifesting behavioural difficulties such as oppositionality/defiance. The findings from the current dissertation revealed that the PSI is an effective tool to illuminate whether parents were coping well or stressed within the parenting role, both in relation to their child’s characteristics, as well as facets of their life beyond parenting (e.g., spousal relationship, depression, health, life stress). Including parents as an essential component of child mental health assessment is consistent with the position of The American Board of Examiners in Clinical Social Work (Cunningham & Booth, 2008) and the guidelines offered by the American Association of Child and Adolescent Psychiatry (Josephson et al., 2007).

Considering the high genetic heritability associated with ADHD, and the likelihood of gene X environment correlations contributing to oppositionality/defiance, it is of the utmost importance for clinicians to determine if parents experience their own difficulties with adult ADHD and/or EFDs. Parental ADHD and/or EFDs, may pose a particular risk factor in difficulties with initiation, monitoring, and emotional control could contribute to gene X
environment correlations, whereby children with similar difficulties by temperament (i.e.,
genetics) evoke negative interactions with their parents, precipitating and perpetuation the rise
of childhood ODD and clinical levels of Child Domain parenting stress. Research by Murray
and Johnston (2006) and Chen and Johnston (2007) showed that mothers with ADHD had
significantly greater difficulties monitoring their child’s behaviour and problem solving about
child rearing issues compared to mothers without ADHD. Furthermore, Sonuga-Barke and
colleagues (2002) indicated that parents who experience deficits which parallel those of their
children (i.e., ADHD and/or EFDs) seldom benefit from general parent training programs that
fail to account for their unique treatment needs.

In addition to assessing parental psychopathology, it may be important to use the
assessment process to gain an understanding of parents’ appraisal/attributions processes, as
they relate to parenting and how they perceive their children’s behaviours. Theory and
research indicate that parental appraisal/attributions likely influence the nature of parent-child
interactions and the levels of parenting stress (Harrison & Sofronoff, 2002; Weiner, 1985;
Lazarus, 1966). The current dissertation asserts that parental attributes/appraisal processes,
including whether parents perceive their child’s EFDs and oppositionality/defiance as
controllable, may be influenced by parenting stress (Child Domain parenting stress and Parent
Domain parenting stress), which contributes to a cycle of negative/unsupportive parenting
practices, greater childhood behaviour problems and heightened parenting stress.

Including parents in a meaningful way when conducting an assessment for childhood
ADHD may also be beneficial in order to identify the perceived availability of coping
resources, which Lazarus (1966) suggests is central to the experience of psychological stress.
Determining whether parents feel that they can access supportive resources is highly
important because the availability of supportive resources, or lack there of, has been connected with elevated levels of parenting stress and childhood behaviour problems (Crnic & Greenberg, 1990; Deater-Deckard & Scarr, 1996; Lange et al., 2005; Ostberg & Hagekull, 2000; Vitanza & Guarnaccia, 1999). Therefore, approaching the assessment from a biopsychosocial orientation (Engel, 1977), that looks at the person-in-environment, is key to identify coping resources that are essential in prevention and/or addressing elevated levels of parenting stress.

In sum, an effective assessment is needed to determine which child and parent factors contribute to the difficulties leading to elevated levels of parenting stress, and which child and parent factors might serve as coping resources during treatment. By widening ADHD assessment protocols to include a picture of the child’s EFDs and parenting functioning, clinical social workers and other mental health professionals may be better equipped to produce a formulation that is more sensitive to the challenges experienced by children and families and therefore be better equipped to provide more effective treatment.

Treatment.

There may be a tendency within social work to conceptualize treatment for children with ADHD as an either/or choice between pharmacotherapy (i.e., medication intervention) or psychosocial interventions (e.g., behavioural parent training, classroom modifications, anti-stigma initiatives). The reality is, however, that children with ADHD who experience EFDs, as well as their families, generally receive a range of services including both pharmacotherapy and psychosocial services. Due to the clinical nature of the sample, and sampling protocols (i.e., study inclusion criteria), it was anticipated all of the sample’s children would be reported
to have clinically significant symptoms of ADHD (i.e., T score > 70), suggesting that intervention would be indicated for many, if not all cases.

Parenting stress for parents raising children with ADHD and ADHD/ODD, the central focus of this dissertation, is typically addressed indirectly by targeting change in the child’s behaviour and/or altering the negative parent-child interactions. These approaches to treatment are informed by parenting stress theory (Abidin, 1995; Mash & Johnston, 1990) and research (Baker, 1994; Baker & McCal, 1995; Baldwin et al., 1995; Breen & Barkley, 1988; Mash & Johnston, 1983; Goldstein et al., 2007; Theule et al., in press) that implicates the child’s characteristics as the principal source of the stress. Simply stated, if the child is viewed as the central source of the parenting stress, altering his or her behaviour is likely to produce positive effects on parenting stress levels. Such conclusions are supported by causal research showing that rapid change in children’s behavioural disturbance is closely followed by change in levels of parenting stress/parent distress (Barkley, 1988; Barkley & Cunningham, 1979; Barkley & Cunningham, 1980; Barkley, Karlsson, Pollard, & Murphy, 1985; Humphries, Kinsbourne, & Swanson, 1978).

