The Impact of Undiagnosed ADHD on Child Outcomes and Parenting Stress

by

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Abstract

Psychosocial and psychopharmacological treatments can alleviate negative outcomes associated with attention-deficit hyperactivity disorder (ADHD); however, few studies have specifically examined the effects of diagnosis on outcomes. This study examined the relationship between ADHD diagnosis and child conduct problems, child emotional problems, and parenting stress. North American parents of 5- to 16-year-old children (n = 284) completed our online survey. Participants were categorized into groups based on children's ADHD diagnostic status and levels of ADHD symptoms: (1) children (n = 66) with ADHD diagnoses who met clinical cut-off criteria on a symptom scale (i.e., "diagnosed"); (2) children (n = 25) without ADHD diagnoses, but who met clinical cut-off criteria for symptoms (i.e., "undiagnosed"); (3) children (n = 34) with ADHD diagnoses who did not met clinical cut-off criteria for symptoms (i.e., "low-symptom"); and (4) children (n = 159) who are not diagnosed with ADHD, nor met clinical cut-off criteria on the symptom scale (i.e., "no-ADHD"). Groups differed significantly on all three outcomes. For conduct problems and parenting stress, the diagnosed group showed more problems compared to other groups. There were no significant differences between undiagnosed and low-symptom groups. For emotional problems, the diagnosed and undiagnosed groups showed similar levels of problems, which were significantly higher than the no-ADHD and low-symptom groups. Interactions between diagnostic status and child gender, medication use, and psychosocial intervention access were significant across outcomes; however, pairwise differences were only significant in certain diagnostic groups for certain outcomes. There was no significant association between any outcome and the time that had elapsed since diagnosis. Results suggest that children with undiagnosed ADHD exhibit more conduct problems, and their parents greater stress, than no-ADHD children, but not children with diagnosed or low-symptom

ADHD. Children with undiagnosed ADHD also experience more emotional problems than children with no-ADHD or low-symptoms ADHD, but not children with diagnosed ADHD.

Keywords: attention-deficit hyperactivity disorder, diagnosis, conduct problems, emotional problems, parenting stress

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The Impact of Undiagnosed ADHD on Child Outcomes and Parenting Stress

Attention-deficit hyperactivity disorder (ADHD) is a common childhood-onset neurodevelopmental disorder, affecting approximately 5% of children and adolescents (Sayal et al., 2018) globally. ADHD is characterized by high levels of hyperactivity/impulsivity, disorganization, and/or inattention leading to functional impairment. Individuals with ADHD face long-term disadvantages in various domains (e.g., academic and occupational achievement, social functioning, self-esteem), but those who access treatment tend to show better outcomes than those left untreated (Shaw et al., 2012). ADHD has a high rate of comorbidity with other psychiatric disorders; in one American sample, 67% of children with ADHD had at least one additional psychiatric diagnosis (Larson et al., 2011). Commonly co-morbid disorders include learning disabilities, externalizing disorders (e.g., conduct disorder), and internalizing disorders (e.g., anxiety; Reale et al., 2017). The presence of comorbid disorders leads to greater impairment in functioning (Larson et al., 2011).

Although the heritability of ADHD may be as high as 88% (Larsson et al., 2014), both biological (e.g., abnormal brain functioning; Cortese, 2012) and psychosocial factors (e.g., parental conflict; Biederman et al., 1995) influence the development and maintenance of ADHD. Family factors, such as positive parenting behaviours and family cohesion, can protect children with ADHD from severe symptoms and the development of comorbid disorders (Dvorsky & Langberg, 2016). However, childhood ADHD is also associated with disrupted family functioning (Johnston & Mash, 2001), including higher levels of negative parenting practices and maladaptive coping (DuPaul et al., 2001), and significantly higher levels of parenting stress (Theule et al., 2010). The relationship between parenting and child ADHD is believed to be

transactional, such that children's ADHD symptoms elicit certain parenting practices, while negative parenting practices in turn influence child behaviours (Johnston & Mash, 2001).

Diagnosis of ADHD is a controversial subject, both in the public sphere and the research literature, with some suggesting that it is overdiagnosed (Kazda et al., 2021) and other literature contradicting these claims (Coker et al., 2016). The controversy is influenced by the fact that little is known about the effects of diagnosis on children. While childhood ADHD treatment outcomes have been well researched (Jensen, 1999) and reviewed (Sibley et al., 2014), surprisingly little work has examined the relationship between diagnosis itself and outcomes. The current study aimed to add to the literature surrounding the effects of a diagnosis of ADHD on children and adolescents by examining whether children who exhibit clinical levels of parent-reported ADHD symptoms but were not diagnosed (i.e., "undiagnosed" children), children who were diagnosed with ADHD and showed clinical levels of ADHD symptoms (i.e., "diagnosed" children), children who were diagnosed with ADHD but did not show clinical levels of ADHD symptoms (i.e., "low-symptom" children), and children without elevated levels of ADHD symptoms nor an ADHD diagnosis (i.e., "no-ADHD" children) differed. Due to the comorbidity between ADHD and internalizing and externalizing disorders, differences in levels of emotional and conduct problems between undiagnosed, diagnosed, low-symptom, and no-ADHD groups of children aged 5-16 years old were compared. Additionally, parenting stress in parents of undiagnosed, diagnosed, low-symptom, and no-ADHD children aged 5-12 years old was examined to explore the effects of diagnosis on the family system.

Diagnosis of ADHD

Accurate diagnoses of mental disorders are valuable in a variety of ways. Reliable diagnostic criteria allow for identifying those affected by and estimating the prevalence of,

certain mental disorders, which holds significance for the fields of research, public health, and mental health service provision (American Psychiatric Association, 2013). Diagnosis of ADHD in North America is predominantly accomplished by establishing whether individuals meet the diagnostic criteria from the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013). For diagnosis, children must demonstrate six or more inattentive and/or six or more hyperactive/impulsive symptoms. The symptoms must be present in two or more settings and reduce the child's quality of functioning. Diagnosis includes specifiers for whether the disorder is predominantly hyperactive/impulsive, inattentive, or combined, and clinicians can specify whether the functional impairment is mild, moderate, or severe. The median age of ADHD diagnosis is 6 years old, with more severe cases diagnosed at age 4 and milder cases diagnosed at age 7, on average (Visser et al., 2014). Rates of ADHD diagnosis vary based on gender, race/ethnicity, household income, parental education, and geographic location (Visser et al., 2014).

Debate Surrounding Diagnosis

Public and media opinions on the diagnosis of ADHD have tended towards seeing ADHD as overdiagnosed and overtreated. Media representations of ADHD have often portrayed ADHD as a diagnosis that pathologizes normal childhood behaviour and have implied blame for parents and/or teachers being unable to control active children's behaviours (Horton-Salway & Davies, 2018). Media representation of ADHD medication use has been similarly negative (Horton-Salway & Davies, 2018). Public perceptions share a similar tone. In a survey of the Australian public, 78.3% of respondents agreed that "too many children are diagnosed with ADHD when they don't really have it," and 38.2% indicated that using medication to treat ADHD was unacceptable (Partridge et al., 2014).

When turning to the research literature, the controversy surrounding ADHD diagnosis becomes more nuanced, but the debate as to whether it is overdiagnosed remains. Meta-analytic evidence suggests that the true prevalence of ADHD, as measured by standardized diagnostic procedures, has been stable over the last three decades and across the globe (Polanczyk et al., 2014). While some have suggested that ADHD is a social and cultural construct of modern, Western culture (Timimi & Taylor, 2004), data contradicts this claim and supports the idea that ADHD is a stable disorder present across cultures and time (Polanczyk et al., 2014). However, there has been an increase in ADHD diagnoses and the use of pharmacologic treatment for ADHD over time (Kazda et al., 2021). Visser et al. (2014) reported an increase of 42% in parent-reported childhood ADHD diagnoses between 2003 and 2011 in the United States of America (USA). Differences in diagnostic classification systems (Döpfner et al., 2008), changes in diagnostic criteria over time (Thomas et al., 2015), the pharmaceutical industry's influence (Thomas et al., 2013), growing awareness of neurodevelopmental disorders (Conrad & Bergey, 2014), and access to information via the Internet (Conrad & Bergey, 2014) have all been proposed as factors leading to inflation of diagnosis and treatment over time. As well, the prevalence of ADHD diagnoses, as assessed via administrative records, is higher in the USA than in other parts of the world, which may suggest an influence of culture on diagnosis (Sayal et al., 2018). Hinshaw (2018) suggests that changes in American educational policies, which incentivized school districts to diagnose their lowest-performing students, may have influenced increased diagnostic prevalence in the USA throughout the past decades.

In addition to evidence demonstrating the increasing prevalence of ADHD diagnosis, there are concerns about the reliability of ADHD diagnosis (Bruchmüller et al., 2012; Whitely et al., 2018). Low diagnostic reliability may lead to an inflation in diagnoses. When presented with

vignettes of children meeting and not-meeting ADHD diagnostic criteria, 16.7% of German child psychologists, psychiatrists, and social workers provided a false-positive diagnosis of ADHD, diagnosing a child not-meeting criteria with the disorder (Bruchmüller et al., 2012). Clinicians surveyed were twice as likely to provide false-positive diagnoses to vignettes with male patients, underlining how gender can affect diagnostic reliability (Bruchmüller et al., 2012). Another example of a factor affecting diagnostic reliability is a child's birth month (Whitely et al., 2018). Young-for-grade children (e.g., children with December birthdates in school districts with a December 31 cut-off) typically display more hyperactive classroom behaviours compared to their older peers. While their levels of hyperactive behaviour may be age-typical, young-for-grade children are diagnosed with greater frequency, a fact that undermines the reliability of ADHD diagnosis (Whitely et al., 2018).

The evidence above suggests that an ADHD diagnosis can be unreliable, may be influenced by social factors, and that rates of diagnosis are increasing over time (Bruchmüller et al., 2012; Visser et al., 2014). However, other evidence suggests that ADHD is underdiagnosed and undertreated, particularly among some specific subgroups. ADHD is consistently under-identified and under-treated in non-male[1] children (Hinshaw, 2018; Sayal et al., 2018). ADHD is more common in males, with a male: non-male ratio of 2-3:1 found in community prevalence samples; however, the male: non-male ratio tends to be much higher, around 3-8:1, in studies examining samples that have been referred for psychological services (Sayal et al., 2018). This suggests that a significant portion of non-males with ADHD do not receive a diagnosis and, subsequently, treatment. Racial and ethnic minority status has also been linked to differential

[1] Most previous research has examined differences in diagnostic rates using binary sex or gender categories. In the current paper, gendered differences in ADHD will be examined using male versus non-male categories to account for the increasing number of youth who identify as non-binary. Previous research has shown that most non-binary youths were assigned female at birth (Todd et al., 2019). See p.28 for more explanation.

rates of diagnosis of ADHD; in the USA, Black, Latinx, and children of other ethnic/racial identities are 69% less likely to receive an ADHD diagnosis than White children (Morgan et al., 2013). Furthermore, indirect evidence from Coker et al. (2016) suggests that disparities in ADHD diagnosis and treatment for non-White children are a result of undertreating ADHD in non-White populations, rather than overtreating it in White populations.

In addition to subgroups who are underdiagnosed and undertreated, evidence suggests that ADHD is broadly undertreated rather than overtreated. According to Canadian pediatric clinical guidelines, psychosocial interventions are the first-line treatment for pediatric ADHD (Feldman et al., 2018).[2] Psychosocial treatments include psychoeducation, parent behaviour training, classroom management, social skills training, and organizational skills training. Meta-analytic evidence suggests that these interventions are effective in reducing symptoms of ADHD, conduct problems, emotional problems, and academic, social, and family impairment caused by ADHD, and improving parenting skills for managing children's ADHD (Corcoran & Dattalo, 2006; Daley et al., 2014; Sibley et al., 2014). Despite recommendations and proven efficacy, the use of psychosocial interventions is limited; in the USA, approximately one-third of children with ADHD receive no psychosocial interventions (Danielson et al., 2018).

Pharmacological treatment is also common and recommended when ADHD symptoms persist despite psychosocial treatment (Feldman et al., 2018). Evidence indicates that pharmacological intervention is effective in reducing childhood and adolescent ADHD symptoms and reducing academic, social, and family impairment (Jensen, 1999; Sibley et al., 2014). As well, ADHD medication has been shown to reduce the risk of co-occurring depression

[2] Guidelines from the United States Centre for Disease Control differ slightly. While psychosocial treatment is the recommended first-line treatment in young children, followed only by prescription medication if necessary, among school-aged children, simultaneously onset of pharmacology and psychosocial interventions is recommended. (Wolraich et al., 2019).

in adult populations (Chang et al., 2016). In a systematic review examining ADHD treatment across continents (i.e., North America, Australia, Europe, South America), only 19.1% of children with ADHD diagnoses were treated with pharmacology (Massuti et al., 2021). In the USA, the proportion of children receiving pharmacological treatments is much higher (66.9% current use among children diagnosed with ADHD; Danielson et al., 2018). However, 6.9% of children diagnosed with ADHD received no medication, psychosocial, or school support interventions at all (Danielson et al., 2018).

The evidence reviewed above is complex. Some evidence demonstrates that within certain subgroups, ADHD is underdiagnosed, and more broadly, it appears that ADHD is undertreated, with evidence suggesting that a minority of children with ADHD access appropriate treatment. However, compelling evidence also exists that shows that ADHD diagnoses can be unreliable, rates are increasing over time, and may be affected by cultural or social factors. Little is known about the effects of diagnosis on children with ADHD and whether there are various harms and benefits associated with ADHD diagnosis. The current study aimed to add to the literature addressing that question, as literature examining the relationships between ADHD diagnosis and outcomes is limited. The knowledge generated from this study will inform the debate surrounding the relative harms of over and underdiagnosing.

Potential Effects of Diagnosis

Labelling & Stigmatization

From a theoretical standpoint, the labelling theory of mental illness, first proposed by Scheff (1966) and later modified by Link et al. (1989), suggests that the diagnosis (or "label") of a mental disorder leads to harm. The theory posits that, in general, people hold negative views of those diagnosed with mental illnesses or disorders; in other words, mental disorders are highly

stigmatized. When a person with a mental illness (a "patient") is labelled with a diagnosis, all the negative social perceptions of that mental disorder become relevant to oneself. The patient forms negative expectations and perceptions of themselves which can lead to low self-esteem and a loss of positive social relationships. In addition, if others become aware of the label, they may respond negatively towards the patient. According to the theory, eventually, the negative self-perceptions and expectations associated with the label, which may be influenced by the responses of others, lead to an entrenchment of the disorder's symptoms and an increased vulnerability to other disorders. Ultimately, the patient embodies the role of a "mental patient" because they have been labelled as such.

Evidence suggests that ADHD is a highly stigmatized disorder. Parents, teachers, and peers view and treat children diagnosed with ADHD differently than typically developing children (Lebowitz, 2016). Parents and teachers of children with ADHD perceive children's disruptive behaviour as more pervasive and uncontrollable than typically developing children's behaviours (Johnston & Freeman, 1997; Mikami et al., 2019). Teachers are more likely to rate children with diagnoses of ADHD as less academically proficient, regardless of children's demonstrated ability (Metzger & Hamilton, 2021). Peers perceive children with ADHD undesirably; Walker et al. (2008) found that when reading vignettes, children are more likely to make negative attributions (e.g., lazy, violent, troublesome) and less likely to make positive attributions (e.g., smart, caring) about children with ADHD compared to children with asthma. Unfortunately, the stigmatization of ADHD also extends beyond the individual child and affects the entire family (Goffman, 1963; Koro-Ljungberg & Bussing, 2009). Goffman described this process as "courtesy stigma," wherein the stigma associated with an individual in the family extends to the entire family unit. Many parents of children with ADHD report experiences of

stigmatization (dosReis et al., 2010; Koro-Ljungberg & Bussing, 2009), with 40% of parents reporting social isolation and rejection due to their child's ADHD. Mothers' experiences of courtesy stigma have been associated with higher levels of parental distress (Charbonnier et al., 2019).

Of note, some of the literature on ADHD and stigma suggests that children's symptoms, rather than their diagnostic status, may account for their stigmatization. In studies of adults' (Ohan et al., 2013) and children's (Law et al., 2007) attitudes towards a child displaying symptoms of ADHD in a written vignette, both groups showed high levels of stigmatizing attitudes and negative behavioural intentions towards the child. However, the addition of a diagnostic label to the vignette did not significantly alter children's perceptions of the child (Law et al., 2007) and had only a small, albeit significant, effect on adults' attitudes (Ohan et al., 2013). These studies contradict the labelling theory of mental illness and suggest that ADHD symptoms, rather than the diagnostic label, are the primary cause of stigmatization of children with ADHD and their families.

Attribution Theory

When seeking to understand how ADHD diagnosis may affect children and their families, considering how ADHD symptoms and related behaviours are viewed by children themselves and others, especially their parents, may be relevant. Attribution theory posits that when seeking to understand behaviour, humans make different types of behavioural attributions. These types are: (a) locus of control, whether the behaviour is caused by factors internal to the individual or external factors related to the situation; (b) stability, whether the behaviour is thought to be likely to fluctuate or to be consistent across time; (c) globality, whether the

behaviour is assumed to occur across situations; and (d) controllability, whether the behaviour is believed to be within the individual's "volitional control"(Weiner, 1985).

Parental attributions are an important factor in the parent-child relationship (Johnston & Ohan, 2005). In general, parents tend to attribute their children's undesirable behaviours to external, transient, and uncontrollable causes (Joiner & Wagner, 1996). However, compared to children who are typically developing, parents of children diagnosed with ADHD tend to see undesirable behaviours as internal and stable, but also less controllable by the child (Johnston & Freeman, 1997). Self-attributions are thought to affect emotions and motivation (Weiner, 1985). Children with ADHD tend to attribute their own problematic behaviours as uncontrollable more often than typically developing children, and occasionally as more stable and global, although results are inconsistent in those domains (Kaidar et al., 2003; Wiener et al., 2012). For both parental and child attribution, the aspect of controllability is particularly salient in understanding problematic behaviours related to ADHD.

Attributions of uncontrollability in ADHD may have contradictory results. On one hand, according to attribution theory, uncontrollability may lead to a lack of motivation to change; if parents and children don't see the behaviours associated with ADHD as controllable, they may not try to change them (Weiner, 1994). On the other hand, attribution theory states that uncontrollability is associated with receiving sympathy from others, whereas attributions of controllability often lead to anger from others (Weiner, 1994). In terms of parental attributions, seeing the disruptive behaviours of children with ADHD as uncontrollable may allow parents to be more forgiving of symptoms of ADHD, as well as related conduct problems, which could reduce dysfunctional parent-child relationship issues (Johnston & Ohan, 2005). Evidence from qualitative interviews with parents suggests that many parents feel primarily positive about their

child receiving a neurodevelopmental disorder diagnosis as they describe a process of acceptance and coping with the symptoms of the disorder, and a sense of relief that their child's behaviour has a biological explanation (Russell & Norwich, 2012). An ADHD diagnosis can free parents from a belief that their parenting is to blame for their child's symptoms; it is, for many parents, a "diagnosis of forgiveness" (Hinton & Wolpert, 1998). From the child's perspective, receiving a diagnosis of ADHD can reduce the sense of responsibility for their "bad" behaviour. Qualitative interviews of youth with ADHD show that the reported positive effects of diagnosis are primarily that, once identified, many of the symptoms of ADHD can be treated; youth desire to improve their "bad" behaviour, achieve academic success, and mend relationships with their peers and their family (Kendall et al., 2003; Singh et al., 2010; Travell & Visser, 2006). Children also experience accommodation and acceptance after diagnosis, with some coming to see their ADHD as an illness that they can learn to cope with and treat, and others accepting it as a natural part of "who they [are]" (Kendall et al., 2003). These sentiments support that when ADHD is seen as an uncontrollable part of oneself through the process of diagnosis, children may experience a reduction in self-blame for their symptoms and perhaps a sense of optimism in treating their symptoms.

Benefits of Treatment

Importantly, diagnosis is often the first step in receiving appropriate treatment and support. In the case of childhood ADHD, an extensive body of literature suggests that early interventions can improve outcomes (Daley et al., 2014; Jensen, 1999; Sibley et al., 2014). A diagnosis is often a key requirement for receiving specialized support and services for ADHD across various institutions, such as education, health care, or social assistance; however, a diagnosis does not guarantee access to treatment and/or improved outcomes. Despite high

efficacy, psychosocial interventions can be difficult to access and afford for many families dealing with ADHD (Danielson et al., 2018). Similarly, while treatment with psychopharmacology also shows high efficacy, side effects and perceived risks may prevent some children from starting or continuing treatment (Toomey et al., 2012). Therefore, we cannot assume that the benefits of diagnosis are synonymous with the benefits of treatment.

The Relationship Between Diagnosis and Outcomes

Previous Research

Several previous studies have addressed the relationship between diagnosis and outcomes. These studies have addressed the question by comparing individuals diagnosed with ADHD with individuals who are not diagnosed with ADHD but show elevated levels of ADHD symptoms, above clinical cut-off scores or at levels matching the diagnosed groups, on various outcomes. Although this second group is referred to in various ways throughout these studies, for simplicity these individuals will be termed "undiagnosed" in the current paper. Some studies also compare outcomes with a non-symptomatic control group, which I will call "no-ADHD" individuals, and a group of individuals with a diagnosis of ADHD, but levels of ADHD symptoms below a clinical cut-off, which I will call "low-symptom" individuals.