The seminal study in the treatment of childhood ADHD is the multi-model treatment study of children with ADHD (MTA). This multi-site, multi-year study compared four treatment conditions: including medication management, behavioural treatment, combined treatment, and community treatment (Pelham, 2007; Richters et al., 1995). Findings from this

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55 Medication management was comprised of rigorously monitored pharmacotherapy intervention; behavioural treatment was comprised of behavioural parent training, children’s summer programming and classroom programming; combined treatment was comprised of treatments from both the medication and behavioural conditions; and community treatment, which comprised children/families accessing “treatment as usual” in the community, where approximately 70% of children received medication from the family doctor/pediatrician/psychiatrist not affiliated with the research.
study showed that medication management alone was superior to behavioural treatment and community care options to address the core symptoms of ADHD (MTA Cooperative Group, 1999a), although outcomes for behavioural treatment was found to be on par with community-based medication treatment (Pelham, 2009).

There are several implications from the MTA study related to parenting stress. The results of the MTA study showed that changes in child behaviours arising from treatment appear to be more significant for ADHD symptoms than for oppositionality/defiance (Jensen et al., 2007). This finding is important to note because research shows that the combination of ADHD and comorbid ODD is likely the key mechanism underpinning the occurrence of significant levels of parenting stress (Anastopoulos et al., 1992; Bussing, Gary et al., 2003; Bussing, Zima, 2003; Evans et al., 2009; Harrison & Sofronoff, 2002; Kadesjo et al., 2002; Podolski & Nigg, 2001), whereas ODD alone and ADHD alone are not experienced as particularly stressful to parents (Ross et al., 1998). Taken together these findings provide a context to interpret the results from the MTA study related to parenting stress, which revealed no significant differences for parenting stress between the four treatment conditions (Wells et al., 2000). Wells and colleagues (2000) explained this finding by suggesting that parenting stress levels declined across all conditions because all children “received some form of active treatment” (p. 551), despite differences in children’s behavioural change between groups. An alternate interpretation for this finding of non-significance is that the parenting stress levels (similar at base-line) did not differ due to the lack of change in ADHD/ODD\(^{56}\), the only

\(^{56}\) Although not explicitly reported, it is assumed that the 312 (54% of the sample) children with ADHD and comorbid aggressive-spectrum disorder were equally dispursed through the four treatment conditions due to random assignment.
condition within the study that was significantly associated with significant levels of parenting stress.

There is some suggestion that psychosocial treatments, such as behavioural parent training, may be much less effective for parents of high-risk children with ADHD/ODD (Shelton et al., 2000) who may be less responsive to treatment due to their own difficulties, such as adult ADHD (Sonuga-Barke et al., 2002) or due to experiencing high levels of distress (i.e., parenting stress) that impede their ability to participate in, or implement, programming (Chronis, Chacko, Fabiano, Wymbs, & Pelham, 2004). Popular parenting programs related to childhood oppositional/defiance, which show promising outcome studies (e.g., Incredible Years), are often evaluated using samples comprised of few, if any, children with ADHD/ODD (Connolly, Sharry, & Fitzpatrick, 2001; Taylor, Schmidt, Pepler, & Hodgins, 1998; Webster-Stratton, & Hammond, 1990; Webster-Stratton, Reid, Hammond, 2004), making generalizability to this population difficult. When parents of children with ADHD/ODD are included, the outcomes for these parents appear to be less positive relative to parents of children with less complicated behavioural issues, such as ODD without ADHD (Reid, Webster-Stratton, & Hammond, 2003; Webster-Stratton, Reid, & Hammond, 2001). Furthermore, these program evaluations provide little or no indication of changing levels of parenting stress, which in the case of the Incredible Years is somewhat surprising considering Webster-Stratton’s (1990) contribution to field of parenting stress.

However, there are several parenting programs pertaining to childhood ADHD and ADHD/ODD that did evaluate change in parenting stress. These programs are relevant to the current dissertation. Parenting programs evaluated by Anastopoulos, Shelton, DuPaul and Guevremont (1993), Pisterman and colleagues (1992) and Treacy, Tripp and Baird (2005) are
three examples that found behavioural parent management to be an effective intervention to reduce childhood behavioural disruption and levels of parenting stress. Two of these three studies show that the change in parenting stress is isolated to the Parent Domain (i.e., changes in stress pertaining to parental isolation, depression) with no change in Child Domain parenting stress (i.e., stress related to the child’s characteristics) despite changes in the severity of the child’s behavioural disruption (Pisterman et al., 1992; Treacy et al., 2005). Therefore, these findings reveal that parent-based interventions may yield little influence on Child Domain parenting stress, the key source of stress linked to ADHD/ODD and ‘hot’ EFDs. As was shown in research by Abidin (1995) and Theule and colleagues (in press), elevated levels of Child Domain parenting stress are what distinguish parents of children with ADHD/ODD from other stressed parents struggling to raise children with special needs other than ADHD.