In adult populations, at least three studies with contradicting results have been conducted using this methodology. Able et al. (2007) measured functional and psychosocial impairment levels between diagnosed and undiagnosed individuals. Although undiagnosed individuals were more likely to be employed full time and had a lower number of different employers in the past 5 years, their annual incomes were significantly lower than those diagnosed with ADHD. The groups showed no differences in number of traffic citations, but the undiagnosed group had significantly higher rates of lifetime arrests. Undiagnosed individuals showed a higher

prevalence of tobacco use and problem drinking. No differences in mean disability level, interpersonal conflict, negative social ties, or quality-of-life overall were found; however, undiagnosed individuals reported lower mean psychological health and life outlooks on quality-of-life subscales. Pawaskar et al. (2020) examined functional performance, work-related productivity, quality-of-life, and self-esteem among diagnosed and undiagnosed groups; they found that undiagnosed individuals showed lower mean scores on all outcomes. Finally, Wood et al. (2021) compared differences in functional impairment, depression, anxiety, stress, procrastination, and time management between groups of undiagnosed, diagnosed, low-symptom, and no-ADHD college students. The undiagnosed group showed significantly worse outcomes than the no-ADHD and low-symptom groups; however, the diagnosed and undiagnosed students did not differ significantly on any of the measured outcomes.

In child and youth populations, studies using this methodology have found conflicting evidence. Two studies, using the same sample, have examined the effects of diagnostic status on academic outcomes. Owens and Jackson (2017) examined eighth-grade outcomes among children diagnosed with ADHD between kindergarten and grade three and undiagnosed children, who were matched on ADHD symptom severity in a large school-based cohort. Undiagnosed children performed significantly better than their diagnosed peers. Notably, differences in academic achievement between diagnosed and undiagnosed children were much greater among children with mild ADHD symptoms than children with severe ADHD symptoms. In the same sample, Owens (2020) examined the relationship between diagnostic status and school behavioural outcomes (i.e., teacher-rated “positive approaches to learning” and externalizing behaviour) in fifth grade. Undiagnosed children scored significantly higher on positive approaches to learning and lower on externalizing behaviour than diagnosed peers. Diagnosed

children who were treated with medication showed smaller differences with undiagnosed children than diagnosed children with no medication treatment; however, differences were not large enough to equalize the undiagnosed and diagnosed groups.

Three studies examined the relationship between diagnostic status and children's social, emotional, and behavioural symptoms. In a Danish national cohort sample, Madsen et al. (2018), found that undiagnosed 7-year-old children scored significantly higher than diagnosed children on the hyperactivity/inattention, conduct problems, emotional problems, peer problems, and impact subscales, and significantly lower on the prosocial subscale, of the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997).

Contrarily, in a sample of 12-year-old children in Japan, Okumura et al. (2021) found that undiagnosed children did not score significantly higher than diagnosed children on the conduct problems, emotional problems, and peer problems subscales of the SDQ; however, they did score significantly lower on the prosocial behaviour subscale compared to diagnosed children. In addition to SDQ outcomes, undiagnosed children did not report significantly different levels of self-harm, school absenteeism, psychological well-being, self-esteem, or depression symptoms from diagnosed children. However, the undiagnosed children scored significantly higher on conduct problems, emotional problems, peer problems, depression, and self-esteem measures and significantly lower on prosocial behaviour, compared to their no-ADHD group.

Finally, O'Connor and McNicholas (2020) used the same SDQ subscales, as well as a measure of children's self-reported self-concept and self-reported depression symptoms, to examine differences in socioemotional outcomes between diagnosed and undiagnosed children in Ireland. This study measured differences at two timepoints. At Time 1, when children were aged 9, children diagnosed with ADHD exhibited more hyperactive/inattention symptoms, poorer

general health, and lower cognitive ability. At Time 2, when children were aged 13, there were no differences in hyperactive/inattention symptoms, general health, or cognitive ability. At both timepoints, diagnosed children had engaged in significantly more mental health service use. Due to these differences between diagnosed and undiagnosed groups, when examining socioemotional symptoms, all analyses controlled for Time 1 hyperactivity/inattention symptoms, Time 1 general health, Time 1 cognitive ability, and past year service engagement. For socioemotional outcomes, there were no significant differences at Time 1 for SDQ subscale scores or child self-concept, and depression was not measured. At Time 2, significantly poorer scores on emotional problems, peer problems, and prosocial behaviours were found for the diagnosed group, with no difference on the conduct problems subscale. As well, diagnosed children had more negative self-concept scores and tended towards higher depression scores, although this comparison did not meet significance. The authors note that since they controlled for differences in hyperactive/inattention symptoms, differences between groups at age 13 cannot be explained by ADHD symptom severity at age 9. They conclude that differences may be due to "socio-emotional pathways triggered by the diagnosis itself" or other unmeasured confounding variables.

Only two of the studies surveyed above considered the potential impacts of diagnosis on parenting or parents' wellbeing. Madsen et al. (2018) measured maternal depression and found no significant difference in levels of diagnosed depression between mothers of diagnosed and undiagnosed children. Okumura et al. (2021) measured parents' self-reported use of yelling at and slapping their children. Parents of undiagnosed children reported significantly higher levels of yelling at their children than parents of diagnosed and no-ADHD children. Parents of

undiagnosed children reported significantly higher levels of slapping than parents of no-ADHD children but not diagnosed children.

Diagnosis and Conduct Problems

Compared to typically developing children, children with ADHD display significantly higher levels of conduct problems (Becker et al., 2006; Reale et al., 2017). Estimated prevalence rates for ADHD with comorbid conduct disorder range from 20-50% and rates for ADHD with comorbid oppositional defiant disorder range from 50-60% (Reale et al., 2017). It seems likely that individuals with undiagnosed ADHD would report significantly more conduct problems than no-ADHD individuals (Okumura et al., 2021) given that even subclinical levels of ADHD symptoms have been associated with conduct problems (Brown & Casey, 2016).

However, differences in conduct problems between undiagnosed versus diagnosed groups may be more nuanced. In fact, previous research examining differences between undiagnosed and diagnosed groups on conduct problems has shown mixed results (Madsen et al., 2018; O'Connor & McNicholas, 2020; Okumura et al., 2021; Owens, 2020). Labelling theory suggests that the stigma associated with ADHD diagnosis would lead to a worsening in comorbid conduct problems and disorders (Link et al., 1989). Attribution theory suggests that an ADHD diagnosis may decrease the perceived controllability of children's conduct problems and therefore lessen their motivation to change their problematic behaviours but could also induce less blame (Weiner, 1994). Meanwhile, interventions, which are often accessed after diagnosis, have been shown to improve conduct problems (Jensen, 1999; Sibley et al., 2014).

When examining the relationship between diagnostic status and conduct problems, it may be important to consider the direction of effects. While receiving a diagnosis may play an important role in the development and maintenance of conduct problems, it is also possible that

children with higher levels of conduct problems might be more likely to be assessed for and diagnosed with ADHD due to their disruptive behaviours. For example, parents of children with high levels of conduct problems are more likely to perceive their children's hyperactivity as problematic and more likely to seek help, than parents of children with lower levels of conduct problems (Sayal et al., 2003).

Diagnosis and Emotional Problems

Elevated rates of emotional problems are also common in ADHD populations, although comorbid internalizing disorders are less common than comorbid conduct disorders (Becker et al., 2006; Reale et al., 2017). Again, much less is known about the relationship between receiving an ADHD diagnosis and emotional problems. In previous research, undiagnosed children have shown higher levels of emotional problems than no-ADHD controls (Okumura et al., 2021). In research among college students, children with undiagnosed ADHD also showed significantly higher levels of depression, anxiety, and stress than students with low-symptom ADHD (Wood et al., 2021). When considering differences between undiagnosed and diagnosed groups, based on labelling theory, one could predict that the ADHD diagnostic label would lead to a worsening and entrenchment of emotional problems (Link et al., 1989); however, the research on ADHD interventions suggests that when children access treatment, often after receiving their diagnosis, they display fewer emotional problems and are less likely to receive a diagnosis of an internalizing disorder (Chang et al., 2016; Corcoran & Dattalo, 2006). As well, attributions of uncontrollability for disruptive behaviours may lessen the anger that others, such as parents, feel towards children with ADHD and lessen the shame that children with ADHD may feel about their undesirable behaviours (Weiner, 1994) which could lessen comorbid emotional problems. Previous studies examining differences in emotional problems between

undiagnosed and diagnosed children have produced varied results (Madsen et al., 2018; O'Connor & McNicholas, 2020; Okumura et al., 2021).

Diagnosis and Parenting Stress

Parenting stress is a specific subset of stress that is influenced by negative feelings towards oneself as a parent, towards one's child, and towards the parent-child relationship (Deater-Deckard, 1998). Elevated parenting stress is common among parents of children with ADHD (Theule et al., 2010) and is linked to poorer parenting practices and child maladjustment (Deater-Deckard, 1998). To date, no studies have examined the specific relationship between parenting stress and ADHD diagnosis. One study examined the relationship between parents who had concerns about their child's development related to autism spectrum disorder (ASD) and parenting stress (DesChamps et al., 2020). DesChamps et al. (2020) found that elevated levels of parenting stress were present in parents of young children with ASD-related concerns prior to a formal diagnosis, suggesting that symptoms of ASD, without a diagnosis, can influence parenting stress. Labelling theory (Link et al., 1989) and the concept of courtesy stigma (Goffman, 1963) would suggest that when a child receives a diagnosis, parents would adopt negative perceptions of themselves based on the stigma associated with ADHD. This implies that parents of children with diagnosed ADHD would have higher parenting stress than parents of children with undiagnosed ADHD. However, attribution theory (Weiner, 1994), as well as evidence from qualitative interviews (Russell & Norwich, 2012), suggests that a diagnosis of ADHD allows parents to see disruptive child behaviours as uncontrollable, which can decrease parents' frustration with their child and potentially, lower their parenting stress. Research also suggests that parenting stress is associated with the severity of child ADHD symptoms (Theule et al., 2010), which points towards the role of symptoms, rather than diagnosis, in causing stress.

Moderating Factors

Child Gender

Child gender has been found to play an important role in diagnostic rates. As mentioned above, non-males are much less likely to receive a diagnosis of ADHD than males (Sayal et al., 2018). On some variables (i.e., inattention, emotional problems, peer aggression) non-males have lower levels than males in community samples, but not in samples referred for services (Gaub & Carlson, 1997), suggesting that gender might interact with the relationship between diagnostic status and symptoms. Differences between girls and boys with ADHD are likely due to both social and biological factors (May et al., 2019). In particular, differences in diagnostic rates may be due to socialized perceptions of gender (May et al., 2019). For example, clinicians are more likely to consider a diagnosis of ADHD when presented with a vignette of a boy than a girl (Bruchmüller et al., 2012). Therefore, although previous research has primarily focused on child sex (e.g., male versus female children; e.g., Ramtekkar et al., 2010), I focused on gender. The decision to focus on gender, rather than sex, was also influenced by the increasing prevalence of children and adolescence who identify as transgender or non-binary(Brown, 2022). Research shows that children who identify as transgender or non-binary are more likely to be diagnosed with ADHD than cisgender children, making it particularly important that gender diverse children and adolescents are included in research concerning ADHD (Goetz & Adams, 2022).

Medication Use

As discussed above, one of the advantages that diagnosis may confer is the ability for children to access evidence-based interventions. One such intervention that is easily measured and widely available in North America is medications (Danielson et al., 2018). Medications prescribed for ADHD include amphetamine-based psychostimulants (e.g., Adderall),

methamphetamine-based psychostimulants (e.g., Concerta), selective norepinephrine reuptake inhibitors (e.g., Strattera), and selective alpha-2A adrenergic agonists (e.g., Intuniv; Canadian ADHD Resource Alliance, 2022). Medications have been found to improve ADHD symptoms, along with both emotional and conduct problems (Chang et al., 2016; Jensen et al., 1999). Medication use has also been associated with increases in parental functioning and parent-child relationship quality among parents of children with ADHD (Schachar et al., 1987). Therefore, medication use may modify the effects of an ADHD diagnosis on outcomes.

Psychosocial Intervention Use

Psychosocial interventions for ADHD have also shown efficacy in reducing ADHD symptoms, comorbid conduct and emotional problems, and parenting stress (Corcoran & Dattalo, 2006; Daley et al., 2014; Sibley et al., 2014; Thorell et al., 2009). A wide range of psychosocial treatments for ADHD exist (Shrestha et al., 2020). Caregiver interventions focus on helping parents discourage unwanted behaviours through rewards systems and non-reactive punishments, as well as improve the parent-child relationship (Shrestha et al., 2020). School interventions also aim to address problematic classroom behaviours through providing specialized supports to children with ADHD, such as one-on-one teaching and modifying the learning environment to reduce distractions (Shrestha et al., 2020). Individual interventions, such as cognitive-behavioural therapy or organizational skills training, can also be used to increase coping skills and strategies (Shrestha et al., 2020). Children with diagnoses of ADHD are more likely to receive psychosocial interventions and, therefore, it was important to investigate these effects when examining the relationship between diagnosis and outcomes.

Covariates

Child Age

ADHD symptoms and impairment varies across development (Sasser et al., 2016). Previous studies examining differences between diagnosed, undiagnosed, and no-ADHD individuals have tended to focus on a single-age cohort (e.g., Madsen et al., 2018). When measured longitudinally, O'Connor and McNicholas (2020) found a discrepancy in group differences across their two times points. While no differences existed between diagnosed and undiagnosed children during middle childhood, by early adolescence, diagnosed children showed poorer scores on the Emotional Problems subscale of the SDQ than undiagnosed children (O'Connor and McNicholas, 2020). ADHD symptoms tend to decrease over time; however, an estimated 40-50% of children with ADHD will continue to meet diagnostic criteria in adulthood (Sibley et al., 2016). Persistence of elevated ADHD symptoms in adolescence has been associated with more severe conduct and emotional problems, greater family life stress, and inconsistent parenting (Sasser et al., 2016). In addition to differences in symptoms levels, prevalence rates of ADHD diagnosis change with age (Danielson et al., 2016). In the USA, the prevalence of children ever diagnosed with ADHD ranges from 2.4% in children under 5 years old to 13.6% of adolescents (Danielson et al., 2016). Therefore, it is important to examine the effects of age on diagnosis and outcomes.

Time Elapsed Since Diagnosis

As briefly mentioned above, an important consideration in this research project is the directionality of effects. While much of the literature reviewed above assumes that receiving a diagnosis of ADHD will lead to changes in child problems or parenting stress, it is also possible that children with a diagnosis of ADHD were given that diagnosis due to differences from those

who do not receive diagnoses. Higher levels of conduct and emotional problems have been associated with greater mental health help-seeking by parents, with stronger effects for children's conduct problems, than emotional problems (Sayal et al., 2003). Parents' perceptions of their children's problems are also influential in their help-seeking behaviour (Eiraldi et al., 2006), so parents with higher levels of initial stress related to their children's ADHD symptoms may seek help more readily than those with lower stress. If children with more emotional and conduct problems, and higher parenting stress, are more likely to be diagnosed with ADHD, then I would expect to see higher levels of problems and stress soon after their diagnosis, perhaps followed by a decline in problems over time, as families learned to cope with the disorder and accessed treatments.

Current Study

This study aimed to add to the literature surrounding the differences between children and their families diagnosed with ADHD with clinically significant ADHD symptoms, children diagnosed with ADHD but not showing significant ADHD symptoms, children not diagnosed with ADHD but showing significant ADHD symptoms, and no-ADHD children. Parents of children aged 5-16 with and without ADHD diagnoses completed an online survey measuring parent and child demographics, ADHD symptoms, conduct problems, and emotional problems. In addition, parents of children aged 5-12 years old completed a measure of parenting stress. All statistical analyses focused on the differences between four groups of participants: (a) a "no-ADHD" group comprised of children who were not diagnosed with ADHD, nor met clinical cut-off criteria on the ADHD symptom scale; (b) a "low-symptom" group of children with ADHD diagnoses who did not meet clinical cut-off criteria for ADHD symptoms; (c) a "diagnosed" group of children with ADHD diagnoses who met clinical cut-off criteria on an ADHD symptom

scale; and (d) an "undiagnosed" group consisting of children without ADHD diagnoses, but who met clinical cut-off criteria for ADHD symptoms. First, demographic characteristics were reported for each group. Then, three ANCOVAs were run to determine whether the diagnostic groups differed in conduct problems, emotional problems, or parenting stress. An additional nine ANCOVAs were run to determine whether child gender, medication use, and psychosocial intervention use interacted with diagnostic status to impact outcomes. During the analysis of these differences, a factor that could potentially confound the relationship between diagnostic status and outcomes (i.e., child age) was controlled for. Any significant differences were followed up with pairwise comparisons. Finally, three regression analyses were performed using only the data from the diagnosed group. These analyses examined the relationship between time elapsed since diagnosis and the three outcomes, while controlling for child age.

Research Questions

1. Do children with undiagnosed ADHD, children with diagnosed ADHD, children with low-symptom ADHD, and no-ADHD children differ on levels of conduct problems while controlling for child age?
    a) Does child gender affect the relationship between ADHD diagnostic status and conduct problems?
    b) Does medication use affect the relationship between ADHD diagnostic status and conduct problems?
    c) Does psychosocial intervention use affect the relationship between ADHD diagnostic status and conduct problems?

2. Do children with undiagnosed ADHD, children with diagnosed ADHD, children with low-symptom ADHD, and no-ADHD children differ on levels of emotional problems while controlling for child age?
    a) Does child gender affect the relationship between ADHD diagnostic status and emotional problems?
    b) Does medication use affect the relationship between ADHD diagnostic status and emotional problems?
    c) Does psychosocial intervention use affect the relationship between ADHD diagnostic status and emotional problems?
3. Do parents of children with undiagnosed ADHD, children with diagnosed ADHD, children with low-symptom ADHD, and no-ADHD children differ on levels of parenting stress while controlling for child age?
    a) Does child gender affect the relationship between ADHD diagnostic status and parenting stress?
    b) Does medication use affect the relationship between ADHD diagnostic status and parenting stress?
    c) Does psychosocial intervention use affect the relationship between ADHD diagnostic status and parenting stress?
4. Is the time elapsed since diagnosis associated with diagnosed children's conduct and emotional problems, or parenting stress while controlling for child age?

Research Hypotheses

Overall, it was hypothesized that no-ADHD children would display lower levels of conduct and emotional problems and their parents would display lower levels of parenting stress than

either diagnosed or undiagnosed children. Previous results support these hypotheses (Okumura et al., 2021). It was also hypothesized that the low-symptom group would show lower levels of child problems and parenting stress than either undiagnosed or diagnosed children. Although the difference between low-symptom and undiagnosed ADHD has not been examined previously in children, results among adults suggest that low-symptom ADHD is associated with a variety of more positive psychosocial outcomes compared to outcomes for those with undiagnosed ADHD (Wood et al., 2021).

Regarding the distinctions between the diagnosed and undiagnosed groups, the labelling theory of mental illness suggests that receiving a diagnostic label of ADHD will result in an exacerbation of problems and increased parenting stress (Link et al., 1989). However, treatment outcomes indicate that when ADHD is diagnosed and subsequently treated, there should be an improvement in problems (Corcoran & Dattalo, 2006; Sibley et al., 2014). Attributions by parents and children for children's ADHD related problems tend to see undesirable behaviours as uncontrollable (Johnston & Ohan, 2005; Kaidar et al., 2003), which could decrease motivation to change, but might also decrease anger and blame towards children with ADHD (Weiner, 1994). Higher levels of problems, especially conduct problems, may have led to a diagnosis of ADHD, which could suggest that diagnosed groups will show higher levels of problems and stress (Sayal et al., 2003). Previous literature investigating the relationship between ADHD diagnosis and outcomes has produced conflicting evidence in the case of emotional and conduct problems and is non-existent in the case of parenting stress.

Therefore, I hypothesized that:

1. No-ADHD and low-symptom children would show significantly lower levels of conduct problems than either undiagnosed or diagnosed children. Diagnosed children would show higher levels of conduct problems than undiagnosed children.
    a) There would be an interaction effect between child gender, diagnostic status, and conduct problems, such that non-males would show lower levels of conduct problems across groups.
    b) There would be an effect of medication use, such that children using medications would show lower levels of conduct problems across diagnostic categories.
    c) There would be an effect of psychosocial intervention use, such that families participating in psychosocial interventions would show lower levels of child conduct problems across diagnostic categories.
2. No-ADHD and low-symptom children would show significantly lower levels of emotional problems than either undiagnosed or diagnosed children. Undiagnosed children would show higher levels of emotional problems than diagnosed children.
    a) There would be an interaction effect between child gender, diagnostic status, and emotional problems, such that across groups, non-males would show higher levels of emotional problems than males.
    b) There would be an effect of medication use, such that children using medications would show lower levels of emotional problems across diagnostic categories.
    c) There would be an effect of psychosocial intervention use, such that families participating in psychosocial interventions would show lower levels of child emotional problems across diagnostic categories.

3. Parents of no-ADHD and low-symptom children would show significantly lower levels of parenting stress than parents of either undiagnosed or diagnosed children. Parents of undiagnosed children would show higher levels of parenting stress than parents of diagnosed children.
    a) There would be an interaction effect of child gender, diagnostic status, and parenting stress, such that across groups, parents of non-males would show lower levels of parenting stress than parents of males.
    b) There would be an effect of medication use, such that parents of children using medications would show lower levels of parenting stress across diagnostic categories.
    c) There would be an effect of psychosocial intervention use, such that families participating in psychosocial interventions would show lower levels of parenting stress across diagnostic categories.
4. There would be a negative relationship between time elapsed since diagnosis and each of the outcomes in families of children diagnosed with ADHD, while controlling for child age.

Method

Research Design

The research questions outlined above were answered through a cross-sectional online survey conducted with parents of children with ADHD and typically developing children. The independent variables were diagnostic status (i.e., no-ADHD, low-symptom, diagnosed, or undiagnosed), child gender (i.e., non-male/ male), child use of medication (i.e., yes/no), and families' use of psychosocial interventions (i.e., yes/no). The dependent variables were child conduct and emotional problems for parents of children aged 5-16 years old, as well as parenting stress for parents of children aged 5-12 years old. Child age was controlled for in the models.

The relationship between outcomes and time elapsed since diagnosis was also examined. This research design received approval from the University of Manitoba Research Ethics Board 1 (HE2021-0241; see Appendix A).

Participants

Eligibility

Eligible participants were parents or caregivers of children aged 5-16 who resided in Canada or the United States. The parents or caregivers themselves had to be 18 years of age or older. Biological, adoptive, foster, and step-parents were all eligible to complete the survey. I originally proposed that I would run a sensitivity analysis if 19 participants per parent type group completed the survey. Less than 19 adoptive, foster, and step-parents completed the survey. In analyses related to accurate reporting of child symptoms, only adoptive, foster, and step-parents who had lived with the child for at least six months were included, as appropriate.

Participants were excluded if the target child had a diagnosis of autism spectrum disorder (ASD) given by a medical doctor, nurse practitioner, or psychologist, or if the child met cut-off criteria on the Social Communication Questionnaire (SCQ), which is a screening measure for traits associated with ASD (Rutter et al., 2003). Children with ASD were excluded due to the potential confounding effects of ASD symptomology on the outcome variables of interest. Research has shown that children with ASD exhibit higher levels of parent-reported emotional and conduct problems (Russell et al., 2013), and parents of children with ASD experience higher levels of parenting stress (Hayes & Watson, 2012) than parents of typically developing children.

Recruitment

Participants were recruited from various sources across Canada and the USA. Two sets of recruitment materials, available in Appendix B, including posters and social media posts, were

created to target two specific groups: (a) parents of typically developing children and (b) parents of children with ADHD diagnoses. Our laboratory's social media accounts were used to share posts in public and private social media groups on platforms like Facebook, Instagram, and Pinterest. Additionally, we shared information in online support blogs that focused on parenting and/or ADHD, such as the ADHD Parent Support Group of Manitoba on Facebook or the Impact Parents blog. The survey was also offered to undergraduate students at the University of Manitoba, who could receive course credit by completing the survey. To expand the reach of our social media posts, paid advertisements on social media platforms were utilized. We also reached out to organizations and non-profits dedicated to ADHD education, advocacy, or services, such as the Centre for ADHD Awareness Canada (CADDAC), Children and Adults with Attention-Deficit/Hyperactivity Disorder (CHADD), and Specialized Services for Children and Youth (SSCY), requesting them to share information with their audience or clients. Furthermore, groups specifically focused on Learning Disabilities, like the Learning Disability Association of America, were contacted, since a significant percentage of children with ADHD also have a Learning Disability (DuPaul et al., 2012).

Sample Size

A sample size calculation was conducted using G*Power to ensure that results would be adequately powered (i.e., at 0.8) with an alpha of .05 (Faul et al., 2007). Using an estimated effect size of $f^2 = 0.402$ based on data obtained from a related study by Okumura et al. (2021) comparing undiagnosed, diagnosed, and no-ADHD groups on emotional problems, a sample size of 28 participants total was required to find at least one significant difference between groups in the overall ANCOVA. However, to provide sufficient power for moderation analyses and to

ensure a sufficient sample size of parents of 5-12-year-olds for parenting stress analyses, I aimed to recruit a sample of approximately 100 participants.

In order to find a significant difference between the undiagnosed and diagnosed groups in a pairwise comparison, I required a much larger sample of 436 participants per group, based on an estimated effect size of $d = 0.19$ from Okumura et al. (2021). Based on effect sizes from Okumura et al. (2021), to find significant pairwise difference between my no-ADHD and undiagnosed, and no-ADHD and diagnosed groups, I required a sample size of 16, and 29, participants per group, respectively.

Data Collection Procedure

The online survey was created by Prairie Research Associates (PRA), a research consulting company specializing in complex survey design. The data collected was stored on their secure servers and transferred to our research team at the end of the recruitment period. Interested participants who were recruited from public settings, such as public Facebook pages, lab social media accounts, or community posters, clicked on a link that took them to a PRA host page for the study. On the host page, they were prompted to enter their email address. Once their email was entered, an automatic email was sent to them containing a link to the survey. Participants who were recruited through closed or private methods, such as email listservs or closed social media groups, directly clicked on the survey link to participate. Before starting the survey, participants were required to review and sign our consent form. Subsequently, participants completed the survey, which took approximately 30-45 minutes in total. It is important to note that this project was part of a larger study, and participants completed the measures listed below, as well as several additional measures. A full list of measures participants completed is available in Appendix C. After completing the survey, participants were given an

opportunity to enter their email addresses for a chance to win one of ten $50 gift cards, receive information about study results, and/or be contacted for future research opportunities.

Measures

Demographic Questionnaire

A demographic questionnaire created for this study was administered to participants. The questionnaire collected information about child age, child gender, when the child was diagnosed with ADHD, whether the child took any ADHD medications, and whether the family engaged in any psychosocial interventions. In terms of child gender, parents were asked "What is this child's gender?" and provided "male," "female," "non-binary," "other," and "prefer not to answer" as response options. Due to insufficient sample size, "female," "non-binary," "other," and "prefer not to answer" respondents were collapsed into a child gender category called "non-male." Medication use for ADHD was coded "Yes" when parents reported that their child was both prescribed and currently taking one of the following types of medication, (a) amphetamine-based psychostimulants, (b) methamphetamine-based psychostimulants, (c) selective norepinephrine reuptake inhibitors, or (d) selective alpha-2A adrenergic agonists. Both trade and generic names for each medication were provided to parents. To assess for psychosocial intervention use, respondents were asked, "Has [your child] received any interventions for behavioural concerns?" with one response option being "Psychosocial interventions (e.g., therapy, biofeedback)." If participants check the psychosocial intervention box, they were coded as "Yes."

Additionally, basic demographic variables such as parent age, parent role identification (mother versus father), number of children in the family, family income, recruitment source, participant gender, race/ethnicity, marital status, and parental education were collected to describe the sample and compare differences between diagnostic groups. Finally, the

questionnaire asked parents of children who did not report a diagnosis of ADHD and/or ASD about whether they had concerns about their child's behaviour and whether they had sought professional help to address those concerns. This allowed us to assess whether children in the undiagnosed group may have been in the process of receiving a diagnosis, which was used to contextualize the results of our analysis. The demographic questionnaire employed branching logic to ask only relevant questions based on participants' previous answers (see Appendix D).

ADHD Rating Scale-IV: Home Version

The ADHD Rating Scale-IV: Home Version (DuPaul et al., 1998) was used to measure ADHD symptoms and classify children into diagnostic groups. The ADHD Rating Scale-IV: Home Version is a parent-reported, 18-item scale measuring hyperactivity-impulsivity and inattention designed for children aged 5-18 years old (Pappas, 2006). The scale asks parents to rate how often their child displayed listed behaviours, such as “Fidgets with hands or feet or squirms in seat,” from *Never or rarely* to *Very often* (see Appendix E). Higher scores indicate more ADHD symptoms. The scale has good test-retest reliability (0.85) and excellent internal consistency (0.92; DuPaul et al., 1998). Parent and teachers’ ratings are moderately correlated (0.41; DuPaul et al., 1998). The test has adequate to excellent convergent validity when compared to other, validated ADHD rating scales and can predict ADHD diagnostic status adequately (Demaray et al., 2003). The scale was standardized in a large, representative sample of children and adolescents in the United States of America (DuPaul et al., 1998).

Cut-off scores for the ADHD-Rating Scale are based on percentile rankings stratified by child age and gender (DuPaul et al., 1998). In the current study, a cut-off score at the 90th percentile was used to identify children with clinical ADHD symptom levels.

Strengths and Difficulties Questionnaire (SDQ): Conduct Problems and Emotional Problems Subscales

Parents completed the 5-item SDQ conduct problems subscale, as my measure of conduct problems, and the 5-item SDQ emotional problems subscale, as my emotional problems measure. These subscales can be administered to parents or teachers of children aged 4-16 years (Goodman, 1997). Items on the scales describe behaviours or characteristics of the child and respondents are asked whether items are *Not true, Somewhat true,* or *Certainly true* of their child (Goodman, 1997; see Appendix F). The scale has acceptable internal consistency and test-retest reliability (Muris et al., 2003) and convergent and divergent validity (Kersten et al., 2016). Despite its brevity (most parents can complete the full questionnaire in 5 minutes), the SDQ shows equivalent or higher correlations with psychiatric interview ratings than the significantly longer Child Behaviour Checklist (Goodman & Scott, 1999). The subscale structural validity has been tested extensively and deemed acceptable or good across studies (Kersten et al., 2016). Higher scores on each of these subscales indicate more problems.

Parenting Stress Index – 4- Short Form (PSI)

Parenting stress in parents of children aged 5-12 years old was measured using the *Parenting Stress Index – 4- Short Form* (PSI-SF) a 36-item scale measuring stress related to the parent-child system within a family (Abidin, 2012). The PSI-SF is validated for parents of children aged 0 to 12 (Abidin, 2012). It has been used in large ethnically diverse and clinical samples, as well as across multiple settings (Holly et al., 2019). Each item on the scale asks parents to rate their agreement with statements such as “I feel trapped by my responsibilities as a parent” on a 5-point scale, from *Strongly Disagree* to *Strongly Agree* (see Appendix G). The scale is divided into three domains, Parental Distress, Parent-Child Dysfunctional Interaction,

and Difficult Child (Abidin, 2012); however, only the total score, including all three domains, was used in the current research. Internal consistency for the PSI-SF is excellent, as is construct validity, with scores able to predict and differentiate clinical and non-clinical samples (Holly et al., 2019).

Social Communication Questionnaire-Lifetime Version (SCQ).

The SCQ is a screening measure for ASD (Rutter et al., 2003). It can be used with individuals over the age of 4 years, with a mental age of at least 2 years (Rutter et al., 2003). The SCQ measures three domains of symptoms associated with ASD, reciprocal social interaction, language and communication, and repetitive and stereotyped patterns of behaviour (Rutter et al., 2003). Only the total score was used in the current study to exclude parents of children with scores at the clinical level (i.e., a score of 15 or greater; Ung et al., 2016). The scale consists of 40 yes/no questions that parents answer about their child. Examples include, "Is she/he now able to talk using short phrases or sentences?" and "When she/he was 4 to 5, did she/he ever try to comfort you if you were sad or hurt?" (see Appendix H). The SCQ has good internal consistency and is adequate at discriminating between ASD and non-ASD samples using the cut-off point of 15 (Ung et al., 2016).

Analytic Strategy

Analyses were carried out using the Statistical Package for the Social Sciences (SPSS; IBM Corp., 2017). First, demographic characteristics such as caregiver and child age, caregiver and child gender, household income, partner status, race/ethnicity, family composition, and diagnostic comorbidities were reported for the sample. Although there was initial interest in exploring statistical differences on all these characteristics between diagnostic groups, it was ultimately determined that such analyses fall beyond the scope of the current project. However,

group means for relevant characterises and a chi-square test for child gender were computed and reported. As well, parental depression symptoms across groups are reported in Appendix I to contextualize the mental health of parents in our sample.

Next, the assumptions underlying ANCOVAs were tested. The normal distribution and absence of outliers for the dependent variables (conduct problems, emotional problems, and parenting stress) were assessed for each combination of the independent variables. The linearity between each covariate and the dependent variables at each combination of independent variables was also examined. Additionally, tests and graphs were computed to evaluate the assumptions of homogeneity of regression slopes and homogeneity of variances.

It should be noted that I initially proposed running three ANCOVAs using diagnostic status, child gender, medication use, and psychosocial intervention use and their interactions as factorial variables. However, due to concerns about insufficient power and difficulty in interpreting results, I ultimately decided to run 12 ANCOVAs, four for each outcome variable. The analysis of parenting stress included only participants with children aged 5-12. Diagnostic status was treated as a four-level factor (no-ADHD, low symptom, diagnosed, or undiagnosed), child gender as a two-level factor (non-male or male), medication status as a two-level factor (based on parent-reported medication use: yes or no), and psychosocial intervention use as a two-level factor (based on parent-reported participation: yes or no). Significant differences were followed up with pairwise comparisons. Each ANCOVA controlled for child age. Initially, my intention was to include child ADHD symptom severity and several family factors as covariates. However, during the initial data preparation phase, it was determined that these variables should be excluded from the analysis. Using Spearman's rho, strong collinearity was observed between

child ADHD symptom severity and diagnostic status, with a correlation coefficient of r (284) = .80, $p < .001$. Family factors were removed due to concerns about insufficient power.

A series of ANOVAs were planned to examine whether recruitment source and/or parental type had an impact on results. However, an insufficient number of participants were recruited from sources other than social media to conduct the sensitivity analyses on recruitment source and an insufficient number of non-biological parents participated to conduct the sensitivity analyses for parental type.

Finally, three linear stepwise regression analyses were conducted using the data from the diagnosed group only. Child age was entered in step one, followed by the dependent variable in step two, allowing the examination of the relationship between time elapsed since diagnosis and (1) conduct problems, (2) emotional problems, and (3) parenting stress while controlling for child age.

Results

Participants

Nine hundred and twenty-one North American parents completed the online survey. To eliminate parents who were not eligible for the current study, 338 parents of children diagnosed with ASD, 94 parents of children with SCQ scores above a clinical cut-off, 204 parents of children outside the age range of 5 to 16 years old, and 1 parent who did not complete the ADHD symptom rating scale were removed from the sample. Therefore, 284 responses were included in the current study's results. For analyses examining parenting stress, 220 parent responses, of children aged 5- to 12-years old, were included (as this analysis did not include parents of older children). The demographic characteristics of the included sample are presented in Table 1 and Table 2. Of note, participants were predominantly biological parents (n = 268), identified as

mothers (n = 223), were married or in common-law relationships (n = 244), had completed post-secondary education (n = 231), and were White (n = 235). Most participants lived in Canada (n = 231) and were recruited to the study via social media (n = 238). Parents completed questionnaires with a target child in mind. Target children were a mean of 9.2 years old (SD = 3.4), 54.9% male (n = 156), and had a variety of mental disorder diagnoses, most commonly ADHD (n = 100), anxiety disorders (n = 47), and specific learning disabilities (n = 22).

Conduct problems for the overall sample were higher than the American norm of M= 1.3 (SD = 1.6; Simpson et al., 2005). Emotional problems were also higher than the American average of M = 1.6 (SD = 1.8; Simpson et al., 2005). The samples' level of parenting stress, M = 88.0 (SD = 24.9), fell at the 69th percentile using PSI-SF-4 norms (Abidin, 2012). Higher than average levels of problems and stress were expected, given the high proportion of families with ADHD in the sample.

Table 1

Participant Demographic Frequencies

	n	***%***
Total Sample	284	100
Parental role identification		
Mothers	223	78.5
Fathers	61	21.5
Relationship to child		
Biological parent	268	94.4
Adoptive parent	8	2.8
Stepparent	6	2.1
Other	2	0.7
Parental marital status		
Married/common law	244	85.9
Divorced/ separated/ widowed/ single	39	13.7
Prefer not to answer	1	0.4
Country of residence		
Canada	231	81.3
USA	53	18.7
Household income		
Canadian participants		
0-40k	14	4.9

40-90k	63	22.1
90k+	150	52.9
Prefer not to answer	4	1.4
USA participants		
0-40k	5	1.8
40-90k	21	7.4
90k+	25	8.8
Prefer not to answer	2	0.7
Parental education		
Less than high school/ High school	14	5.0
Some post-secondary	38	13.4
Completed post-secondary	231	81.3
Prefer not to answer	1	0.4
Ethnicity [a]		
Asian	16	5.6
Black	2	4.2
Indigenous [b]	23	8.1
Latinx	3	1.1
Native Hawaiian or Pacific Islander	2	0.7
White	235	82.7
Other	12	3.5
Child gender		
Male	156	54.9
Non-male [c]	128	45.1
Psychosocial Intervention Use		
Yes	62	21.8
No	222	78.2
Medication Use		
Yes	74	26.1
No	210	73.9
Child diagnoses [a]		
Anxiety disorders	47	16.5
Specific learning disability	22	7.7
Depression	14	4.9
PTSD [d]	10	3.5
Oppositional Defiant Disorder	10	3.5
Conduct Disorder	3	1.1
S(P)CD [e]	6	2.1
Feeding disorder	4	1.4
Other	22	7.7
Recruitment source [a]		
Social Media	238	83.8
Undergraduate research subpool	16	5.6
Community posting	13	4.6
Other	22	7.7

[a] Percentages sum to greater than 100 as participants could select multiple options.
[b] Includes those identifying as First Nations, Inuit, Métis, American Indian, or Alaskan Native.
[c] Includes children identifying as female (n =116), as well as those identifying as non-binary, another gender not listed, and prefer not to answer (n = 12).
[d] Post Traumatic Stress Disorder
[e] Social (Pragmatic) Communication Disorder

Table 2

Participant Demographic Means

	M	*SD*
Child age (years)	9.2	3.4
Parent age (years)	39.4	5.9
Number of children per family	2.1	1.0
ADHD Symptoms [a]	17.6	12.5
Conduct Problems [b]	2.0	2.0
Emotional Problems [c]	2.8	2.5
Parenting Stress [d]	88.0	24.9

[a] Raw scores ADHD Rating Scale-IV: Home Version
[b] SDQ Conduct Problems subscale score
[c] SDQ Emotional Problems subscale score
[d] PSI-4-SF total score

Group Sample Sizes

Next, sample sizes for each diagnostic group were calculated. Included in the sample, there were (a) 159 children who were not diagnosed with ADHD, nor met clinical cut-off criteria on the symptom scale (i.e., "No-ADHD" group); (b) 34 children with ADHD diagnoses who did not meet clinical cut-off criteria for symptoms (i.e., "low-symptom" group); (c) 66 children with ADHD diagnoses who met clinical cut-off criteria on a symptom scale (i.e., "diagnosed" group); and (d) 25 children without ADHD diagnoses, but who met clinical cut-off criteria for symptoms (i.e., "undiagnosed" group). Key demographics for each group are displayed in Table 3. A chi-square test was conducted for differences in child gender between groups, $X^2(3) = 22.94$, $p < .001$. Pairwise comparisons revealed that there was a significantly greater proportion of males in the low-symptom group and a significantly greater proportion of non-males in the undiagnosed group.

Table 3

Demographics by Diagnostic Group

	No-ADHD	Low-Symptom	Diagnosed	Undiagnosed
	n (%)			
All	159 (56)	34 (12)	66 (23)	25 (9)
Child gender				
Male	84 (52.8)	30 (88.2)	35 (53.0)	7 (28.0)
Non-male	75 (47.2)	4 (11.8)	31 (47.0)	18 (72.0)
Psychosocial Intervention Use				
Yes	12 (7.5)	14 (41.2)	33 (50)	3 (12)
No	147 (92.5)	20 (58.8)	33 (50)	22 (88)
Medication Use				
Yes	4 (2.5)	26 (76.5)	44 (66.7)	0 (0)
No	155 (97.5)	8 (23.5)	22 (33.3)	25 (100)
Concerns about child's behaviour				
Yes & not spoken to a professional about concerns	11 (7.0)			5 (20.0)
Yes & spoken to a professional about concerns	16 (10.1)			7 (28.0)
Yes & on a waitlist for a diagnosis or assessment	4 (2.5)			0 (0.0)
Yes & in the process of receiving a diagnosis or assessment	2 (1.3)			2(8.0)
Other	6 (3.8)			1(4.0)
No	119 (75.3)			10 (40.0)
	M(SD)			
Child age	8.7 (3.4)	10.4 (3.5)	10.2 (3.2)	8.3 (3.1)
ADHD Symptoms [a]	9.6 (6.6)	19.4 (7.2)	34.7 (7.9)	27.2 (6.4)
Conduct Problems [b]	1.4 (1.6)	2.8 (2.5)	3.8 (2.1)	2.0 (1.7)
Emotional Problems [c]	2.1 (2.2)	2.6 (1.9)	4.0 (2.3)	4.3 (2.3)

Parenting Stress [d]	80.0 (23.6)	91.1 (20.8)	106.9 (21.8)	91.5 (20.0)

[a] Raw scores ADHD Rating Scale-IV: Home Version
[b] SDQ Conduct Problems subscale score
[c] SDQ Emotional Problems subscale score
[d] PSI-4-SF total score

Assumption Testing

Normality

Conduct Problems. In each group, conduct problems were non-normally distributed according to the Shapiro-Wilk test of normality (i.e., all $p < .001$). A visual examination of the data revealed positively skewed distributions across groups, with the most pronounced skews occurring in the no-ADHD and low-symptom groups.