Pisterman and colleagues (1992) explained that the lack of change in Child Domain parenting stress following treatment likely failed to materialize due to “parents’ appreciation of the relative intransigence of some of their children’s problems” (p. 55). Given the fairly stable nature of ADHD and EFDs across development (Biederman et al., 2007; Biederman et al., 2008) this dissertation accepts Pisterman and colleagues’ (1992) explanation that some sources of Child Domain parenting stress may be more intractable to problem-focused interventions (e.g., parent training) due to the intransigence of some characteristics of childhood ADHD/ODD, such as hyperactivity/inattention and demandingness. This may be reflected in the fact that these characteristics measured by the PSI subscales of the same name (i.e., hyperactivity/inattention and demandingness), along with the PSI subscale acceptance [of the child] were the only subscales in the current dissertation to surpass the ‘clinical cut
point’ (i.e., T score > 65, as noted in Table 3). Together these three subscales comprise the majority of the stress reported by the PSI Child Domain. Contrary to findings offered by Pisterman and colleagues (1992), this author rejects the notion that parental acceptance of the child, likely an emotion-focused coping process, is intransigent and cannot be a focal point of treatment for parents raising children with ADHD/ODD or ‘hot’ EFDs and ODD. For example, Kazdin and Whitley (2003) showed that adding programming designed to enhance parental coping and facilitate attributional change to traditional parenting training programming (i.e., focused on strategies to facilitate behavioural change in the child) resulted in significant reductions in parenting stress levels compared to programs that only engaged problem-focused coping targeting change in parenting techniques and/or behaviour change in the child.

Interventions targeting enhanced coping and parental acceptance of children’s’ special needs may interrupt cycles of negative parent-child interactions (see Figure 1 on page 29) associated with Child Domain parenting stress, negative appraisals/attributions (Harrison & Sofronoff, 2002; Jenson et al., 1998), negative/unsupportive parenting practices with childhood oppositionality/defiance (Johnston et al., 2002; Rogers et al., 2009a). In theoretical terms, the IMS suggests that behavioural treatment strategies targeting change in children’s behaviour can be classified as problem-focused coping efforts (Folkman, Lazarus, Dunkel-Schetter et al., 1986; McKee et al., 2004; Lazarus, 1993a, 1993b). Working directly to remediate children’s difficulties associated with ADHD and/or EFDs may be just one component of the treatment equation. Rather than focus treatments exclusively on remediating children’s behavioural difficulties, parenting stress may also be effectively addressed by enhancing the parent’s ability to cope (Evans et al., 2009), as is predicted by the IMS
Research shows that treatment programs that include a focus on enhancing parental coping, such as attributional change, have a significant impact on enhancing coping and lowering levels of Child Domain parenting stress (Kazdin & Whitley, 2003) while other programming does not (Pisterman et al., 1992; Treacy et al., 2005; Wells et al., 2000).

Findings from the current dissertation linking 'hot' EFDs and ODD with Child Domain parenting stress, indicate the need for the design, or redesign, of parenting programming to help enhance parental coping and reduce parenting stress. Lazarus (1966) suggests that reducing psychological stress/parenting stress may be more complex than engaging problem-focused coping efforts directed at reducing the severity of the child’s behaviour. To enhance coping, parents can also engage emotion-focused coping efforts that shift parental focus from change in the environment (i.e., the child’s behaviour) to intrinsic change (i.e., acceptance, change of appraisal/attribution of the child’s behaviour). Harrison and Sofronoff (2002) and Johnston and colleagues (2009) suggest that treatment programs for parents may be most successful when parental affect and misattributions are addressed.

Kendall (1998) noted that emotional-focused coping efforts, such as acceptance, are not easily engaged by parents raising children with ADHD. As was shown in the current dissertation, the lack of parental acceptance (Table 11) was a significant contributor to the levels of reported Child Domain parenting stress. Kendall described parents’ coping methods with ADHD as revolving around emotion-focused coping. This begins with parents grieving over their own childhood difficulties with behaviour, family relations and school performance, which in many cases are vividly replayed in their children due to the high genetic heritability of ADHD. From a perspective of acceptance and grieving, Kendall further suggested that
parents need to let go of unrealistic expectations for their children, including the belief that he or she will simply outgrow their EFDs and/or ADHD (i.e., grieving the loss of the anticipated ‘normal’ child).

Larson (1998) suggested that accepting a child’s chronic health condition can pose somewhat of a paradox for parents, as acceptance means “embracing the disabled child while clinging to the desire for change” (p. 870). In the case of the current research, this might be interpreted to mean that the parent accepts that the child has ADHD and EFDs, but hopes for, and in most cases actively works towards, behavioural improvement and symptom reduction. Larson (1998) suggested that the tension between the child’s current abilities and the parent’s hope for change in the future is the motivating force energizing parents to continue providing intensive care for their special needs child. Accepting the child as he or she is while also maintaining hope for positive change in the future, are two central coping mechanisms available to parents raising children with special needs such as ADHD (Cronin, 2004; Heiman, 2002; Stephenson, 1991). It is likely that acceptance is an ongoing process (Muller-Miezo, 1983) that sees parents confront the challenges of parenting a special needs child, at times coping well, and at times experiencing stress. This point was captured by Harden’s (2005) qualitative research with parents of children with mental disorders who juxtaposed the “impossibility of the task and their sense of failure...with their acceptance of the situation and their ability to ‘get on with it’” (p. 367).

Ultimately, parents striving to cope with the demands of raising children with EFDs and ADHD most likely benefit from finding a balance between the use of problem-focused and emotion-focused coping efforts (Folkman, Lazarus, Dunkel-Schetter et al., 1986; Lazarus, 1993b). This would mean, on the one hand, parents engaging problem-focused coping to
effect change in the child’s behaviour (e.g., behavioural modification and/or medication) or
the child’s fit with the environment (e.g., advocacy for accommodations and modification in
the school environment). On the other hand, where control of the external world appears
futile, parents may rely on emotion-focused coping to gain control over their own lives,
including contending with the stress vis-à-vis their child. By accepting that the child has
unique needs that require specialized parenting and educational supports, parents are able to
accept their child while continuing to working for positive outcomes that maximize the child’s
potential (Heiman, 2002; Larson, 1998).

It is possible that the insights gained from the current study regarding the patterns of
‘hot’ EFDs experienced by children with ADHD/ODD may be helpful to inform psychosocial
treatments, such as behavioural parent training. By including the importance of emotion-
focused coping processes, such as accepting the child, as well as recognizing the role of
parental appraisals/attribution, treatment may be more successful for those children and
parents who were found most at risk in the current study: those with ADHD/ODD and ‘hot’
EFDs. For example, the results of the mediation model (Figure 4) suggest that by accepting
that the child is not ‘deliberately’ oppositional/defiant, but has difficulties with emotional
control, shift and inhibition, parents may be less stressed by their child. Reframing or
recasting (Kendall, 1998) the parents’ perspective of their child as ODD (i.e., the child is
manipulative, controlling, headstrong or wilfully hurtful) to a perspective that their child is
experiencing ‘hot’ EFDs with inhibition and emotional control, may help re-appraise the
emotions related to their child’s characteristics and possibly reduce their Child Domain
parenting stress. By helping parents understand ODD differently, as difficulties with
inhibition and/or emotional control, parents may have enhanced empathy for their child and
increase their support levels, rather than continue the parent-child conflict typical of ADHD/ODD parent-child relationships. Research supports this supposition, as it reveals that parents of children with ADHD/ODD who engage in these types of reframing activities are able to reduce their levels of parenting stress (Podolski & Nigg, 2001).

Prevention/Early intervention.

The current study suggests that there may be ways to prevent the high levels of Child Domain parenting stress associated with childhood ADHD and EFDs. For example, not all parents in the current sample raising children with even the most severe behavioural disruptions (i.e., ADHD/ODD with EFDs in the area of emotional control) experienced clinically significant levels of Child Domain parenting stress. In fact, almost 20% of the parents raising children with ADHD/ODD experienced ‘normal’ ranges of total parenting stress (as measured by the PSI Total Stress Domain). Early screening for children on the ‘cool’ pathway may be helpful to identify difficulties, such as EFDs with WM, which can contribute to learning difficulties (Alloway, Gathercole, & Elliott, 2010) and possibly global impairments (Tripp, Ryan, & Peace, 2002). Screening for ‘cool’ EFDs in the school environment may be particularly beneficial, as these difficulties may be less obvious to parents/caregivers than to teachers due to different expertise and different contexts.

Early identification and intervention initiatives are needed in particular for children with ADHD/ODD and children on the ‘hot’ pathway to ADHD (Nigg, 2006), because these children are especially at-risk to develop extremely serious behavioural patterns in adolescence (e.g., Conduct Disorder) and adulthood (e.g., Anti-social Personality Disorder) (Costello et al., 2003; Lahey et al., 2002; Loeber et al., 2000; van Lier et al., 2007). Without early identification and intervention, these behavioural difficulties (i.e., ADHD/ODD) are
shown to be one of the most potent predictors of elevated levels of parenting stress (Anastopoulos et al., 1992; Baldwin et al., 1995; Evans et al., 2009; Harrison & Sofronoff, 2002; Podolski & Nigg, 2001; Harrison & Sofronoff, 2002; Theule et al., in press; Vitanza & Guarnaccia, 1999). Therefore, parents of children with ADHD/ODD should be considered a group at high risk to experience clinically significant levels of Child Domain parenting stress.

By examining the potential developmental pathways associated with ADHD, it may be possible for social workers to do as Webster-Stratton (1990) suggests, and identify those families most at risk for disruption from stress and assist them with supportive resources and coping mechanisms. Due to the high heritability rate for ADHD, clinical social workers should consider that it is likely that at least one of the child’s parents suffer with symptoms or difficulties that parallel those experienced by their child (Weiss & Murray, 2003; Weiss, Hechtman, & Weiss, 2000). Prevention initiatives may not be about preventing ADHD or EFDs per se, but are directed towards enhancing positive outcomes by finding the correct combination of parental supports to prevent the onset of comorbid learning and behavioural difficulties (e.g., ODD) associated with negative outcomes.