Emotional Problems. The assumption of normality was partially met for emotional problems. Levels of emotional problems were normally distributed in the diagnosed, low-symptom, and undiagnosed groups, according to the Shapiro-Wilk test and a visual examination of histograms. In the no-ADHD group, data were non-normally distributed, $W = .84$, $p < .001$. A visual inspection of the histogram in the no-ADHD group revealed a positively skewed distribution.

Parenting Stress. Visual examination of histograms and Shapiro-Wilk tests revealed that levels of parenting stress were normally distributed across all groups.

Outliers

Conduct Problems. In the no-ADHD group, two outliers with high scores were identified. Similarly, two high-score outliers were detected in the diagnosed group.

Emotional Problems. Three outliers were present in the no-ADHD group. All outliers were scores of 8 or above on the SDQ Emotional Problems scale.

Parenting Stress. Two high-score outliers were identified in the no-ADHD group. One low-score outlier was detected in the diagnosed group, as well as one high-score outlier in the undiagnosed group.

Outlying data was examined and no abnormal patterns in responding were apparent. All analyses were run with and without outliers. There were minor differences in pairwise comparisons results between sets of analyses but no differences between the significance of main and interaction effects. Therefore, all results presented below include outliers. Results excluding outliers are available in Appendix J.

Linearity Between Covariates and Dependent Variables

Scatterplots were created to analyze the relationship between child age and the outcome variables in each group. Spearman's rho was also computed to assess the relationship between child age and outcomes within each group.

Conduct Problems. In each group, child age and conduct problems were negatively linearly related.

Emotional Problems. Child age and emotional problems were not significantly correlated in any group. However, a visual examination of scatterplots suggested a linear relationship.

Parenting Stress. Child age and parenting stress were not significantly correlated in any group. However, a visual examination of scatterplots suggested a linear relationship.

Homogeneity of Regression Slopes

To test for homogeneity of regression slopes, 12 separate general linear models (GLMs) were run using an interaction term that included child age and the independent variable of each of the 12 ANCOVAs (i.e., (a) child age and diagnostic group, (b) child age, diagnostic group,

and medication use, (c) child age, diagnostic group, and psychosocial support use, and (d) child age, diagnostic group, and child gender).

Conduct Problems. All interactions were significant for the four GLMs run using conduct problems as the dependent variable. This suggests that the effects of diagnostic group, medication use, psychosocial support use, and child gender on conduct problems differ based on child age. To address the potential confounding effect of child age, it was added in the interaction term for each ANCOVA predicting conduct problems.

Emotional Problems. In the four GLMs run with emotional problems as the dependent variable, interaction terms (a) child age and diagnostic group, (b) child age, diagnostic group, and medication use, and (c) child age, diagnostic group, and psychosocial support use, were non-significant. However, there was a significant interaction between child age, diagnostic group, and child gender, F (8, 261) = 2.37, p = .018. Therefore, child age was added to the factor of interest (e.g., three-way interaction term with diagnostic group, child gender, and child age) for this ANCOVA.

Parenting Stress. No significant interactions were found in GLMs with parenting stress.

Homogeneity of Variances

Both Levene's F test for heteroskedasticity and a visual examination of residual plots were conducted for each of the 12 ANCOVAs run.

Conduct Problems. Significant heteroskedasticity was found using both Levene's test and a visual examination of residual plots for each of the four GLMs predicting conduct problems.

Emotional Problems. No significant heteroskedasticity was apparent in emotional GLMs.

Parenting Stress. No significant heteroskedasticity was apparent in parenting stress GLMs.

Analyses Evaluating the Impact of Diagnostic Status on Outcomes

Conduct Problems

To examine whether ADHD diagnostic status, as well as its interaction with child gender, medication use, and psychosocial intervention access, were related to children's conduct problems, four ANOCOVAs were run. Results to answer these research questions (1, 1a, 1b, 1c) are available in Table 4.

Table 4

ANCOVAs Testing Differences in Conduct Problems by Diagnostic Group

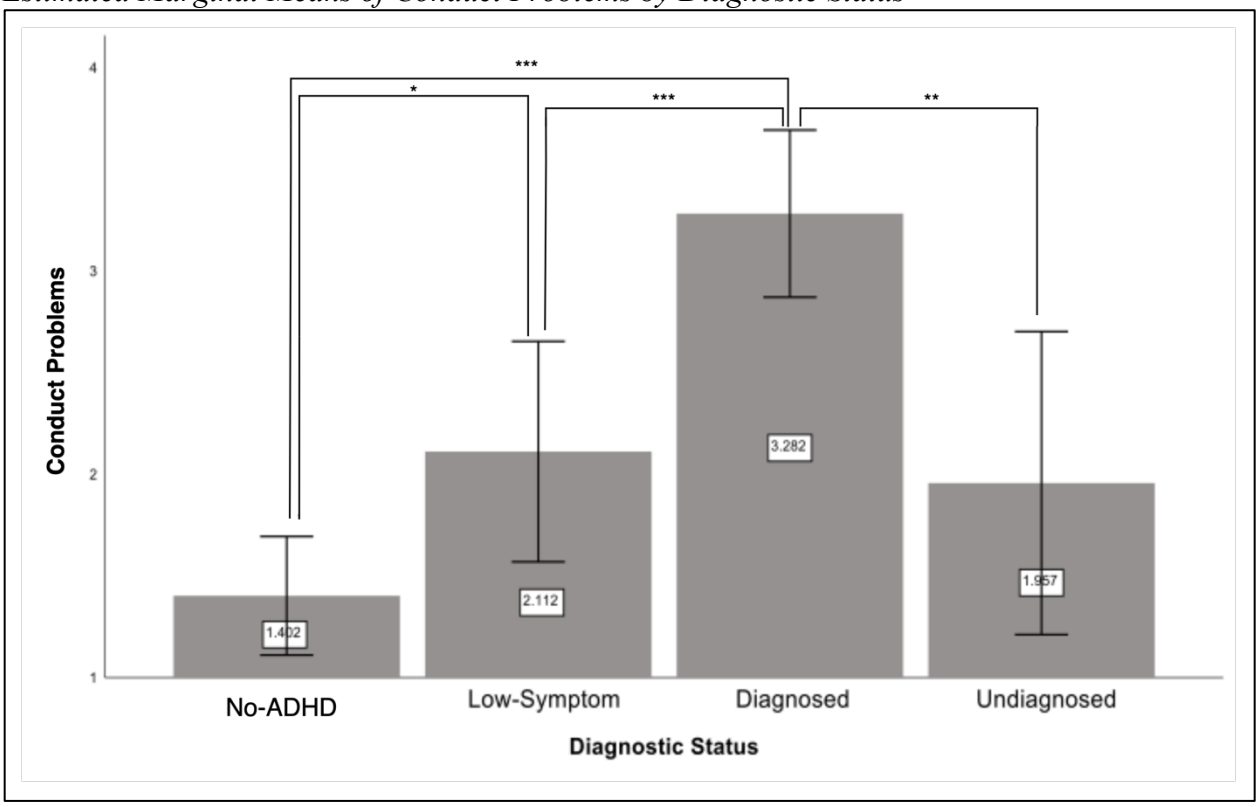
	df	*F*	*p*
Diagnostic Status			
Child Age	1, 271	5.69	.018
Diagnostic Status x Child Age	3, 271	18.71	< .001
Diagnostic Status X Child Gender			
Child Age	1, 267	3.88	.050
Diagnostic Status X Child Gender X Child Age	7, 267	8.26	< .001
Diagnostic Status X Medication Use			
Child Age	1, 268	.72	.399
Diagnostic Status X Medication Use X Child Age	6, 268	11.04	< .001
Diagnostic Status X Psychosocial Intervention Use			
Child Age	1, 267	3.23	.074
Diagnostic Status X Psychosocial Intervention Use X Child Age	7, 267	9.64	< .001

Diagnostic Status. The interaction of diagnostic status and child age was entered into the model, while controlling for child age. Conduct problems were significantly different across diagnostic status groups, F (3, 271) = 18.71, $p < .001$. Pairwise group comparisons revealed that the no-ADHD group had significantly fewer conduct problems than the low-symptom, $p = .022$, and diagnosed, $p < .001$, groups, see Figure 1. The diagnosed group had significantly higher

levels of conduct problems than the no-ADHD, $p < .001$, low-symptom, $p < .001$, and undiagnosed, $p = .002$, groups.

Figure 1

Estimated Marginal Means of Conduct Problems by Diagnostic Status



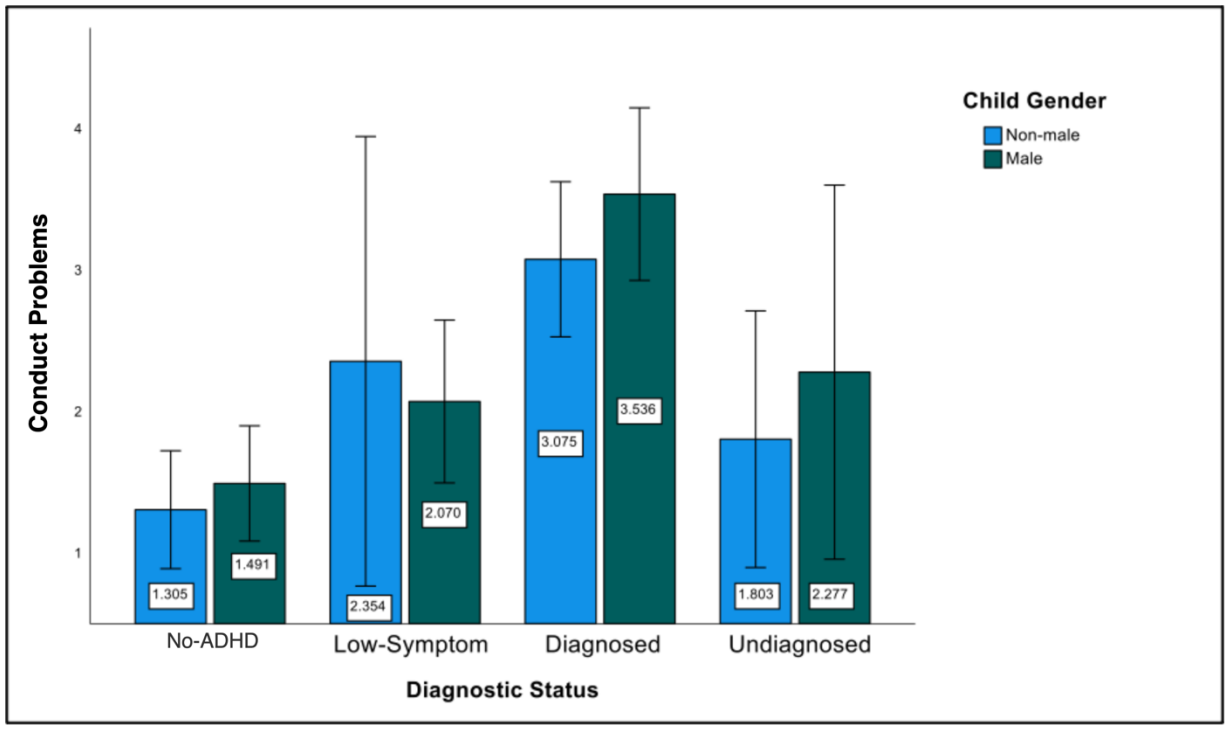
Note. Covariates in the model are evaluated at the following values: Child age = 9.6498. Error bars represent 95% CI.
*$p < .05$
**$p < .01$
***$p < .001$

Diagnostic Status X Gender. In the second ANCOVA, a three-way interaction between diagnostic status, child gender, and child age was entered into the model. Child age was included as, during assumption testing, it was revealed that the relationships between child age and conduct problems was not consistent across levels of diagnostic status (i.e., the homogeneity of regression slope assumption was violated). Child age was also entered as a covariate. The interaction was significant, $F(7, 267) = 8.26$, $p < .001$. Pairwise comparisons suggested that

there were no significant differences between non-male and male groups at each level of diagnostic status, see Figure 2. Among children identifying as non-male, conduct problems were significantly lower in the no-ADHD group than in the diagnosed group, $p < .001$. Conduct problems were also significantly higher in the diagnosed group than undiagnosed group among non-males, $p = .019$. In children identifying as male, children in the diagnosed group showed significantly higher levels of conduct problems than children in the no-ADHD, $p < .001$, and low-symptom, $p < .001$, groups.

Figure 2

Estimated Marginal Means of Conduct Problems by Diagnostic Status and Child Gender



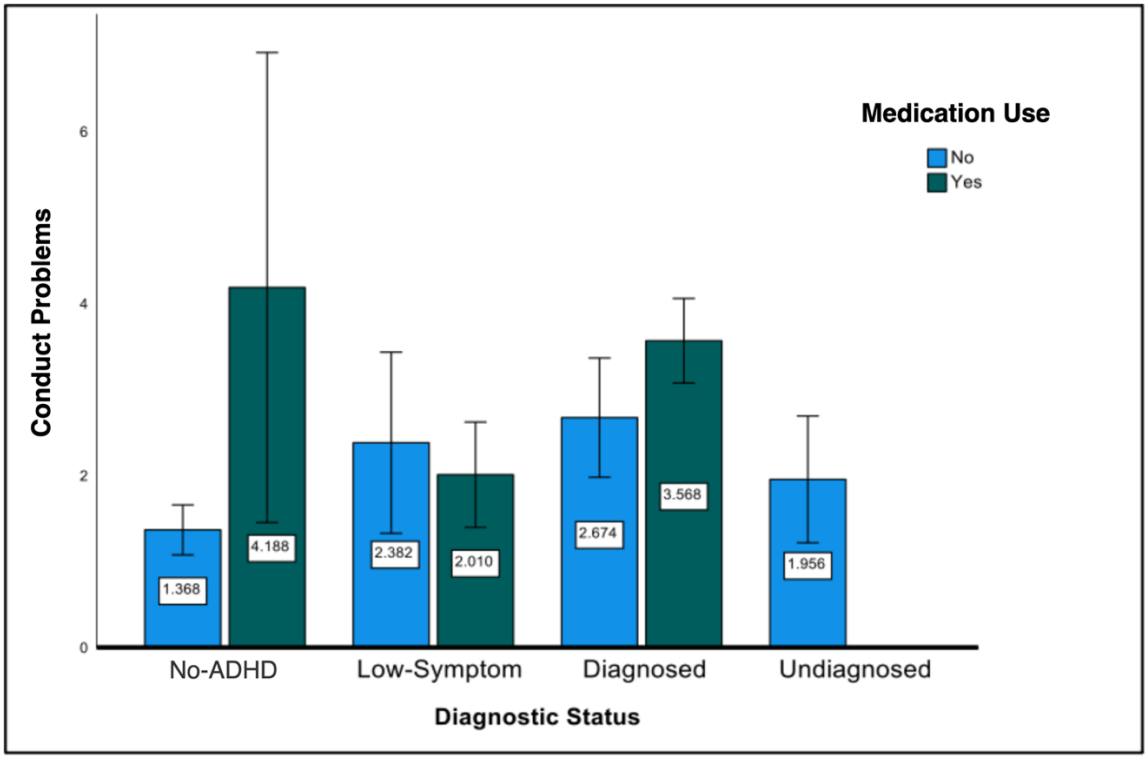
Note. Covariates appearing in the model are evaluated at the following values: Child Age = 9.6498. Error bars represent 95% CI.

Diagnostic Status X Medication Use. While controlling for child age, a three-way interaction term, diagnostic status x medication use x child age, was entered into the model. Child age was included in the interaction term because the assumption of homogeneity of regression slopes was violated. The interaction term was significant, $F(6, 268) = 11.04$, $p < .001$,

suggesting a difference in conduct problems across diagnostic groups, dependent on the child's use of medication and their age. Pairwise comparisons suggested that among children in the no-ADHD group, those who were using medication had significantly higher levels of conduct problems than those who were not, $p = .045$, see Figure 3. The same pattern was found in the diagnosed group, $p = .037$. There were no significant differences between levels of conduct problems based on medication use in the low-symptom group. There were no children using medications in the undiagnosed groups. When examining differences between diagnostic groups among children not using medications, children in the no-ADHD group had fewer conduct problems than those in the diagnosed group, $p < .001$. Among children who were using medication, the only significant difference was between the low-symptom and diagnosed groups, $p < .001$. However, it should be noted that there was a small sample size of children who were in the no-ADHD group, and zero children in the undiagnosed group, who were currently taking medication.

Figure 3

Estimated Marginal Means of Conduct Problems by Diagnostic Status and Medication Use



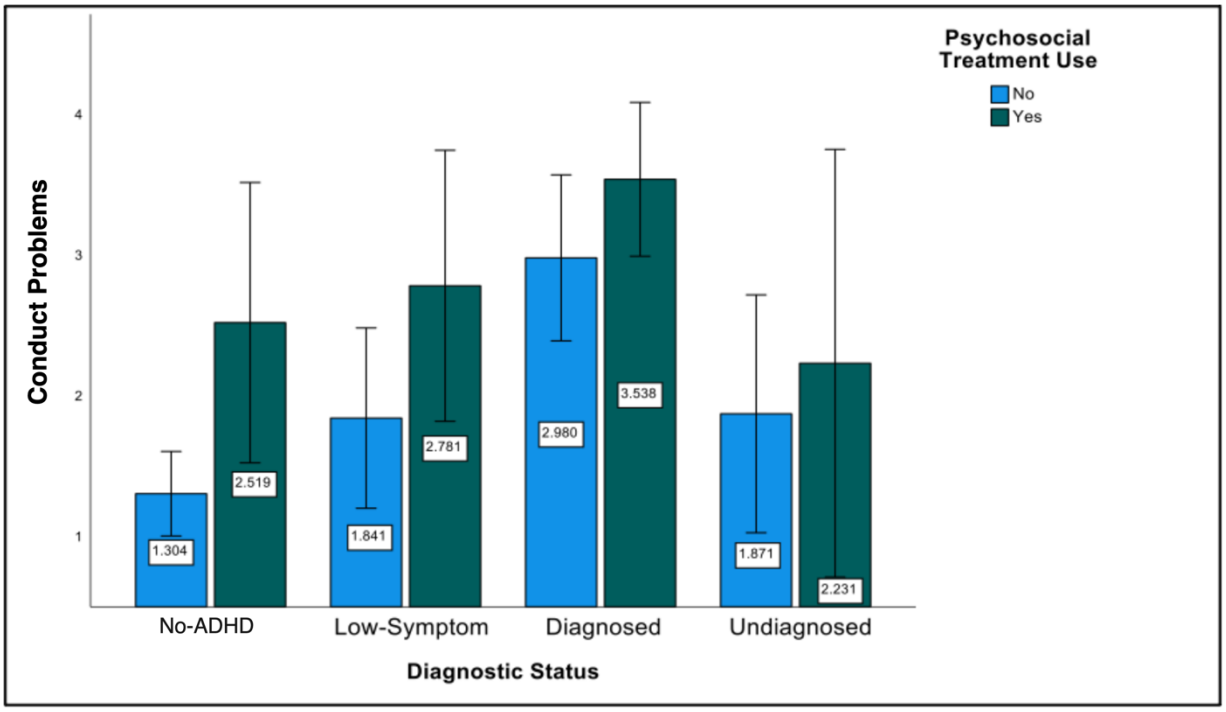
Note. Covariates appearing in the model are evaluated at the following values: Child Age = 9.6498. Error bars represent 95% CI.

Diagnostic Status X Psychosocial Intervention Use. In the fourth ANCOVA, conduct problems differed based on the three-way interaction between diagnostic status, psychosocial 0treatment use, and child age, F (7, 267) =9.64, $p < .001$. Child age was included in this interaction term due to the violation of the assumption of homogeneity of regression slopes. Pairwise comparisons suggested that among children in the no-ADHD group, those who had accessed psychosocial treatments had significantly higher levels of conduct problems than those who had not, $p = .022$. Among children in the low-symptom, diagnosed, and undiagnosed groups, there was no significant difference in problems between those who had and had not used psychosocial treatments. Among children who had not accessed treatment, those in the no-ADHD group had significantly lower levels of conduct problems than those in the diagnosed

group, $p < .001$. As well, the diagnosed group showed significantly higher levels of conduct problems than all three other groups (no-ADHD: $p < .001$, low-symptom: $p = .009$, undiagnosed: $p = .036$). Among children who had accessed psychosocial interventions, there were no significant differences between diagnostic groups, see Figure 4.

Figure 4

Estimated Marginal Means of Conduct Problems by Diagnostic Status and Psychosocial Treatment Use



Note. Covariates appearing in the model are evaluated at the following values: Child Age = 9.6498. Error bars represent 95% CI.

Emotional Problems

To answer research questions 2, 2a, 2b, and 2c, four ANCOVAs were run to examine potential differences in emotional problems based on diagnostic status, child gender, medication use, and psychosocial treatment use. The results of these ANCOVAs are presented in Table 5.

Table 5

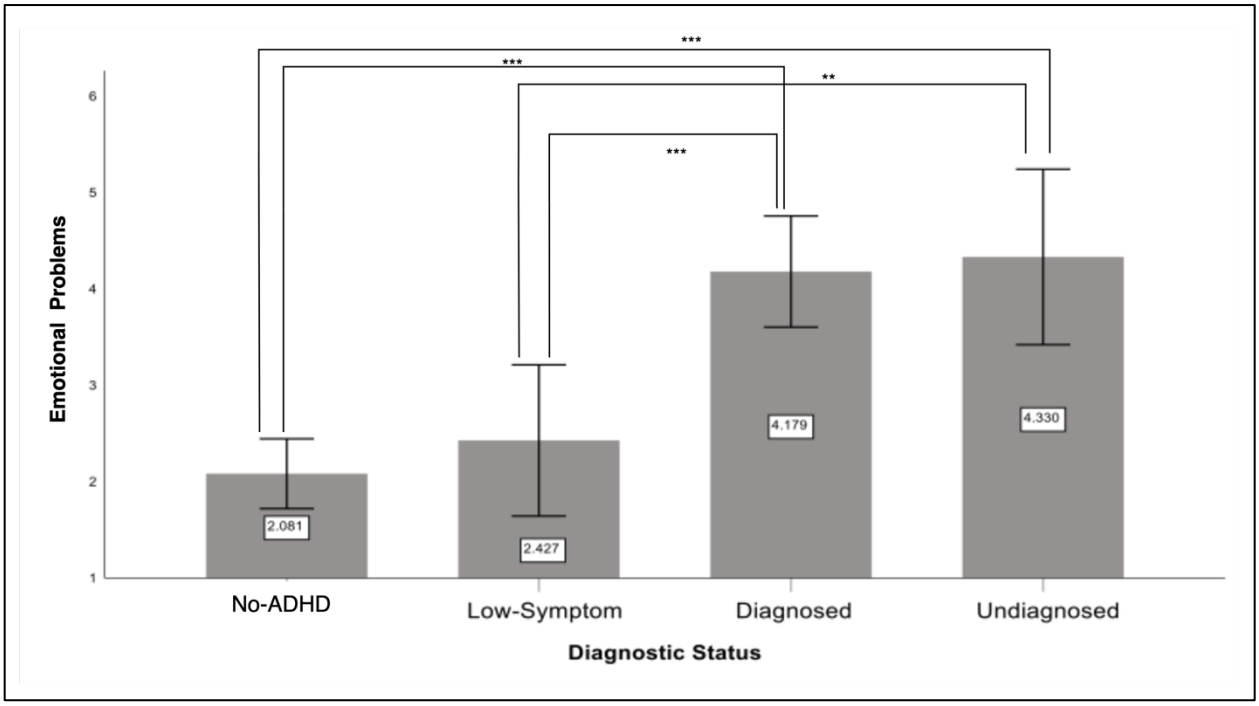
ANCOVAs Testing Differences in Emotional Problems by Diagnostic Group

	df	*F*	*p*
Diagnostic Status			
Child Age	1, 272	.38	.541
Diagnostic Status	3, 272	16.29	< .001
Diagnostic Status X Child Gender			
Child Age	1, 268	2.35	.127
Diagnostic Status X Child Gender X Child Age	7, 268	7.94	< .001
Diagnostic Status X Medication Use			
Child Age	1, 269	.33	.564
Diagnostic Status X Medication Use	6, 269	8.58	< .001
Diagnostic Status X Psychosocial Intervention Use			
Child Age	1, 268	.00	.966
Diagnostic Status X Psychosocial Intervention Use	7, 268	11.29	< .001

Diagnostic Status. Diagnostic status was entered as a four-level factor in this model. Child age was a covariate. Emotional problems differed significantly across the diagnostic groups, F (3, 272) = 16.29, $p < .001$. Pairwise comparisons were completed to examine differences between groups, see Figure 5. The no-ADHD and low-symptom groups showed significantly lower levels of emotional problems than the diagnosed group, both $p < .001$. The undiagnosed group had significantly higher levels of emotional problems than the no-ADHD, $p < .001$, and low-symptom, $p = .002$, groups. The diagnosed and undiagnosed groups did not differ significantly.

Figure 5

Estimated Marginal Means of Emotional Problems by Diagnostic Status



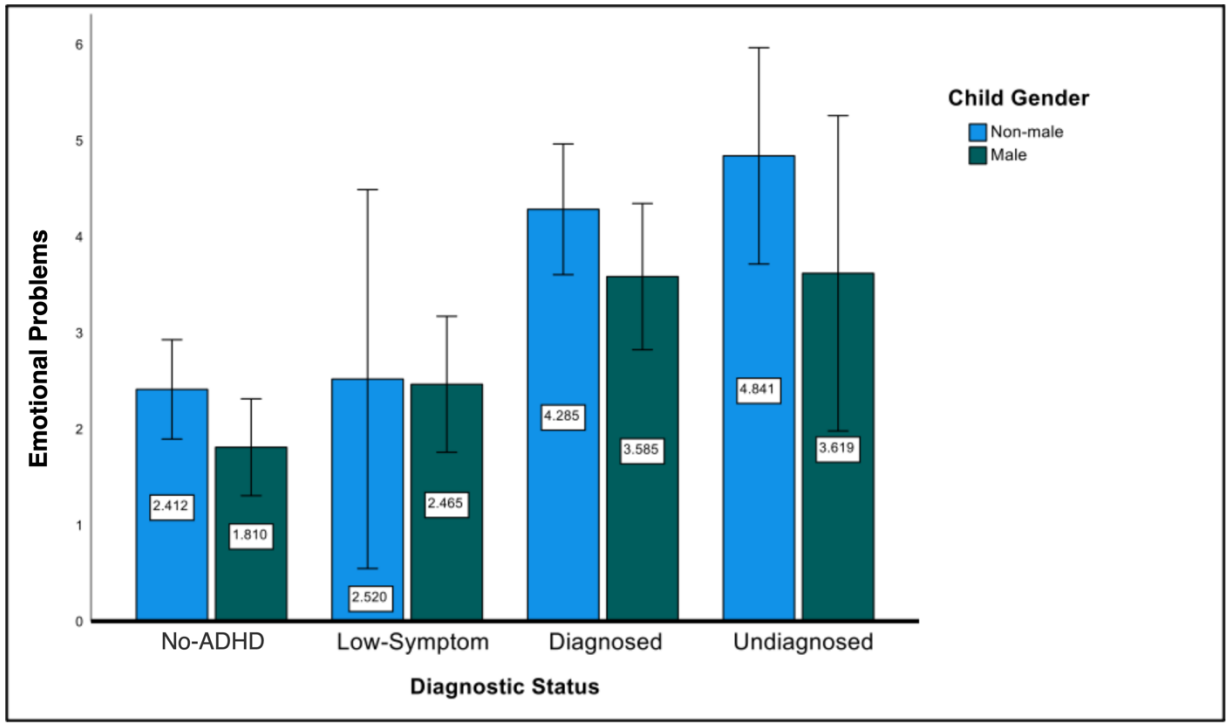
Note. Covariates appearing in the model are evaluated at the following values: Child age = 9.6453. Error bars represent 95% CI.
*$p < .05$
**$p < .01$
***$p < .001$

Diagnostic Status X Gender. To assess for the potential effect of child gender on emotional problems, a three-way interaction term including diagnostic status, child gender, and child age was tested in this model. Child age was added to the interaction term because during assumption testing, it was discovered that the association between child age and conduct problems varied depending on the diagnostic status (i.e., the assumption of homogeneity of regression slopes was violated). There was a significant interaction between diagnostic status, child gender, and child age, F (7, 268) = 7.94, $p < .001$. There were no significant differences between non-male and male groups at each level of diagnostic status, see Figure 6. Among children identifying as non-male, emotional problems were significantly higher in the diagnosed,

$p < .001$, and undiagnosed, $p < .001$, groups compared to the no-ADHD group. Emotional problems were also significantly higher in the undiagnosed group, p = .045, compared to the low-symptom group. Among male children, the no-ADHD group had significantly lower levels of problems than the diagnosed, $p < .001$, and undiagnosed, $p = .039$, groups. Emotional problems were significantly lower in the low-symptom group than the diagnosed group, $p = .033$.

Figure 6

Estimated Marginal Means of Emotional Problems by Diagnostic Status and Child Gender



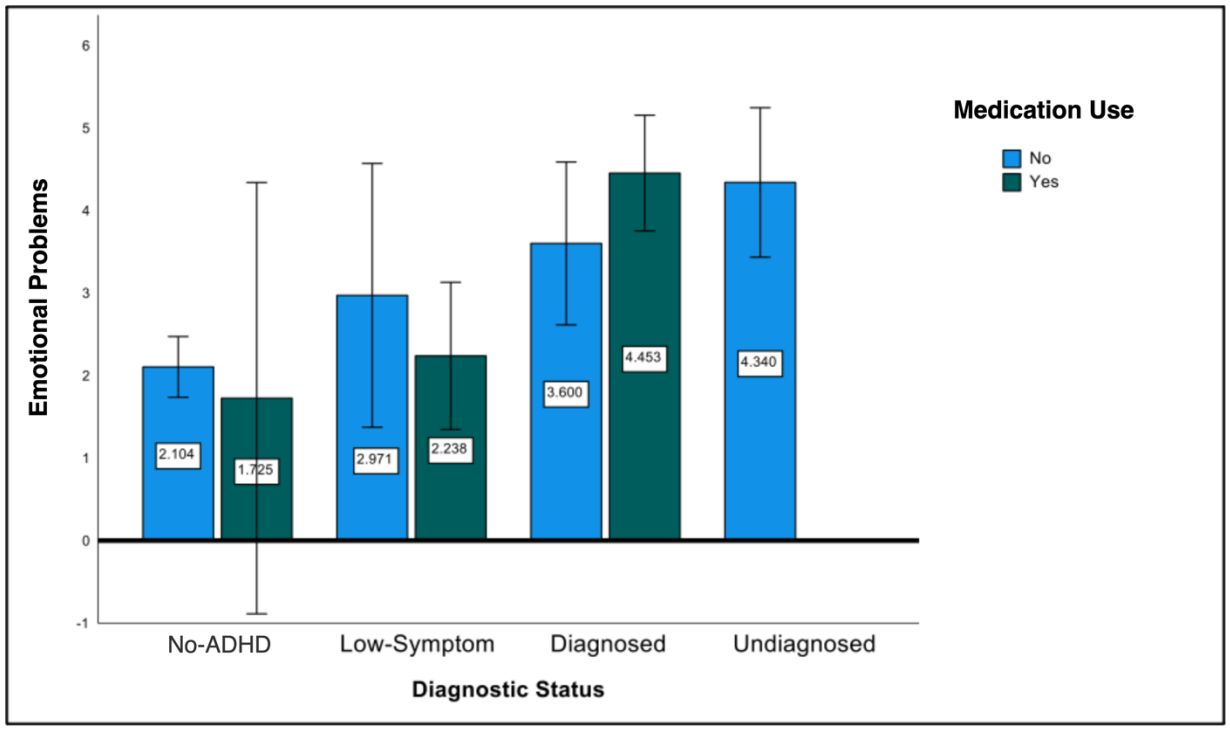
Note. Covariates appearing in the model are evaluated at the following values: Child age= 9.6453. Error bars represent 95% CI. Different letters above the error bars indicate significant differences at the 0.05 level.

Diagnostic Status X Medication Use. While controlling for child age, there was a significant interaction effect of diagnostic status x medication use on emotional problems, F (6, 269) = 8.58, $p < .001$. There were no significant differences between children who did and did not use medications in the no-ADHD, low-symptom, and diagnosed groups (Figure 7). No

children in the undiagnosed group used medications; therefore, a comparison was not possible. Among children who did not use medication, those in the no-ADHD group showed significantly lower levels of emotional problems than those in the diagnosed, $p = .006$, and undiagnosed, $p < .001$, groups. The low-symptom, diagnosed, and undiagnosed groups did not differ. Among children who did use medication, the diagnosed group showed higher levels of emotional problems than both the no-ADHD, $p = .049$, and low-symptom, $p < .001$, groups.

Figure 7

Estimated Marginal Means of Emotional Problems by Diagnostic Status and Medication Use



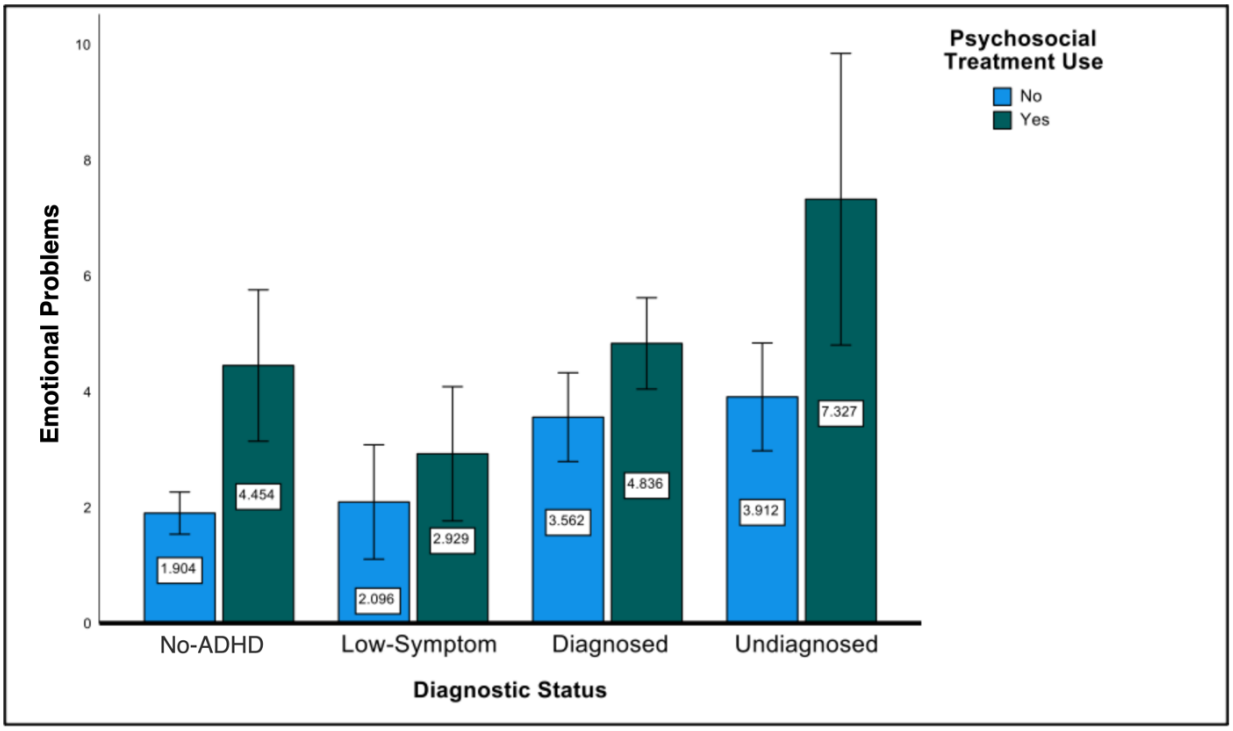
Note. Covariates appearing in the model are evaluated at the following values: Child age= 9.6453. Error bars represent 95% CI. Different letters above the error bars indicate significant differences at the 0.05 level.

Diagnostic Status X Psychosocial Intervention Use. The interaction between diagnostic status and psychosocial intervention use was significant, $F(7, 268) = 11.29$, $p < .001$, while controlling for child age. When comparing differences in problems between children who had and had not accessed psychosocial treatments, significant differences existed in the no-ADHD, *p*

< .001, diagnosed, p = .023, and undiagnosed, p =013, groups (Figure 8). In each case, children who accessed psychosocial treatments had significantly higher emotional problems. There was no significant difference in the low-symptom group. Among children who had not received any psychosocial interventions, the no-ADHD group were found to have significantly lower levels of problems than both the diagnosed, $p < .001$, and undiagnosed, $p < .001$, groups. The low-symptom group also had significantly lower levels of problems that the diagnosed, p = .021, and undiagnosed, p = .010, groups. Emotional problems were not found to differ significantly between the diagnosed and undiagnosed groups. Next, pairwise comparisons among children who did access psychosocial treatments revealed that, among these children, low-symptom children had significantly lower levels of emotional problems than diagnosed, p = .008, and undiagnosed, p = .002, children. Also, the no-ADHD children had significantly lower levels of problems than the undiagnosed children, p = .047. No-ADHD and diagnosed groups did not differ significantly on emotional problems.

Figure 8

Estimated Marginal Means of Emotional Problems by Diagnostic Status and Psychosocial Intervention Use



Note. Covariates appearing in the model are evaluated at the following values: Child age= 9.6453. Error bars represent 95% CI. Different letters above the error bars indicate significant differences at the 0.05 level.

Parenting Stress

Differences in levels of parenting stress based on diagnostic group, child gender, medication use, and psychosocial treatment use were evaluated using four ANCOVAs, to answer research questions 3, 3a, 3b, and 3c. The results are presented in Table 6.

Table 6

ANCOVAs Testing Differences in Parenting Stress by Diagnostic Group

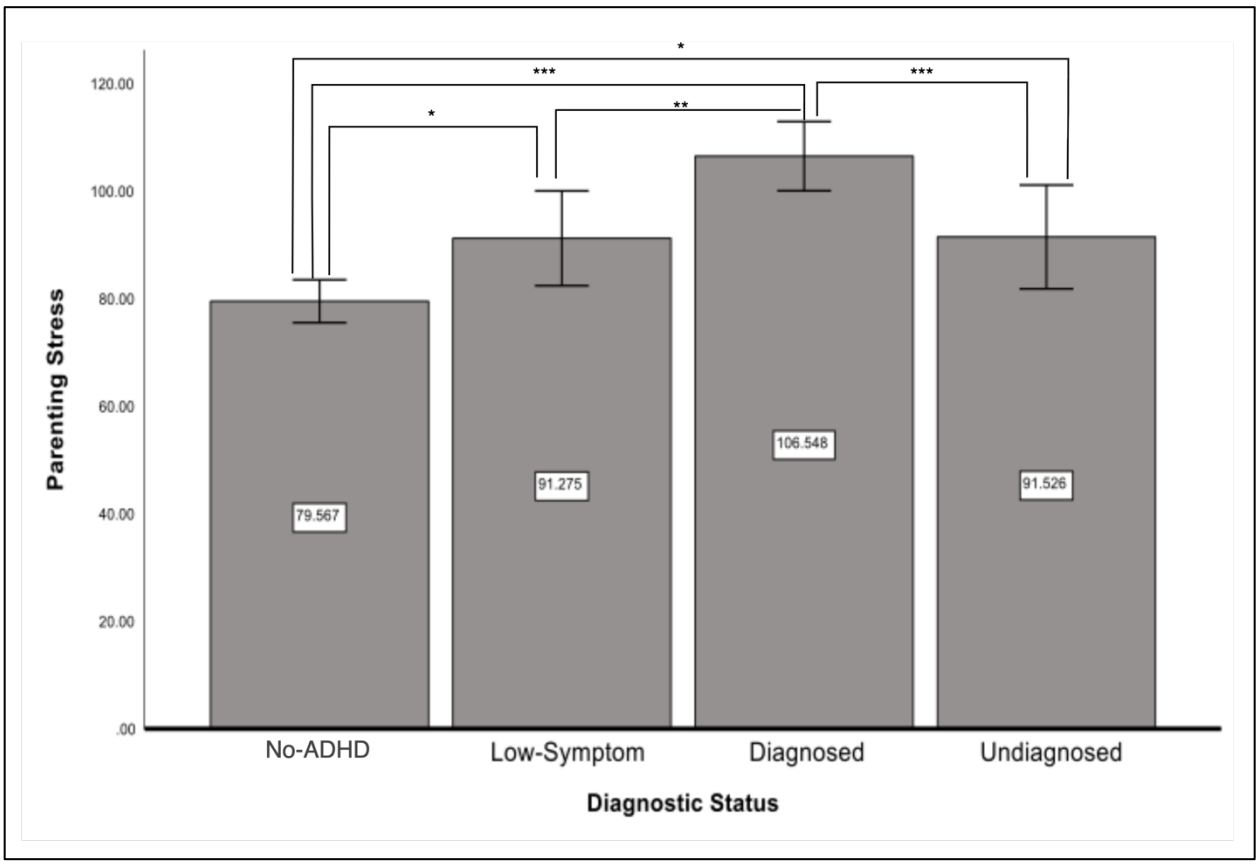
	df	*F*	*p*
Diagnostic Status			
Child Age	1, 215	.00	.953
Diagnostic Status	3, 215	16.50	< .001
Diagnostic Status X Child Gender			
Child Age	1, 211	.00	.989

Diagnostic Status X Child Gender	7, 211	8.36	< .001
Diagnostic Status X Medication Use			
Child Age	1, 212	.05	.820
Diagnostic Status X Medication Use	6, 212	9.78	< .001
Diagnostic Status X Psychosocial Intervention Use			
Child Age	1, 211	.09	.766
Diagnostic Status X Psychosocial Intervention Use	7, 211	7.97	< .001

Diagnostic Status. Levels of parenting stress differed significantly between diagnostic groups, F (3, 215) = 16.50, p < .001. Levels of stress were significantly lower in the no-ADHD group than in the three other groups (Figure 9). Stress was highest among parents of diagnosed children, compared to all three other groups. There was no significant difference between levels of parenting stress in the low-symptom and undiagnosed groups.