Research with mothers reveals that high levels of parenting stress, low levels of social support and elevated reports of childhood behaviour problems are highly interrelated (Crnic & Greenberg, 1990; Deater-Deckard & Scarr, 1996; Ostberg & Hagekull, 2000). This research suggests that increased supports for parents may be beneficial to reduce parenting stress and/or positively influence childhood behavioural disturbances. These parental supports might include social network development (Crnic & Greenberg, 1990; Deater-Deckard & Scarr, 1996; Lange et al., 2005; Vitanza & Guarnaccia, 1999) and marital therapy (Edwards et al., 2001). Low cost, easily accessible respite programs for parents raising children with ADHD
may be an important service to help intervene to keep parental stress levels in check prior to their becoming elevated to the point where parent-child conflict emerges, or issues of child abuse occur (Bussing, Zima et al., 2003; Hazell et al., 2002). Programs of this nature may be especially beneficial for single parents who have become socially isolated due to their child’s behavioural challenges (Brook & Boaz, 2005; Cronin, 2004; McCleary, 2002; Shapiro, 1988).

The results of the current study showed that, by-and-large, parents are coping well in facets of their life that do not directly involve the high demands of raising a child with special needs (e.g., emotional control and inhibition difficulties). As was noted by Whalen and colleagues (2006), when not interacting with their children, parents raising kids with ADHD are not angry parents. Considering the evidence regarding the importance of genes and gene X environment correlations to ADHD, social workers can play an important role in developing prevention and early identification/intervention programs to reduce the risk associated with ADHD and EFDs. For example, in light of the lack of acceptance of the child by a sub-group of parents at-risk for elevated levels of parenting stress, it may be helpful to provide scientifically derived, easily accessible information to the public regarding the nature of ADHD and EFDs. Public awareness campaigns and programming will be helpful as a sizable segment of the population has little knowledge regarding ADHD. This is particularly true for older individuals, such as grandparents, who often provide respite and parenting support, as well as ethno-cultural groups (McLeod et al., 2007, Fettes, Jensen, Pescosolido, & Martin, 2007). Providing the necessary information and coping resources to parents to help support their success in the parenting role is an essential prevention/early intervention goal because parents are the principal buffers between stress factors and positive developmental outcomes for children (Sparrow, 2007).
Working with the Schools

Clinical social workers specializing in the area of ADHD and EFDs can play an important role working with educators, schools and school-boards to enhance their understanding of these neurodevelopmental difficulties and to help develop programming that strives to “alter the [school] environment so as to reduce the adverse effect of a biological” impairment (Barkley, 2007, p. 281). Possibly due to the fact that teachers are often the first to suggest that a child’s difficulties may be ADHD related, or because they are often the first professional to suggest the need for a referral for a formal assessment (Sax & Kautz, 2003), mental health professionals may overestimate the knowledge regular classroom teachers have regarding ADHD and EFDs. Even though teachers are active in identifying possible ADHD in their students, research suggests that regular classroom teachers have limited understanding of the nature of this neurodevelopmental disorder or how to effectively provide remediation/accommodations (Bussing, Gary, Leon, Wilson & Reid, 2002; Ghanizadeh, Bahredar, & Moeini, 2006; Kos, Richdale, & Hay, 2006; Kos, Richdale, & Jackson, 2004; Sciutto, Terjesen, & Bender-Frank, 2000). By providing training designed to enhance educators’ knowledge of ADHD and EFDs, as well as improve educators’ skills to support success within the classroom, social workers may help enhance the outcomes of children with ADHD or EFDs (Sherman, Rasmussen, & Baydala, 2008).

Teacher reports in the current study revealed that children with ADHD display high levels of EFDs in the school environment. The presence of these difficulties suggests that a large portion of the current sample may be at risk for poor academic outcomes (Biederman, et al., 2004). However, the results of the current dissertation revealed that despite the presence of
severe EFDs within the school setting, teacher-reported EFDs were not strongly associated with levels of parenting stress.

Social workers and mental health professionals may play a key role in supporting the academic success of children with ADHD by establishing close working relationships with educators and school professionals to bridge the professional divide between psychiatric services (e.g., child psychiatrists) and school-based programming. By forging a close working relationship between parents, educators, mental health professionals and young people, social workers will undoubtedly improve the consistency of the service delivery between home and school and likely enhance the outcome for the child and family. When children experience difficulties in two settings, such as the home and school, parents are likely to experience higher levels of stress compared to parents of children who experience difficulties in one setting (Beck et al., 1990).

Teachers provide a valuable source of information and perspective on children’s academic, emotional and social functioning that may not otherwise be available to parents or mental health professionals. For example, teachers are able to easily compare the functioning of children within a specific developmental age range, which is crucial to determine whether a child’s difficulties are significantly impaired relative to developmental expectations. Teachers may also act as valuable members of the treatment team, implementing behavioural classroom management programs that have been shown to improve the functioning of the child (Barkley et al., 2000; Cunningham, Bremmer, & Secord, 1997; DuPaul & Eckert, 1997). Research suggests, however, that teachers require the assistance of parents to address children’s behavioural disturbances and support academic success (Bendell et al., 1989; Johnston & Reader, 2002; McKeever & Miller, 2004; Riley et al., 2006).
Establishing a working alliance between educators and parents may not always be easy, as a sizable number of parents (22%) in the current dissertation reported having a high-conflict relationship with their child’s teacher. Findings from the current study also noted that parents are particularly stressed by their child’s EFDs when their child is entering a new school. This finding suggests that entering a new school may lead to additional hassles within the parenting role, such as attending parent-teacher meetings to discuss the special learning/behavioural needs of the child.

Findings from the current study may inform social workers practicing within the educational system to help educational professionals understand the role that EFDs may play in relation to children’s academic, social and emotional difficulties. For example, research suggests that teachers of children with non-obvious impairments, such as EFDs, can often be skeptical and resistant to requests for special accommodations (Miller & Sammons, 1999; Stage & Milne, 1996). These barriers to accessing supports may contribute to parents experiencing increased hassles and stress when advocating for services for their children and/or increased stress resulting directly from the consequences of a poor-fit between their child and teacher (i.e., increased emotional blowups of the child). Therefore, the findings of the current study suggest that it is helpful to work with educators to understand the nature of ADHD, including the specific EF subcomponents, such as WM, inhibition, shift and emotional regulation, which could pose potential difficulties within the classroom setting.

Challenging Stigma.

Stigma associated with mental health problems, disorders, and illness is the main barrier to access and provision of care (Sartorius, 2007). Imbedded in the values section of the *Evergreen Framework: A Child and Youth Mental Health framework for Canada* (Kutcher &
McLuckie, 2010), recently released by the Child and Youth Advisory Committee of the Mental Health Commission of Canada, young people, parents, family members and professionals from across Canada identified that mental health and services for mental disorders, based on best available evidence, are not a privilege, but a human right. The disadvantage commonly experienced by young people with ADHD and other neurodevelopmental or mental disorders is seldom the complete consequence of their impairment (e.g., EFD), but rather a failure of social institutions, such as schools, to accommodate them on equal terms with their fellow classmates and community members (Oliver, 1985). The failure by society to naturally and seamlessly make accommodations for mental disorders typically lies in the non-obvious or ‘invisible’ nature of such impairments.

Goffman (1963) described the dilemma of having an invisible impairment/disability as deciding on the one hand to share with the public the nature of the impairment (i.e., ADHD or EFDs) and possibly face being discredited and discriminated against by society. On the other hand, the fear of being discriminated against can lead to silence and the reduced availability of needed supports and accommodations for young people (e.g., extra time in class for exams) or highly stressed parents (i.e., respite care) (Miller & Sammons, 1999). Davis (2005) suggests that even after disclosure, invisible impairments such as ADHD and EFDs, are readily discredited in society, often leaving young people and parents in the position of needing to convince others that they have real impairments and that they are not seeking some unfair advantage (e.g., more time for testing) when they may actually be seeking accommodations that level the ‘playing field.’ Social workers may play a key role in advocating within the school system for the formal recognition of ADHD as an exceptionality, which may reduce the burden of parents who often take on such a role with varying success.
Social stigma related to mental disorders and mental illness continues to persist in most societies which can lead to prejudicial judgments against parents who access psychiatric care for their children and families (Pescosolido, Perry, Martin, McLeod, & Jensen, 2007; Summers & Caplan, 1997). Parents of children with ADHD are commonly viewed in a negative light either for their perceived inaction in not ‘fixing’ their child’s disruptive behaviours, or for their use of pharmaceutical interventions (Brook & Boaz, 2005; Blum, 2007; Cronin, 2004; McCleary, 2002; Peters & Jackson, 2008; Shapiro, 1988). Ross and Ross (1982) suggested that there is a culture of scepticism regarding the legitimacy of ADHD that is unique among all other paediatric health concerns. Despite having an almost identical heritability rate to schizophrenia, ADHD continues to be discredited by family members and professionals, including social workers and educators. Although one would hope that the social sciences and helping professionals learned from the egregious mistakes of past theories of schizophrenogenic parenting (Lidz & Lidz, 1949), it appears that parent blaming practices are alive and well in relation to ADHD (Blum, 2007; Singh, 2004).

Social work has a key role to play in working directly with families to reduce the negative impact of this blame and societal stigma. Research shows that parents of children with ADHD need supports to help deintegrate the stigma they hold for ADHD perpetuated by special interest groups and circulated in the media (Kendall, 1998). Kendall’s research found that most parents of children with ADHD hold some of the same biases and erroneous beliefs about ADHD which circulate within the media and with society.