Figure 9

Estimated Marginal Means of Parenting Stress by Diagnostic Status

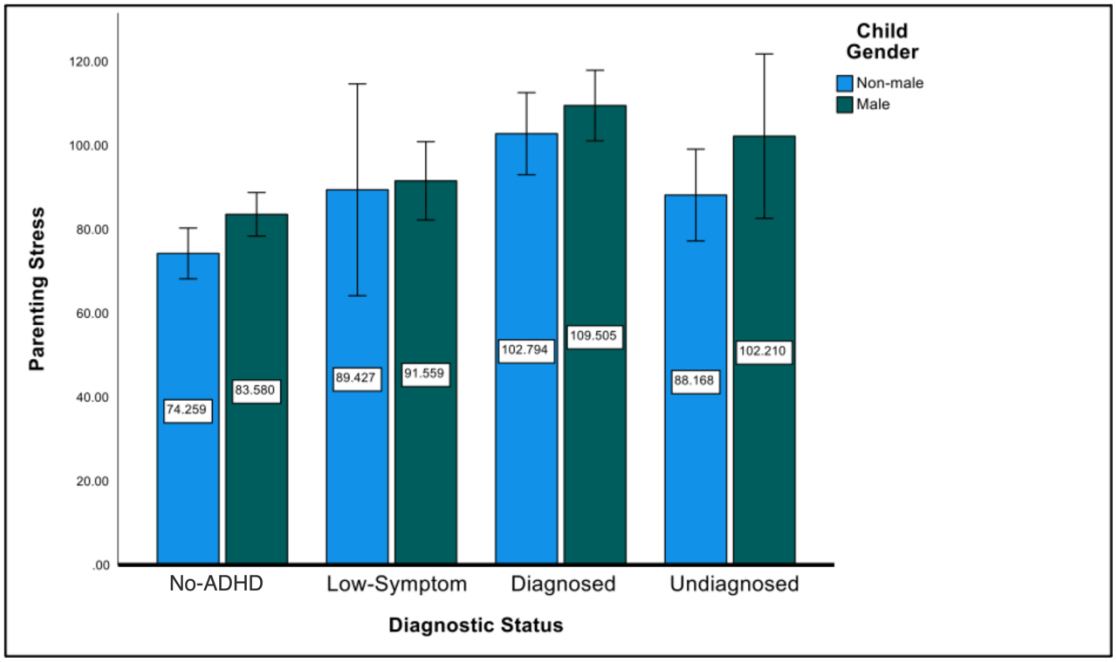


Note. Covariates appearing in the model are evaluated at the following values: Child age = 8.2648. Error bars represent 95% CI.
*$p < .05$
**$p < .01$
***$p < .001$

Diagnostic Status X Gender. Next, the interaction between diagnostic status and child gender was entered into a model, while controlling for child age. The interaction was significant, $F(7, 211) = 8.36$, $p < .001$. Pairwise comparisons revealed that in the no-ADHD group, parents of male children had significantly higher levels of parenting stress than parents of non-male children, $p = .022$, see Figure 10. No other gender differences emerged in pairwise comparisons. When examining differences between diagnostic groups among non-male children, the no-ADHD group had significantly lower levels of parenting stress than the diagnosed, $p < .001$, and undiagnosed, $p = .029$, groups. No other significant differences existed among non-male children. Among children identifying as male, there were significant pairwise differences between the no-ADHD and diagnosed groups, $p < .001$, and between the low-symptom and diagnosed groups, $p = .005$.

Figure 10

Estimated Marginal Means of Parenting Stress by Diagnostic Status and Child Gender



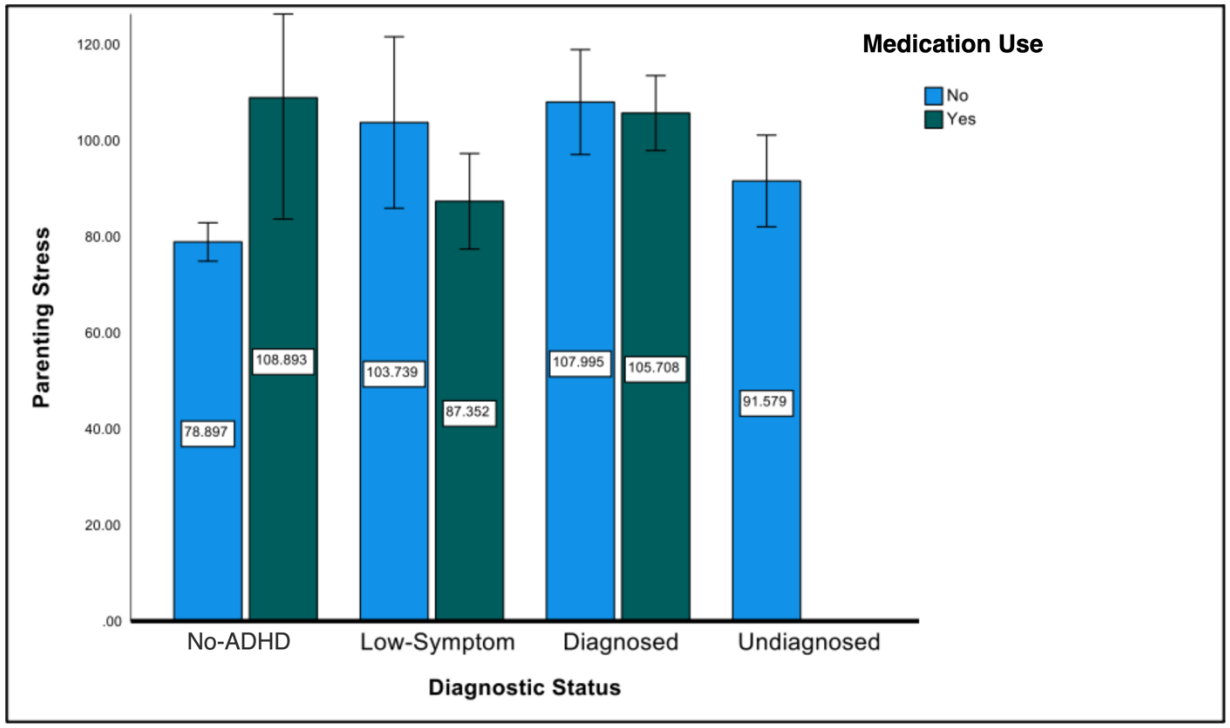
Note. Covariates appearing in the model are evaluated at the following values: Child age= 8.2648. Error bars represent 95% CI. Different letters above the error bars indicate significant differences at the 0.05 level.

Diagnostic Status X Medication Use. The two-way interaction between diagnostic status and medication was tested with child age as a covariate. There was a significant interaction effect, F (6, 212) = 9.78, $p < .001$. When testing pairwise comparisons, see Figure 11, a significant difference between parents whose children did and did not use medication emerged in the no-ADHD group, where levels of stress were higher among parents whose children used medication, $p = .021$. No differences were apparent in the low-symptom and diagnosed groups, and no children in the undiagnosed groups used medications. Among parents of children not using medications, parents in the no-ADHD group showed lower levels of parenting stress than parents in the low-symptom, $p = .008$, diagnosed, $p < .001$, and undiagnosed, $p = .016$, groups. Parents in the diagnosed group also had significantly higher levels of parenting stress than parents in the undiagnosed group, $p = .027$. Among parents of children using medication, parents

in the low-symptom group had significantly lower levels of parenting stress than parents in the diagnosed group, $p = .004$.

Figure 11

Estimated Marginal Means of Parenting Stress by Diagnostic Status and Medication Use



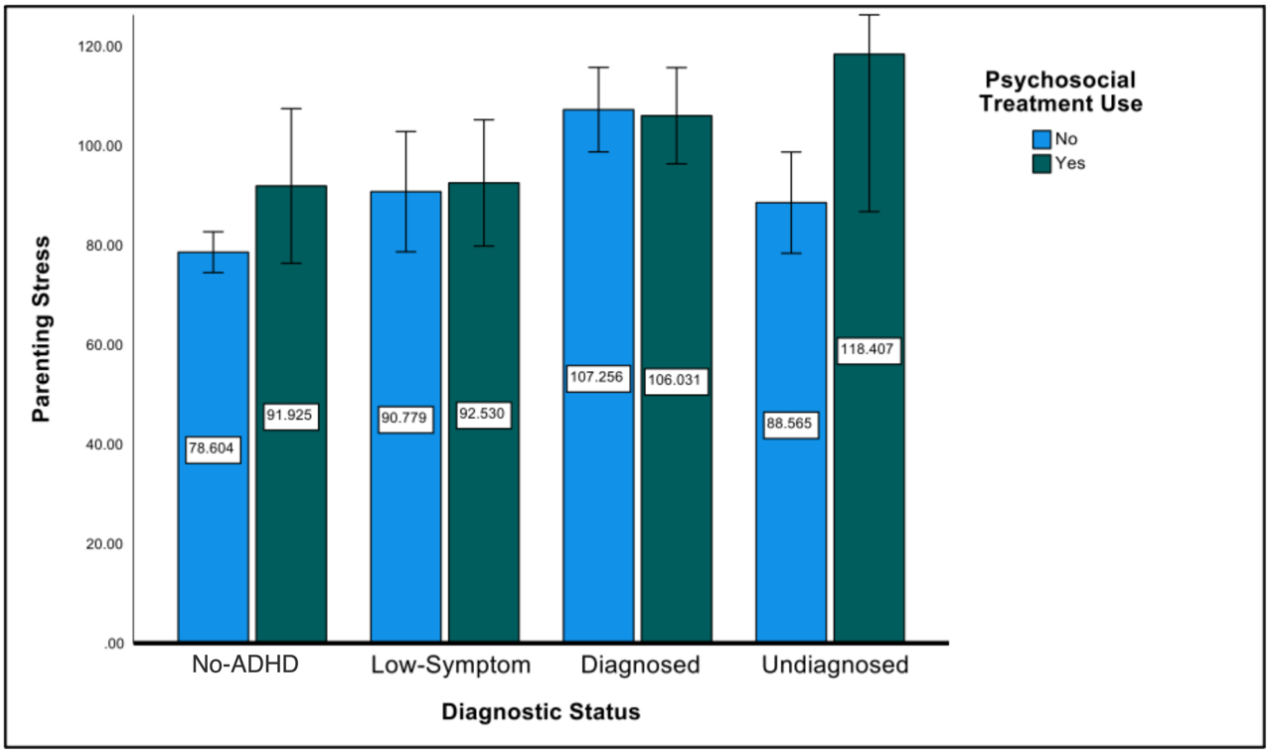
Note. Covariates appearing in the model are evaluated at the following values: Child age= 8.2648. Error bars represent 95% CI. Different letters above the error bars indicate significant differences at the 0.05 level.

Diagnostic Status X Psychosocial Intervention Use. There was a significant two-way interaction between diagnostic status and psychosocial intervention use on parenting stress, F (7, 211) = 7.97, $p < .001$, while controlling for child age. There were no significant differences in levels of parenting stress between those who had and had not accessed psychosocial treatments, across the four diagnostic groups (Figure 12). When examining the effects of diagnostic status among those who had not accessed psychosocial interventions, parents in the diagnosed group showed significantly higher levels of stress than parents in the no-ADHD, $p < .001$, low-symptom, $p = .027$, and undiagnosed, p =006, groups. There were no significant differences in

parenting stress among the no-ADHD, low-symptom, and undiagnosed groups. Among parents of children who had used psychosocial treatments, there were no statistically significant differences in levels of parenting stress across the four diagnostic groups.

Figure 12

Estimated Marginal Means of Parenting Stress by Diagnostic Status and Psychosocial Treatment Use



Note. Covariates appearing in the model are evaluated at the following values: Child age = 8.2648. Error bars represent 95% CI. Different letters above the error bars indicate significant differences at the 0.05 level.

Time Elapsed Since Diagnosis

To examine the association between time elapsed since being diagnosed with ADHD and outcomes (research question 4), three hierarchical linear regressions were conducted using responses from parents of children diagnosed with ADHD (n = 96). In each regression, children's age was entered in the first step and years that had elapsed since being diagnosed with ADHD was entered in step two.

Conduct Problems

In model 1, child age was a significant predictor of conduct problems, $R^2 = .114$, F (1, 93) =15.681, β = -.380, t = -3.960, $p < .001$. The model was also significant in step two, $R^2 = .144$, F (2, 92) = 7.757, $p < .001$. However, while child age continued to be a significant predictor of conduct problems, β = -.381, t = -3.358, $p < .001$, years elapsed since diagnosis was not, β = .002, t = .017, p = .987.

Emotional Problems

In step one, child age did not significantly predict emotional problems, $R^2 = .002$, F (1, 95) = .222, p = .639. When time elapsed since diagnosis was added in step two, the model remained nonsignificant in predicting emotional problems, $R^2 \Delta < .001$, F (2, 93) = .133, p = .876.

Parenting Stress

Child age was not a significant predictor of parenting stress among parents of 5- to 12-year-olds in the current sample, $R^2 = .001$, F (1, 69) = .100, p = .753. When years elapsed since diagnosis was added, the model remained nonsignificant, $R^2 \Delta = .001$, F (2, 68) = .076, p = .927.

Discussion

The current study aimed to examine the potential differences in child conduct and emotional problems, as well as parenting stress, among no-ADHD, low-symptom, diagnosed, and undiagnosed children. The findings of this study provided evidence that children with undiagnosed ADHD, and their families, may differ from no-ADHD and low-symptom children; however, the undiagnosed group was not found to exhibit more problems or parenting stress than the diagnosed group across outcomes measured. The differences observed between the undiagnosed and no-ADHD groups do not appear to be solely attributable to a lack of assessment

resources. In the undiagnosed group, none of the parents reported being on a waitlist for diagnostic services, and only two parents reported actively undergoing an assessment at the time of data collection.

Conduct Problems

Given the high co-occurrence between conduct problems and ADHD (Reale et al., 2017), we first evaluated the differences between conduct problems and ADHD diagnostic status. Our first hypothesis, that conduct problems would be highest in the diagnosed group, followed by the undiagnosed group, then the low-symptom and no-ADHD groups, was partially met. The low-symptom group showed similar levels of conduct problems as the undiagnosed group. My hypothesis that gender would moderate the effect of diagnostic status on conduct problems was partially met. There was a significant interaction between gender and diagnostic status. Within diagnosis groups, there were no significant differences between male and non-male children. However, non-male children in the undiagnosed group showed lower conduct problems than non-male-diagnosed children, but among males, there was no significant difference between diagnosed and undiagnosed groups.

These findings partially align with Okumura et al.'s (2021) findings that no-ADHD children show significantly lower levels of conduct problems than undiagnosed and diagnosed children. However, although Okumura et al. and O'Connor and McNicholas (2020) found no significant differences between undiagnosed and diagnosed children, we found that diagnosed children had significantly more conduct problems. My findings also contradict Madsen et al.'s (2018) work, which showed higher levels of conduct problems among 7-year-old undiagnosed children. The results of the current study are most aligned with findings from Owens (2020),

who found that among American fifth-grade students, undiagnosed children showed lower levels of externalizing behaviours than diagnosed children.

Differences in results from previous studies may be due to differences in research methods; for example, to identify cases of undiagnosed children, Madsen et al. (2018), Okumura et al. (2021), and O'Connor and McNicholas (2020) used the SDQ hyperactivity/ inattention subscale with a 95th percentile cut-off score, whereas I used the ADHD-RS-IV with a 90th percentile cut-off. This ensured that I had adequate power to complete my analyses but may have created an undiagnosed group that was larger, with less severe ADHD symptoms, than in previous studies. As well, neither of those three studies ensured that children in the diagnosed group exhibited clinical levels of ADHD symptoms and therefore grouped children, who in my study were separated into low-symptom and diagnosed groups, together. This likely created a diagnosed group that was proportionally smaller, with more severe ADHD symptoms, in my study than in previous work. On the other hand, Owens (2020) used propensity score matching to create a group of undiagnosed children with equivalent ADHD symptoms to their diagnosed group, which may explain why our results are more aligned. As well, cultural differences in the diagnosis and treatment of ADHD may explain the differences, as both Owens (2020) and I conducted our studies in a North American sample whereas other studies were conducted in Europe (Madsen et al., 2018; O'Connor and McNicholas, 2020) and Asia (Okumura et al., 2021).

These results partially align with the labelling theory of mental illness (Link et al., 1989), which suggests that the diagnosis of ADHD would lead to stigmatization, by oneself and others, and entrenchment of conduct problems. From an attribution theory perspective, children diagnosed with ADHD might perceive conduct problems as less controllable, and therefore be less motivated to reduce them (Weiner, 1994). However, children in the low-symptom group,

who were also diagnosed with ADHD, showed about the same level of conduct problems as the undiagnosed children. This suggests that the labelling theory of mental illness and attribution of uncontrollability for conduct problems may not be related to conduct problems for all children diagnosed with ADHD.

An alternative explanation of these findings is that children with higher levels of conduct problems are more likely to be diagnosed with ADHD. Conduct problems are often easily observed and distressing to others, particularly parents (Sayal et al., 2003), which may give children who display them greater odds of being referred, assessed, and diagnosed with ADHD. Even among undergraduate university students, children's conduct problems are perceived as more impairing and distressing than emotional problems (Howell & Watson, 2008). In the United Kingdom, Sayal et al. (2002) discovered that parents who view their children's behaviours as problematic are more likely to consult their primary care doctors about ADHD symptoms, a crucial step in obtaining a diagnosis as these physicians often act as gatekeepers to specialized psychiatric care. They also found that among families who attended an appointment with a primary care physician for suspected ADHD, parental factors (e.g., asking for a specialist referral) and higher levels of child conduct problems were strongly associated with receiving a diagnosis of ADHD.

The connection between co-occurring conduct problems and a higher likelihood of diagnosis might be particularly true for non-male children, as non-males in the diagnosed group showed higher levels of conduct problems than non-males in the undiagnosed group, but this trend was not seen for males. Chi-square results also showed that the undiagnosed group had a high proportion of non-males, which may suggest that non-males with low conduct problems are unlikely to be considered for a diagnosis of ADHD. Correspondingly, the low-symptom group

showed similar levels of conduct problems as the undiagnosed group, but was predominantly male, which might suggest that the threshold of conduct problems that increase the odds of being diagnosed with ADHD might be lower for male children. This aligns with previous research which has shown that in community samples of children with ADHD, non-males show lower levels of conduct problems than non-males, but in ADHD samples referred to psychiatric services, males and non-males show equal levels of various symptoms (Gaub & Carlson, 1997). Unfortunately, none of the pairwise comparisons comparing gender in each diagnostic group met significance, so it is difficult to draw definite conclusions about the effects of gender and conduct problems based on this data alone.

While I predicted that medication use would be associated with fewer conduct problems, the opposite was found in the no-ADHD and diagnosed groups. The results regarding psychosocial intervention use and conduct problems also did not meet my hypothesis. In the no-ADHD group, psychosocial treatment use was associated with higher levels of conduct problems. Because the number of children accessing medication and psychosocial services was low in the no-ADHD and undiagnosed groups, results should be interpreted cautiously. Initially, I predicted that medication and psychosocial treatment use would be associated with lower levels of conduct problems because treatment of ADHD leads to improvements in conduct problems. However, the results may be best understood by considering the opposite direction of effects; that is, that children with higher levels of conduct problems are more likely to receive medication and psychosocial treatments.

Emotional Problems

It was also important to examine levels of emotional problems between groups, as children with ADHD also tend to exhibit higher levels of emotional problems and internalizing

disorders (Reale et al., 2017). My hypothesis, that emotional problems would be lowest in the no-ADHD and low-symptom groups and that diagnosed children would show lower levels of problems than those in the undiagnosed group, was partially supported. While the no-ADHD group and the low-symptom group showed lower levels of emotional problems than the diagnosed and undiagnosed groups, there was no significant difference between the diagnosed and undiagnosed groups' problem levels.

These findings provide additional evidence to suggest that undiagnosed children may be burdened with higher levels of emotional problems than their no-ADHD peers, but that diagnosed and undiagnosed children do not differ significantly in this domain (Okumura et al., 2021). Wood et al. (2021) also investigated the relationship between emotional problems (i.e., depression, anxiety, and stress) and diagnostic status in college students. They found the same pattern of results (i.e., no-ADHD and low-symptom groups of young adults had significantly lower levels of problems than both undiagnosed and diagnosed groups; Wood et al., 2021). The non-significant difference between diagnosed and undiagnosed groups here is unsurprising given the mixed results of previous studies investigating this relationship; while Okumura et al. (2021) found no significant differences between diagnosed and undiagnosed children on emotional problems, O'Connor and McNicholas (2020) found higher levels of emotional problems in the diagnosed group, and Madsen et al. (2018) found lower levels of emotional problems in the diagnosed group. Differences in results investigating this question could be due to the studies' wide range of sample sizes, ages, and cultural milieus.

While there was an overall significant interaction between child gender and diagnostic status, the findings from pairwise comparisons also did not support my original hypothesis regarding gender and emotional problems. While I expected undiagnosed non-males to show the

highest level of emotional problems, there was no difference in problems between non-male and male children, in any of the diagnostic groups. As well, when examining diagnostic group differences in each gender group, the difference between undiagnosed and diagnosed children was non-significant in both non-males and males. Small sample sizes (and thus low power), especially for males in the undiagnosed group and non-males in the low-symptom group, may have impacted my ability to detect significant differences between groups. Another explanation might be the age of the current sample. Parents of children aged 5 to 16 years old were included in this study and the mean child age was 9.2 years. Emotional problems tend to show differential trajectories from childhood to adolescence (Leve et al., 2005). While levels of emotional problems are similar across genders throughout childhood, differentiation in mean levels of emotional problems increases in early adolescence, with non-males developing more frequent and severe problems (Gutman & Codiroli McMaster, 2020). It is possible that if the sample was on average older, or if I had recruited a larger total sample and conducted analyses for children and adolescents separately, I would have been able to detect interaction effects between diagnosis and gender.

There were no significant differences between children who did and did not use medication in levels of emotional problems, across any of the four groups. This did not support my hypothesis that emotional problems would be lower in children using medications. Regarding psychosocial intervention use, the findings were opposite to my hypothesis. Children who had accessed psychosocial treatments in the no-ADHD, diagnosed, and undiagnosed groups showed significantly higher levels of emotional problems. Higher levels of emotional problems among children who accessed psychosocial interventions may be best explained by higher pre-existing emotional problems rather than a lack of treatment effects. Large, randomized controlled trials

have shown that medication and psychosocial interventions effectively treat comorbid conduct and emotional problems in children with ADHD (Jensen, 1999).

Parenting Stress

In previous literature, parenting a child with ADHD has been associated with a higher level of parenting stress (Theule et al., 2010). In the current study, I hypothesized that parenting stress would be higher in the diagnosed and undiagnosed groups, compared to the no-ADHD and low-symptom groups, and that the undiagnosed group would show higher levels than the diagnosed group. This hypothesis was partially met. Levels of parenting stress were significantly higher among the low-symptom, diagnosed, and undiagnosed groups compared to the no-ADHD group. Parenting stress was also significantly higher in the diagnosed group than in the undiagnosed and low-symptom groups.

This pattern suggests that while a diagnosis of ADHD without elevated symptoms (i.e., low-symptom group) and elevated symptoms of ADHD without a diagnosis (i.e., undiagnosed group) are both associated with significantly higher levels of parenting stress than no-ADHD children, the combination of a diagnosis and elevated symptoms of ADHD is most strongly related with parenting stress. From a labelling theory of mental illness perspective, the difference between the undiagnosed and diagnosed groups of parents could be explained by the concept of "courtesy stigma" (Link et al., 1989; Goffman, 1963); parents of diagnosed children experience negative self-perceptions of themselves as parents, which leads to higher levels of stress associated with the parenting role. "Courtesy stigma" would also presumably apply to parents in the low-symptom group. This might explain why their stress levels are elevated, despite currently parenting children with non-clinical ADHD symptoms. When considering these findings in the context of attributional theory, the idea that parents of children with diagnosed

ADHD see their children's behaviour as uncontrollable, thereby decreasing their frustration with their child and lowering parenting stress, is not supported.

The elevated levels of stress among parents of undiagnosed children, compared to no-ADHD children, suggests that the presence of ADHD symptoms also plays an important role in the development of parenting stress. In a meta-analysis of parenting stress and childhood ADHD, Theule et al. (2010) reported a strong association between ADHD symptom severity and parenting stress.

As hypothesized, there was a significant interaction between child gender and diagnostic status. However, the pattern of pairwise comparisons did not align with the original hypothesis. Parenting stress levels did not significantly differ between non-male and male children in any of the diagnostic groups. The relationship between parenting stress and child gender among children with ADHD has been contradictory across several previous studies (e.g., Breen & Barkley, 1988; Theule et al., 2010).

Contrary to my hypothesis, parenting stress was higher among children who used medication, but only in the no-ADHD group. My hypothesis that psychosocial treatment use would be associated with lower levels of parenting stress was also not supported, as there were no significant differences in parenting stress among parents of children who had and had not accessed psychosocial interventions. Given the small number of children who accessed medication and psychosocial interventions in the no-ADHD and undiagnosed groups, these results should be interpreted cautiously. Previous research has shown that both medications and psychosocial interventions for childhood ADHD have a moderate effect size in reducing levels of parenting stress (Theule et al., 2018).

Time Elapsed Since Diagnosis

Finally, my hypothesis of a negative relationship between child problems/ parenting stress and the amount of time that had elapsed since being diagnosed with ADHD was unsupported across the three outcomes. In the current sample, there was no relationship between problems / stress and time elapsed since diagnosis of ADHD while controlling for child age. The goal of these analyses was to try to understand the directionality of effects between ADHD diagnosis and outcomes (i.e., does receiving a diagnosis of ADHD lead to changes in problems/stress or are diagnoses of ADHD received due to pre-existing differences). The current results suggest that emotional and conduct problems and parenting stress do not decrease significantly after a diagnosis is given. This challenges the possibility that differences in problems/ stress are exclusively due to children and families with higher levels of problems and stress being more likely to be diagnosed with ADHD; if that were the case, we would expect to see a reduction in problems/ stress over time. This reinforces the idea that the diagnosis itself could lead to a developmental trajectory which includes worsening conduct and emotional problems and parenting stress. However, it is difficult to say with certainty whether we could expect to see sharp decreases in problems/ stress over time, as many children in the diagnosed and low-symptom groups were not accessing treatments (e.g., 50% in the diagnosed group not accessing psychosocial treatments). To confidently answer the question of the directionality of effects, a longitudinal analysis which looked at emotional and conduct problems, parenting stress, the process of receiving a diagnosis, and treatments accessed, would have to be conducted.

Strengths

There are several noteworthy strengths of the current study. First, this study extends previous work on the topic of undiagnosed childhood ADHD conducted in Europe (O'Connor & McNicholas, 2020; Madsen et al., 2018) and Asia (Okumura et al., 2021) to a North American sample. Although Owens and Jackson (2017) and Owens (2020) examined differences between undiagnosed and diagnosed children in the USA, their focus was only on academic outcomes. This study extended the work of these previous studies by including both parent-reported emotional and conduct problems. As there are numerous cross-cultural differences in the assessment and treatment of ADHD around the world, as well as ongoing debate as to whether ADHD is overdiagnosed in North America, the current study's results are vital (Sayal et al., 2018). To best relate the results from this study with previous work, the current study utilized the SDQ conduct problems and SDQ emotional problems subscales (O'Connor & McNicholas, 2020; Okumura et al., 2021; Madsen et al., 2018). Utilizing consistent measures across studies with similar research questions facilitates comparisons of study findings and enhances the potential for more effective data synthesis in future meta-analyses (Barch et al., 2016).

The current study also differs from previous work (O'Connor & McNicholas, 2020; Okumura et al., 2021; Madsen et al., 2018). For example, I was originally planning to exclude children diagnosed with ADHD who did not meet the 90th percentile ADHD symptoms cut-off from analyses. However, upon examining the data, the number of children meeting these criteria was higher than initially expected (n =34). As well, while none of the previous studies in children had examined outcomes among this group, one study (Wood et al., 2021) included a low-symptom group in their analyses among college students, and found that the low-symptom group differed significantly from both the diagnosed and undiagnosed groups. Therefore, I

included them as an additional group in all my analyses. This produced interesting results regarding the relative importance of an ADHD diagnosis versus ADHD symptoms, as the low-symptom group showed similar patterns of problems/ stress as the undiagnosed group in several analyses. Future research in this area could consider the inclusion of a low-symptom group as an interesting comparator to the diagnosed, undiagnosed, and no-ADHD groups.

This study is also novel because it is the first to examine parenting stress in the context of ADHD diagnosis. Parenting stress is an important factor to consider in the well-being of families with ADHD as it is associated with various negative parent, child, and family outcomes (Deater-Deckard & Scarr, 1996; Stone et al., 2015). Higher levels of parenting stress are associated with increased emotional and conduct problems in children, harsh and inconsistent parenting, and decreased marital satisfaction among parents, all outcomes which are pertinent to the management of childhood ADHD (Deater-Deckard & Scarr, 1996; Fisher, 1990; Stone et al., 2015). In treatment studies, parenting stress has also been found to moderate the efficacy of childhood interventions for conduct problems (Kazdin, 1995). While it was previously well-established that parents of children with ADHD experience more parenting stress, the current study adds to the literature by showing that parents of children with undiagnosed ADHD also show elevated levels of parenting stress (Theule et al., 2010).

A final strength of this study is its timeliness, given the ongoing debate regarding whether childhood ADHD is overdiagnosed, particularly in North America, and the increasing concern about content related to ADHD and other neurodevelopment disorders available on social media (Kazda et al., 2021; Yeung et al., 2022). On Tiktok, the world's most popular social media platforms among adolescents, videos tagged with #ADHD were the seventh most viewed health-related videos, with more than 7 billion total views, as of 2021 (Vogel et al., 2022;

Zenone et al., 2021). Misinformation about ADHD is common on social media. One recent study found that 52% of the most viewed Tiktok videos tagged with #ADHD contained misleading information (Yeung et al., 2022). This proliferation of online information has led to concerns about individuals "self-diagnosing" with ADHD or developing health/illness anxiety related to ADHD, which could increase diagnoses (Gilmore et al., 2022; Muse et al., 2012). The current findings add evidence to the debate about overdiagnosing ADHD by showing that undiagnosed children differ from no-ADHD children in several important ways. Future research should continue to assess the relative benefits and disadvantages of ADHD diagnosis to add evidence to the debate on overdiagnosis.

Limitations & Future Directions

In addition to its strengths, this study has several limitations that should be addressed in future research. First, this study used a convenience sample of parents primarily recruited through social media, which may limit the generalizability of these results. The demographic characteristics of the current sample suggest that our sample was predominantly composed of White mothers who had completed post-secondary education and who were in married or common-law relationships. Recruiting research participants through social media can be an efficacious way to acquire large samples and can also lead to a greater sense of anonymity for participants, who may then be more likely to answer questionnaires honestly (Sanchez et al., 2020). However, social media recruitment also has several disadvantages, including a lack of representativeness (Sanchez et al., 2020). Differences in demographic variables of samples recruited from various online recruitment methods versus traditional recruitment methods have been found in previous research (Dworkin et al., 2017). These sampling limitations reduce the generalizability of these findings to the wider population of parents. For example, higher levels

of maternal education are associated with a lower prevalence of ADHD diagnoses in children (Spencer et al., 2022); as the current study's sample was composed of parents with high levels of education, this may mean that the relationship between diagnosis and outcomes could differ in families with lower levels of parental education. Similarly, discrepancies in rates of diagnosis have also been found based on race (Shi et al., 2021) and parental marital status (Russell et al., 2015). Therefore, my over-representation of White, married parents compared to the general population, may mean that results could differ in a sample with higher proportions of non-White and single parents. In addition to demographic differences from the wider population, recruitment from social media also inherently excludes parents who do not use social media and/or have access to the internet (Sanchez et al., 2020). To mitigate the impact of social media recruitment, attempts were made to recruit using additional methods, such as sending recruitment materials to community and healthcare centres, speaking about our study to the media, and presenting information about the study at a child development clinic. Despite these efforts, much of the current sample was recruited through social media. Although I planned to conduct a sensitivity analysis to examine the impact of recruitment source on study results, ultimately, an insufficient number of participants were recruited from methods other than social media, therefore I was not able to conduct this analysis.

Although the goal of the study's goal was to represent Canada and the USA, most participants were Canadian (81.3%). There are some differences in the diagnosis and treatment of ADHD between the USA and Canada, such as a decreased emphasis on the use of stimulant medications as a first-line treatment in childhood ADHD (Feldman et al., 2018; Wolraich et al., 2019). As well, significant differences in health care systems between the USA and Canada may lead to differences in the process of diagnosing ADHD (Smith, 2017). Given these differences,

future studies examining the relationship between diagnosis and outcomes in North America should consider analyzing differences in results between Canadian and American families.

Second, all our measures were parent-reported, including our measure of ADHD symptoms which is central to the research design. Parent-reported measures of childhood behaviour are common in the psychological literature but present several challenges (Dirks et al., 2012). In fact, in a seminal meta-analysis, Achenbach et al., (1987) found only small correlations between parents' and others' (such as teachers') ratings of children's behaviours. Parent ratings of child behaviour represent children's behaviours in the environments where parents see their children (Dirks et al., 2012). Given that, according to the DSM, the diagnosis of ADHD must include symptoms in at least two contexts, a limitation of the current paper is that our undiagnosed group was defined based only on parent reports, which may only represent the child's behaviour in the home context. However, in clinical practice settings, the use of multiple informants to diagnose ADHD is not consistent; a chart review study of community pediatricians in the USA found that teacher reports of symptoms were only used in about half of all ADHD diagnoses (Epstein et al., 2014). Therefore, using only parent reports to study ADHD diagnosis may partially mimic the reality of clinical assessment of ADHD in North America.

Third, there were several issues regarding power in this study. Due to small sample sizes in my low-symptom and undiagnosed groups, I did not apply any corrections for multiple comparisons which increases the likelihood that a type I error may have occurred (Sato, 1996). Given the familial nature of ADHD, there were several important family factors to consider in these analyses. Parental role identification (e.g., mothers versus fathers) is associated with differences in reporting of child health symptoms (Waters et al., 2000), as well as differences in the relationship between parenting stress and other parenting outcomes (McBride et al., 2002).

Parental age has been found to affect parental mental health and both younger and older paternal age is associated with a greater risk for psychopathology in offspring (Janecka et al., 2017; Spence, 2008). The number of children in a family also affects family and child functioning; families with multiple children tend to experience higher levels of parenting stress (Qian et al., 2021). Families' socioeconomic status (SES) is well established as a risk factor for a variety of deleterious child and parenting outcomes (Hoff & Laursen, 2019; Letourneau et al., 2011). Due to concerns surrounding power, I did not control for any of these family factors which should be included in future work. As well, parental type is another familial factor which could influence outcomes. Biological parents of children with ADHD are more likely to experience ADHD themselves versus non-biological parents (e.g., foster, adoptive, or step-parents; Cheung & Theule, 2016). That said, foster, adoptive, and step-parents experience higher levels of parenting stress compared to biological parents in typically developing families (Bergsund et al., 2020; Harris-Waller et al., 2016; Shapiro, 2014). However, an insufficient number of non-biological parents participated in my project to examine whether outcomes differed between biological, foster, adoptive, and step-parent participants.

Although this study was adequately powered to detect differences between the undiagnosed and no-ADHD groups, it may have been insufficiently powered to detect differences between the undiagnosed and diagnosed groups. An a priori power analyses, based on data from Okumura et al. (2021), showed that I would require 436 participants in my undiagnosed and diagnosed groups to find a significant difference. Being underpowered to detect differences was most applicable for emotional problems, as the undiagnosed group's mean levels of problems (M = 4.3) were slightly higher than the diagnosed group (M = 4.2; however, the sample size was much too small for a difference of that size to be significant.

As well, we were likely underpowered to detect differences based on child gender, medication use, and psychosocial service use. We were unfortunately unable to analyse outcomes separately for children identifying as non-binary and gender diverse due to the small number of these participants. Once divided into four groups, the numbers of non-males in the low-symptom group (n = 4) and males in the undiagnosed group (n = 7) was also small, which limited my ability to find significant pairwise differences between gender groups.

Fourth, this study utilized the 5-item SDQ conduct problems and SDQ emotional problems subscales. These subscales are widely used to measure of child behavioural problems and were chosen based on their use in previous literature and (Goodman, 1997; Madsen et al., 2018; Okumura et al., 2021). However, both subscales showed non-normal distributions in some groups; in particular, both were strongly positively skewed in the no-ADHD groups. In the no-ADHD group, there may have also been a floor effect, as the mode of the distributions for both conduct problems and emotional problems fell at 0. Given that the SDQ subscales only contain 5 items each and three response choices per item, the measure may not have been responsive enough to detect meaningful differences at the lower end of the distribution. There was also some evidence of heteroskedasticity in each analysis using these measures, which may have been related to the lack of responsivity and discriminant validity for low scores. An alternative factor structure of the SDQ, which splits items into an internalizing subscale and externalizing subscale consisting of 10 items each, has shown better psychometric properties among low-risk, community samples (Goodman et al., 2010). In future studies, particularly those including a no-ADHD group, using the 10-item subscales or a more comprehensive child behaviour scale, such as the Child Behaviour Checklist may be useful to avoid floor-effects (Achenbach & Rescorla, 2001).

Fifth, while receiving a diagnosis is important, some evidence suggests that ADHD symptoms are more strongly associated with negative outcomes than the diagnosis itself. Peer stigma towards children with ADHD symptoms is present even in the absence of a diagnostic label (Law et al., 2007). As well, parenting stress (DesChamps et al., 2020) and comorbid conduct problems (Brown & Casey, 2016) can be elevated, in the absence of a formal diagnosis, when symptoms of a disorder exist. While I initially planned to control for ADHD symptom severity in all my analyses, ultimately, high collinearity between ADHD symptoms severity and diagnostic group prevented me from including ADHD symptoms as a covariate.

Another limitation of our study was the lack of clarity in measurement of psychosocial treatment use. We assessed this by asking parents whether their child had received any psychosocial interventions for behavioural concerns, and we also provided an open-ended response option for parents to describe the specific type of psychosocial interventions received. Although we did not systematically analyze these responses, a brief examination revealed a diverse range of interventions, varying from gold-standard ADHD treatments such as parent management training to interventions not specifically designed for ADHD, such as speech therapy. Furthermore, we did not measure the intensity of interventions, but the open-ended responses indicated a wide range of treatment lengths and amounts. Including both high- and low-intensity interventions, as well as more and less relevant ones, likely resulted in dilution of any potential benefits associated with psychosocial treatments.

A final limitation of this work is its cross-sectional nature, which restricts the interpretation of these results. Although significant differences were found between low-symptom, diagnosed, and undiagnosed groups, it is unclear whether children differed prior to receiving their diagnosis and how the diagnosis may or may not have impacted problems and

stress. Interpreting the interaction between diagnosis and use of treatments was challenging as it appeared that pre-existing differences, between children who accessed treatment versus those who had not, were driving significant differences. Future longitudinal studies should investigate the impact of a diagnosis on subsequent service use and then subsequent outcomes. It would also be interesting to examine the emotional and conduct problem trajectories of the low-symptom and diagnosed groups to examine whether diagnostic procedures and subsequent treatment differences existed between groups. As the overdiagnosis of ADHD remains highly contested, and evidence presented here shows that undiagnosed children differ meaningfully from their no-ADHD peers, high-quality longitudinal studies should continue to investigate the benefits and harms of the diagnosis of ADHD.

Implications

The current study adds to the literature concerning the impact of ADHD diagnosis on children and extends previous work in a North American sample. Given the higher rates of ADHD diagnosis and medication use in North America than in other geographic areas (Danielson et al., 2018; Sayal et al., 2018), these results are more informative for a North American audience than previous studies.

Our results show that children with undiagnosed ADHD and their families are faring worse than no-ADHD children across emotional problems, conduct problems, and parenting stress. This indicates that additional support should be provided to families of children with elevated ADHD symptoms, rather than reserving services for only those with a diagnosis. This may be particularly applicable for interventions designed to treat emotional problems, as these seem to be the most significant concern for undiagnosed children and adolescents. In fact, emotional problems were significantly higher for undiagnosed children than low-symptom

children, suggesting that access to services for emotional problems should not be conditional on a diagnosis. For example, clinicians who see children with elevated ADHD symptoms who do not meet diagnostic criteria, could consider offering evidence-based interventions, such as parent training or cognitive behavioural therapy, to these families. Teachers and school administration could offer additional services and classroom support for children showing elevated ADHD symptoms, irrespective of diagnostic status. Moreover, these results indicate that parents should seek help from professionals if they notice their children exhibiting ADHD symptoms. Increased parental help-seeking could be particularly beneficial for non-male children, especially those who do not show elevated conduct problems, as these children were more likely to be undiagnosed.

Finally, my results open new avenues for future research. Addressing the limitations of this study, such as using a more representative sample or including teacher reports of child behaviour, would add significantly to our understanding of the impacts of diagnosis. To answer the question of directionality, longitudinal research which measures outcomes in children before, during, and following the process of ADHD diagnosis (or in the case of undiagnosed children, lack of ADHD diagnosis) is necessary. Other areas of future exploration could be to examine the impact of ADHD diagnosis on other important areas of family functioning, such as parents' mental health or parental relationship quality. Moreover, the impact of other types of mental disorder diagnoses could be explored, such as the impact of an ASD diagnosis on children and their families.

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Appendix A
Research Ethics Board Approval



Human Ethics - Fort Garry
208-194 Dafoe Road
Winnipeg, MB R3T 2N2
T: 204 474 8872
humanethics@umanitoba.ca

PROTOCOL APPROVAL

Effective: March 25, 2022 Expiry: March 24, 2023

Principal Investigator: Jennifer Allison Nicole Theule
Protocol Number: HE2021-0241
Protocol Title: *Family Experiences and Neurodevelopmental Disorders*

Jonathan Marotta, Chair, REB1

Research Ethics Board 1 has reviewed and approved the above research. The Human Ethics Office (HEO) is constituted and operates in accordance with the current *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans*- TCPS 2 (2018).

This approval is subject to the following conditions:

i. Approval is granted for the research and purposes described in the protocol only.

ii. Any changes to the protocol or research materials must be approved by the HEO before implementation.

iii. Any deviations to the research or adverse events must be reported to the HEO immediately through an REB Event.

iv. This approval is valid for one year only. A Renewal Request must be submitted and approved prior to the above expiry date.

v. A Protocol Closure must be submitted to the HEO when the research is complete or if the research is terminated.

vi. The University of Manitoba may request to audit your research documentation to confirm compliance with this approved protocol, and with the UM *Ethics of Research Involving Humans*Ethics of Research Involving Humans policies and procedures.

Appendix B

Recruitment Materials

Research Opportunity:

Researchers at the University of Manitoba are looking for

Caregivers of children 2-18 years old

What is the Study About?

The purpose of this study is to learn about the strengths and parenting experiences of families. If you decide to participate, you will be asked to complete a survey on parenting, your family, your child's development and characteristics, and your own wellbeing.



Why Participate?