Social work must take a lead role to challenge stigmatizing societal messages and help develop anti-stigma campaigns that infiltrate and resonate within key institutions (e.g., schools, hospitals), the media and professional discourse (e.g., journal articles), that
knowingly or unknowingly discredit ADHD. These include messages which cast doubt on, or seek to dismiss, the legitimacy of medical interventions (e.g., medications). However, as a profession, we must remain ever critical of research and treatments targeting this vulnerable population, while remaining equally vigilant against dismissing or discrediting the needs of this vulnerable segment of society.

Conclusions: Future Research

The current study is one of only two studies known to this author to examine the relationship between EFDs and parenting stress in relation to children diagnosed with ADHD. Building on the work of Joyner and colleagues (2009), this study contributes to the body of knowledge related to EFDs and childhood ADHD, and advances knowledge regarding the factors that contribute to parenting stress for this population.

As this is one of the first studies examining this important area, replications and further research are required. Given the questions surrounding the validity of the BRIEF to investigate childhood EFs/EFDs (McAuley et al., 2010), future research in this area should consider utilizing performance-based measures in conjunction with observational measures (Toplak et al., 2009). As EF skills are highly contextualized, this may be a more effective means of capturing the child’s true EF abilities within the home, community and school environments.

More research is needed to understand how EFs may perform differently across ‘hot’ and ‘cool’ contexts (Castellanos et al., 2006). Currently, most research regarding EFs/EFDs focuses on ‘cool’ EFDs and seldom explores ‘hot’ EFDs (Happaney et al., 2004; Kerr & Zelazo, 2004; Zelazo, 2004), such as difficulties with emotional control (Martel, 2009), especially in relation to ADHD populations (Melnick & Hinshaw, 2000).
The current area of study needs to be extended and replicated with an adolescent ADHD population. There is little research examining parenting stress with respect to this age group, due in part to the age restrictions associated with the PSI. With the creation of the Stress Index for Parents of Adolescents (SIPA), researchers are now equipped to research parenting stress in relation to raising adolescents with ADHD and/or EFDs. Replication of the current research using the SIPA in place of the PSI would provide needed insight into the nature of parenting stress within an adolescent sample. Longitudinal studies examining stress across childhood and into adolescence are also needed in order to identify the risk and protective factors in the parent-child dyad, as parenting is recognized as a moderating force in positive developmental outcomes (Doyle, 2006). These studies will help determine if parenting stress, believed to be cumulative (Crnic, Gaze, & Hoffman, 2005), compounds over the course of development as EFDs persists into adolescence and adulthood (Biederman et al., 2007).

Theories of parenting stress endorse the existence of a reciprocal relationship between parent and child (Mash & Johnston, 1990), however, research to date in this area has not sufficiently examined gene X environment correlations. Nigg (2006) warned that without looking at the gene X environment correlations, research in the area of childhood ADHD may be much less accurate. Research is needed to examine whether gene X environment correlations contribute to EFDs, oppositionality/defiance and parenting stress. Identifying the areas where genetics and environmental factors interact, including the identification of mediating and moderating forces may help to explain the remaining 50% of the variance in Child Domain parenting stress within the current sample left unexplained by EFDs.
In conclusion, there is a need for a richer, fuller understanding of the experiences that children, youth and parents have with ADHD and EFDs, particularly in relation to parent-child interactions and the occurrence of parenting stress. There are few qualitative studies that have examined the experience of young people with ADHD (see Brady, 2004; Cooper & Shea, 1999; Firmin & Phillips, 2009; Gallichan & Curle, 2008; Krueger & Kendall, 2001; Kendall, Hatton, Beckett, & Leo, 2003; Segal, 1998). There are no studies known to this author that have tapped into the perspective of children/adolescents to determine what it is like to grow up with parents who are highly stressed by the young person’s ADHD and EFD characteristics. This is especially important considering that quantitative research points to the child as the nucleus of the stress experienced within the parent-child dyad and the family system. It is key to ask what the experience is for young people with ADHD growing up with highly stressed parents, likely knowing that their symptoms of inattention, hyperactivity and EFDs are at the root of this stress. Considering that the current findings suggest that parents struggle with accepting children with ADHD and EFDs, it is further important to understand whether, and how, this sentiment may or may not impact the young person and the nature of the parent-child relationship. Social work’s commitment to working with vulnerable populations and the profession’s expertise in qualitative research methods, position the profession well to work with childhood ADHD.
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Appendix A: DSM-IV-TR Criteria for ADHD

(APA, 2000, p. 92-93)

A. Either (1) or (2)

(1) six (or more) or the following symptoms of inattention have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:

*Inattention*

(a) often fails to give close attention to details or makes careless mistakes in schoolwork, or other activities
(b) often has difficulty sustaining attention in tasks or play activities
(c) often does not seem to listen when spoken to directly
(d) often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behaviour or failure to understand instructions)
(e) often has difficulty organizing tasks and activities
(f) often avoids, dislikes or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework)
(g) often loses things necessary for tasks or activities (e.g. toys, school assignments, pencils, books or tools)
(h) is often easily distracted by extraneous stimuli
(i) is often forgetful in daily activities

(2) six (or more) of the following symptoms of hyperactivity-impulsivity have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:

*Hyperactivity*

(a) often fidgets with hands or feet or squirms in seat
(b) often leaves seat in classroom or in other situations in which remaining seated is expected
(c) often runs about or climbs excessively in situations in which it is inappropriate (in adolescence or adults, may be limited to subjective feelings of restlessness)
(d) often has difficulty playing or engaging in leisure activities quietly
(e) is often “on the go” or often acts if “driven by a motor”
(f) often talks excessively

**Impulsivity**

(g) often blurts out answers before questions have been completed
(h) often has difficulty awaiting turns
(i) often interrupts or intrudes on others (e.g. butts into conversations or games)

B. Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before age 7 years.

C. Some impairment from symptoms is present in two or more settings (e.g. at school [or work] and at home)

D. There must be clear evidence of clinically significant impairment in social, academic, or occupational function

E. The symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder and are not better accounted for by another mental disorder (e.g., Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder)
Appendix B: DSM-IV-TR Criteria for ODD

(APA, 2000, p. 102)

A. A pattern of negativistic, hostile, and defiant behavior lasting at least 6 months, during which four (or more) of the following are present:

(1) often loses temper
(2) often argues with adults
(3) often actively defies or refuses to comply with adults’ requests or rules
(4) often deliberately annoys people
(5) often blames others for his or her mistakes or misbehavior
(6) is often touchy or easily annoyed by others
(7) is often angry
(8) is often spiteful or vindictive

Note: Consider a criterion met only if the behavior occurs more frequently than is typically observed in individuals of comparable age and developmental level.

B. The disturbance in behavior causes clinically significant impairment in social, academic, or occupational functioning.

C. The behaviors do not occur exclusively during the course of a Psychotic or Mood Disorder.

D. Criteria are not met for Conduct Disorder, and, if the individual is age 18 years or older, criteria are not met for Antisocial Personality Disorder.
Appendix C: The Scarborough Hospital Research Ethics Board Approval

To: Alan McLuckie
From: The Scarborough Hospital Research Ethics Board
Date: July 19, 2010
Re: The Relationship Between Attention Deficit Hyperactivity Disorder (ADHD) Disruptive Behaviours, Executive Functioning Impairments and Parent Stress

TSH File No: PSY-18

This is to acknowledge the full Research Ethics Board has re-approved the following:

Protocol: The Relationship Between Attention Deficit Hyperactivity Disorder (ADHD) Disruptive Behaviours, Executive Functioning Impairments and Parent Stress

Last Approval Date: July 21, 2009 to July 20, 2010
Re-Approval Date: July 21, 2010 to July 20, 2011
Information & Consent Form Version Date: N/A
Reviewed By The Research Ethics Board On: July 19, 2010

The Research Ethics Board of the Scarborough Hospital agrees with the principles for ethical research found in the TRI-Council Policy Statement: Ethical Conduct For Research Involving Humans, the Declaration of Helsinki, the ICH Guideline for Good Clinical Practice, and the Code of Federal Regulations: Title 45, Part 46

The Research Ethics Board of the Scarborough Hospital adheres to the regulations found within these documents, as appropriate

During the course of the research, any significant deviations from the approved protocol and/or any unanticipated developments within the research or significant adverse events should immediately be brought to the attention of the Research Ethics Board. Please advise the board annually on the progress of your research.

L. Castagna, MD, FRCP (C)
Chairman, Research Ethics Board
The Scarborough Hospital
3050 Lawrence Avenue East
Scarbrough, Ontario, M1P 2V5

July 19, 2010
Date
Appendix D: The University of Toronto Research Ethics Board Approval

University of Toronto
Office of the Vice-President, Research
Office of Research Ethics

PROTOCOL REFERENCE #24760

December 16, 2009

Prof. Faye Mishna
Factor-Inwentash Faculty of Social Work
University of Toronto
246 Bloor St West
Toronto, ON M5S 1A1

Dear Prof. Mishna:

Re: Administrative Approval of your research protocol entitled, "The Relationship between Attention-Deficit/Hyperactivity Disorder (ADHD), Disruptive Behaviours, Executive Function Impairments and Parenting Stress"

We are writing to advise you that the Office of Research Ethics has granted administrative approval to the above-named research study. The level of approval is based on the following role(s) of the University, as you have identified with your submission:

- Graduate Student research – hospital-based only
- Storage or analysis of De-identified Personal Information (data)

This approval does not substitute for ethics approval, which has been obtained from your hospital Research Ethics Board. Please note that you do not need to submit Annual Renewals, Study Completion Reports or Amendments to the ORE unless the involvement of the University changes so that ethics review is required. Please contact the ORE to determine whether a particular change to the University’s involvement requires ethics review.

Best wishes for the successful completion of your project.

Yours sincerely,

Daniel Gyewu
Research Ethics Board Manager- Health Sciences