By taking part in this study, your contribution will help to improve the lives of families and allow clinicians to more effectively provide parent-child support. You will also be entered to win one of ten **$50 Amazon eGift Cards**!

To Participate in this Study:

- Click on the link below or scan our QR code to open a new browser
- This will lead you to a website where you will be asked to enter your email
- An automatic email will be sent to you with the survey link
- The survey will take 30-45 minutes to complete

https://survey.pra.ca/S2/1/UM202223Reg/

SCAN ME

If you are interested in participating in this research project
and would like to learn more please email Dr. Jen Theule at jen.theule@umanitoba.ca
or call 204-474-7417

This research has been approved by the Research Ethics Board at the University of Manitoba, Fort Garry campus. If you have any concerns or complaints about this project, you may contact any of the above-named persons or the Human Ethics Officer at 204-474-7122 or HumanEthics@umanitoba.ca.
This document is available in alternative formats upon request.

Please feel free to share this information with anyone else you think might be interested!

University of Manitoba

fdpl.ca FAMILY AND DEVELOPMENTAL PSYCHOPATHOLOGY LAB

Research Opportunity:

Researchers at the University of Manitoba are looking for

Caregivers of children with ADHD 6-18 years old

What is the Study About?



The purpose of this study is to learn about the strengths of families of children with attention-deficit/hyperactivity disorder (ADHD), as well as their parenting and family needs. If you decide to participate, you will be asked to complete a survey on parenting, your family, your child's development and characteristics, and your own wellbeing.

Why Participate?

By taking part in this study, your contribution will help to improve the lives of families with a child with ADHD and allow clinicians to more effectively implement parent-child intervention programs. You will also be entered to win one of ten **$50 Amazon eGift Cards!**

To Participate in this Study:

- Click on the link below or scan our QR code to open a new browser
- This will lead you to a website where you will be asked to enter your email
- An automatic email will be sent to you with the survey link
- The survey will take 30-45 minutes to complete

https://survey.pra.ca/S2/1/UM202223Reg/

SCAN ME

If you are interested in participating in this research project and would like to learn more please email Dr. Jen Theule at jen.theule@umanitoba.ca or call 204-474-7417

This research has been approved by the Research Ethics Board at the University of Manitoba, Fort Garry campus. If you have any concerns or complaints about this project, you may contact any of the above-named persons or the Human Ethics Officer at 204-474-7122 or HumanEthics@umanitoba.ca.
This document is available in alternative formats upon request.

Please feel free to share this information with anyone else you think might be interested!

University of Manitoba

fdpl.ca FAMILY AND DEVELOPMENTAL PSYCHOPATHOLOGY LAB

Dear _____,

My name is_____, and I am part of a team of researchers at the University of Manitoba, working under the supervision of Dr. Jen Theule. We are conducting a study, and are looking for mothers and fathers that have a child who is typically developing (TD) or who has been diagnosed with ASD and/or ADHD between the ages of 2 and 18 years. This study involves completing a brief online survey investigating the strengths of these families as well as their parenting and family needs as part of a new and exciting study! The Family and Developmental Psychopathology Lab are wondering if you would be willing to assist us with our recruitment efforts and either send out a recruitment email on our behalf to your members/contacts or circulate a poster about our study around your organization?

The study URL:

https://survey.pra.ca/S2/1/UM202223Reg/

I have attached our study poster(s) to this email. Any assistance you may be willing to provide would be greatly appreciated!

Sincerely,

_____

Appendix C

Measures for Family Experiences and Neurodevelopmental Disorders Project

- ADHD Rating Scale-IV (ADHD-RS-IV)
- Developmental Profile 4 (DP-4)
- Social Communication Questionnaire (SCQ)
- Strengths and Difficulties Questionnaire (SDQ)- Conduct Problems and Emotional Problems Subscales
- Parenting Stress Inventory (PSI-SF-IV)
- Family Quality of Life (FQOL)
- Coparenting Relationship Scale
- Multidimensional Scale of Perceived Social Support (MSPSS)
- Center for Epidemiologic Studies Depression Scale (CES-D)

Appendix D

Demographic Questionnaire

Please Note:

This is Part 1 of the demographic survey which asks questions about the parent and general family. Depending on answers, parents will be taken to Version A(for parents of children with no diagnosis of ADHD) or B (for parents of children with a diagnosis of ADHD) of Part 2 to answer questions about the target child.

General Demographics:

Q1 What is your gender?

- ❍ Male
  - i) Branching: If checked: Do you identify as a father? Yes/No
- ❍ Female
  - i) Branching: If checked: Do you identify as a mother? Yes/No
- ❍ Non-Binary
  - i) Branching: If checked: Do you identify as a father? Yes/No; Do you identify as a mother? Yes/No
- ❍ I do not identify with the genders listed above
  - i) Branching: If checked: Do you identify as a father? Yes/No; Do you identify as a mother? Yes/No
- ❍ I prefer not to answer

Q2 What is your age? _____

Branching: If under 18, survey ends, see note on pg. 6 for message.

Q3 What is your marital status?

- ❍ Single
- ❍ Common-law
- ❍ Married
- ❍ Separated/divorced
- ❍ Widowed

Q4 What is your average household income?

- ❍ 0-40k
- ❍ 40-60k
- ❍ 60-90k
- ❍ 90-125k
- ❍ 125k+

Q5 What is the highest level of education that you have received?

(Post-secondary education includes trade training, College, University Certificate, Diploma, and University degree)

- ❍ Less than high school

- ❍ High school
- ❍ Some post-secondary education
- ❍ Completed post-secondary education

Q6 What country do you currently live in?
- ❍ Canada
- ❍ United States
- ❍ Other (please specify) ___
- ❍ _____

Branching: If "Other", survey ends, see note on pg. 6 for message.

Branching: If "Canada" is selected.
Q7 What ethnicity do you identify with?
- ❍ Asian
- ❍ Black
- ❍ LatinX
- ❍ First Nations
- ❍ Inuit
- ❍ Métis
- ❍ White
- ❍ Other (please specify) _____

Branching: If "United States" is selected.
Q7 What ethnicity do you identify with?
- ❍ Asian
- ❍ Black
- ❍ LatinX
- ❍ American Indian or Alaska Native
- ❍ Native Hawaiian or other Pacific Islander
- ❍ White
- ❍ Other (please specify) _____

Q8 What state, province, or territory do you currently live in (please specify)?
Please specify: _____

Q9 How did you hear about this survey?
- ❍ Social Media (e.g., Facebook, Twitter) (please specify) _____
- ❍ Webpage Posting (please specify) _____
- ❍ ASD Service Organization (please specify) _____
- ❍ ADHD Service Organization (please specify) _____
- ❍ Community posting (e.g., in school, community centre, doctor's office) (please specify) _____
- ❍ Participation in previous research (please specify where) _____
- ❍ U of M Participant Subpool
- ❍ Other (please specify) _____

ASD/ADHD Demographics:

Q10 Have you ever received a diagnosis of autism spectrum disorder (or Asperger's Disorder, Autistic Disorder, Pervasive Developmental Disorder Not Otherwise Specified)?

- ❍ Yes
- ❍ No

Branching: If "Yes" to Q10.

Q11 What autism spectrum diagnosis have you received?

Please specify: _____

Branching: If "Yes" to Q10.

Q12 Who did you receive this diagnosis from?

- ❍ Family physician
- ❍ Paediatrician
- ❍ Psychiatrist
- ❍ Clinical Psychologist
- ❍ School Psychologist
- ❍ Other (please specify) _____

Branching: If "Yes" to Q10.

Q13 At what age were you diagnosed with ASD?

Please specify: _____

Q14 Have you ever received a diagnosis of attention-deficit/hyperactivity disorder (or attention-deficit disorder)?

- ❍ Yes
- ❍ No

Branching: If "Yes" to Q14.

Q15 Who did you receive this diagnosis from?

- ❍ Family physician
- ❍ Paediatrician
- ❍ Psychiatrist
- ❍ Clinical Psychologist
- ❍ School Psychologist
- ❍ Other (please specify) _____

Branching: If "Yes" to Q14.

Q16 At what age were you diagnosed with ADHD/ADD?

Please specify _____

Child Demographics

Q17 How many children do you have?

- ❍ 1

- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ >5

Q18 Do you have a child between 2 and 18 years of age?

- ❍ Yes
- ❍ No

Branching: If "No" survey ends, see note on pg. 6 for message.

Demographic Questionnaire- Part 2 Version A- TD

Target Child Diagnostic Questions

QA1 How many years old is _____? _____

QA2 What month was _____ born in? _____

QA3What is your relationship to _____?

- ❍ Biological parent
- ❍ Adoptive parent
- ❍ Foster parent
- ❍ Step-parent
- ❍ Other (please specify) _____

Branching logic: If "foster parent" or "step-parent" **or "adoptive":**
How long has _____ lived with you? _____ months

QA4 What is your custodial arrangement for _____?

- ❍ Primary caregiver
- ❍ Shared custody
- ❍ Non-custodial caregiver

QA5 How many days a week does _____ live with you?

- ❍ 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7

QA6 Does _____ attend school?

If yes, what grade is _____ in now?

- Pre-Kindergarten (including junior kindergarten, nursery)
- Kindergarten
- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Grade 5
- Grade 6
- Grade 7
- Grade 8
- Grade 9
- Grade 10
- Grade 11
- Grade 12
- Other

QA7 Is there another person in your family who you share the responsibilities of parenting _____ with (i.e., a coparent)?

- Yes
- No

Branching: If "Yes" to QA7
QA8 What is the relationship of your parenting partner/coparent to _____?

- Biological mother
- Biological father
- Adoptive mother
- Adoptive father
- Foster mother
- Foster father
- Step-mother
- Step-father
- Other (please specify) _____

Branching: If "Yes" to QA7
QA9 How much of the time does your parenting partner/coparent live with you and _____?

- Less than 50% of the time
- 50% of the time
- Between 50% and 100% of the time
- 100% of the time

QA19 Have you had any concerns about _____'s behavior?

- No.
- Yes, and I have not spoken to a professional about my concerns.
- Yes, and I have spoken to a professional about my concerns.
- Yes, and we are on a waitlist for a diagnosis or assessment.

- ○ Yes, and we are in the process of receiving a diagnosis or assessment.
- ○ Other, please explain:_____

Branching: If any of the "Yes" answers to QA19
QA20 Has _____ received any interventions for behavioural concerns?

- ❍ Medications
- ❍ Psychosocial interventions (e.g., therapy, biofeedback)
- ❍ Both

Branching: If "Psychosocial interventions" or "Both" to QA10
QA21 Please describe the type of psychosocial intervention_____ has been receiving?

Branching: If "Psychosocial interventions" or "Both" to QA10
QA22 How long has _____ received this intervention for? _____ years _____ months

QA10 Has _____ been **prescribed** any of the following medications? Please select all medications _____ has been **prescribed:** (Brand name/Drug name)

- ❍ Adderall/ Dextroamphetamine and amphetamine
- ❍ Biphentin/Methylphenidate
- ❍ Concerta/Methylphenidate
- ❍ Dexedrine/Dextroamphetamine
- ❍ Focalin/Dexmethylphenidate
- ❍ Intuniv/Guanfacine
- ❍ Ritalin/ Methylphenidate
- ❍ Strattera/Atomoxetine
- ❍ Vyvanse/Lisdexamfetamine dimesylate
- ❍ Zenzedi/ Dextroamphetamine

QA11Which medication(s) is _____ currently **taking**? (Brand name/Drug name). Please select all:

- ○ Adderall/ Dextroamphetamine and amphetamine
- ○ Biphentin/Methylphenidate
- ○ Concerta/Methylphenidate
- ○ Dexedrine/Dextroamphetamine
- ○ Focalin/Dexmethylphenidate
- ○ Intuniv/Guanfacine
- ○ Ritalin/ Methylphenidate
- ○ Strattera/Atomoxetine
- ○ Vyvanse/Lisdexamfetamine dimesylate
- ○ Zenzedi/ Dextroamphetamine

Branching: If any medication checked off on QA11

QA12 How long has_____taken this medication for?_____ years _____ month

QA13 Has _____ been diagnosed with an intellectual disability (and/or ID, developmental delay, global developmental delay, mental retardation, cognitive disability)?

- ○ Yes
- ○ No

Branching: If "Yes" to QA13
QA14 Who diagnosed _____ with an intellectual disability?

- ○ Family physician
- ○ Paediatrician
- ○ Psychiatrist
- ○ Clinical Psychologist
- ○ School Psychologist
- ○ Other (please specify) _____

QA15 Has _____ been diagnosed with any of the following mental health or developmental conditions?

- ❍ Prenatal Alcohol Exposure/Fetal Alcohol Spectrum Disorder (FASD)/Fetal Alcohol Syndrome (FAS)
- ❍ Generalized Anxiety Disorder
- ❍ Panic disorder
- ❍ Social Anxiety Disorder
- ❍ Post-traumatic stress disorder
- ❍ Obsessive Compulsive Disorder (OCD)
- ❍ Depression
- ❍ Specific Learning Disability (reading, writing, and/or math, also known as dyslexia, dyscalculia)
- ❍ Social (Pragmatic) Communication Disorder
- ❍ Language Disorder
- ❍ Developmental Coordination Disorder
- ❍ Feeding Disorder (e.g., avoidant/restrictive food intake disorder)
- ❍ Oppositional Defiant Disorder
- ❍ Conduct Disorder
- ❍ Other: _____

QA16. How has the coronavirus pandemic and associated public health changes to services in your community impacted you and your family?

- ○ Sliding scale from "Very negative" to "Very positive"

QA23 Are you seeking formal parenting support?

- ❍ Yes

- ❍ No

QA24. Do you belong to a Facebook or other social media parenting group (e.g., Parenting Toddlers, St. Louis Moms of Kids with Autism)?
- ❍ Yes
- ❍ No

QA25. Do you belong to an online or in-person parenting group or parenting program?
- ❍ Yes
- ❍ No

QA26. Are you seeing a psychologist, therapist, social worker or parent educator for parenting-related concerns?
- ❍ Yes
- ❍ No

Qualitative Questions:
QA17. If you wish, please feel free to use the space below to report on any of your personal experiences with parenting.

QA18. Is there anything else you would like to add?

Demographic Questionnaire Part 2- Version B- ADHD

Target Child Diagnostic Questions

QC1 How many years old is _____? _____

QC2 What month was _____ born in? _____

QC3 What is your relationship to _____?
- ❍ Biological parent
- ❍ Adoptive parent
- ❍ Foster parent
- ❍ Step-parent
- ❍ Other (please specify) _____

Branching logic: If "foster parent" or "step-parent":
How long has _____ lived with you? _____ months

QC4 What is your custodial arrangement for _____?
- ❍ Primary caregiver
- ❍ Shared custody

- ❍ Non-custodial caregiver

QC5 How many days a week does _____ live with you?

- ❍ 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7

QC6 Does _____ attend school?

If yes, what grade is _____ in now?

- o Pre-Kindergarten (including junior kindergarten, nursery)
- o Kindergarten
- o Grade 1
- o Grade 2
- o Grade 3
- o Grade 4
- o Grade 5
- o Grade 6
- o Grade 7
- o Grade 8
- o Grade 9
- o Grade 10
- o Grade 11
- o Grade 12
- o Other

QC7 Is there another person in your family who you share the responsibilities of parenting _____ with (i.e., a coparent)?

- ❍ Yes
- ❍ No

Branching: If "Yes" to QC7

QC8 What is the relationship of your parenting partner/coparent to _____?

- ❍ Biological mother
- ❍ Biological father
- ❍ Adoptive mother
- ❍ Adoptive father
- ❍ Foster mother
- ❍ Foster father
- ❍ Step-mother
- ❍ Step-father
- ❍ Other (please specify) _____

Branching: If "Yes" to QC7
QC9 How much of the time does your parenting partner/coparent live with you and _____?

- ❍ Less than 50% of the time
- ❍ 50% of the time
- ❍ Between 50% and 100% of the time
- ❍ 100% of the time

QC10 Who diagnosed _____ with attention-deficit/hyperactivity disorder (ADHD or ADD)?

- ❍ Family physician
- ❍ Paediatrician
- ❍ Psychiatrist
- ❍ Clinical Psychologist
- ❍ School Psychologist
- ❍ Other (please specify) _____

QC11 How old was _____ when he/she was diagnosed with attention-deficit/hyperactivity disorder (ADHD or ADD)?
Please specify_____

QC12 Has _____ received any interventions for behavioural concerns? If yes, select which:

- ❍ Medications
- ❍ Psychosocial interventions (e.g., therapy, biofeedback)
- ❍ Both

Branching: If "Psychosocial interventions" or "Both" to QC12
QC13 Please describe the type of psychosocial intervention_____ has been receiving?

Branching: If "Psychosocial interventions" or "Both" to QC12
QC14 How long has _____ received this intervention for? _____ years _____ months

QC15 Has _____ been **prescribed** any of the following medications? Please select all medications _____ has been **prescribed:** (Brand name/Drug name)

- ❍ Adderall/ Dextroamphetamine and amphetamine
- ❍ Biphentin/Methylphenidate
- ❍ Concerta/Methylphenidate
- ❍ Dexedrine/Dextroamphetamine
- ❍ Focalin/Dexmethylphenidate
- ❍ Intuniv/Guanfacine
- ❍ Ritalin/ Methylphenidate
- ❍ Strattera/Atomoxetine
- ❍ Vyvanse/Lisdexamfetamine dimesylate
- ❍ Zenzedi/ Dextroamphetamine

QC16 Which medication(s) is _____ currently **taking**? (Brand name/Drug name). Please select

all:

- ○ Adderall/ Dextroamphetamine and amphetamine
- ○ Biphentin/Methylphenidate
- ○ Concerta/Methylphenidate
- ○ Dexedrine/Dextroamphetamine
- ○ Focalin/Dexmethylphenidate
- ○ Intuniv/Guanfacine
- ○ Ritalin/ Methylphenidate
- ○ Strattera/Atomoxetine
- ○ Vyvanse/Lisdexamfetamine dimesylate
- ○ Zenzedi/ Dextroamphetamine

Branching: If any medication checked off to QC16
QC17 How long has ___taken this medication for? _____years _____month

QC18 Has _____ been diagnosed with an intellectual disability (and/or ID, developmental delay, global developmental delay, mental retardation, cognitive disability)?

- ○ Yes
- ○ No

Branching: If "Yes" to QC18
QC19 Who diagnosed_____ with an intellectual disability?

- ○ Family physician
- ○ Paediatrician
- ○ Psychiatrist
- ○ Clinical Psychologist
- ○ School Psychologist
- ○ Other (please specify) _____

QC20 Has _____ been diagnosed with any of the following mental health or developmental conditions?

- ❍ Prenatal Alcohol Exposure/Fetal Alcohol Spectrum Disorder (FASD)/Fetal Alcohol Syndrome (FAS)
- ❍ Generalized Anxiety Disorder
- ❍ Panic disorder
- ❍ Social Anxiety Disorder
- ❍ Post-traumatic stress disorder
- ❍ Obsessive Compulsive Disorder (OCD)
- ❍ Depression

- ❍ Specific Learning Disability (reading, writing, and/or math, also known as dyslexia, dyscalculia)
- ❍ Social (Pragmatic) Communication Disorder
- ❍ Language Disorder
- ❍ Developmental Coordination Disorder
- ❍ Feeding Disorder (e.g., avoidant/restrictive food intake disorder)
- ❍ Oppositional Defiant Disorder
- ❍ Conduct Disorder
- ❍ Other: _____

QC21. How has the coronavirus pandemic and associated public health changes to services in your community impacted you and your family?

- ○ Sliding scale from “Very negative” to “Very positive”

Qualitative Questions:
QC22. If you wish, please feel free to use the space below to report on any of your personal experiences with parenting.

QC23. Is there anything else you would like to add?

Appendix C

ADHD Rating Scale-IV: Home Version

Select the response/number that best describes your child's home behavior over the past 6 months.

Q1 Fails to give close attention to details or makes careless mistakes in schoolwork.
- ❍ Never or Rarely
- ❍ Sometimes
- ❍ Often
- ❍ Very Often

Q2 Fidgets with hands or feet or squirms in seat.
- ❍ Never or Rarely
- ❍ Sometimes
- ❍ Often
- ❍ Very Often

Q3 Has difficulty sustaining attention in tasks or play activities.
- ❍ Never or Rarely
- ❍ Sometimes
- ❍ Often
- ❍ Very Often

Q4 Leaves seat in classroom or in other situations in which remaining seated is expected.
- ❍ Never or Rarely
- ❍ Sometimes
- ❍ Often
- ❍ Very Often

Q5 Does not seem to listen when spoken to directly.
- ❍ Never or Rarely
- ❍ Sometimes
- ❍ Often
- ❍ Very Often

Q6 Runs about or climbs excessively in situations in which it is inappropriate.
- ❍ Never or Rarely
- ❍ Sometimes
- ❍ Often
- ❍ Very Often

Q7 Does not follow through on instructions and fails to finish work.

- ❍ Never or Rarely
- ❍ Sometimes
- ❍ Often
- ❍ Very Often

Q8 Has difficulty playing or engaging in leisure activities quietly.

- ❍ Never or Rarely
- ❍ Sometimes
- ❍ Often
- ❍ Very Often

Q9 Has difficulty organizing tasks and activities.

- ❍ Never or Rarely
- ❍ Sometimes
- ❍ Often
- ❍ Very Often

Q10 Is “on the go” or acts as if “driven by a motor.”

- ❍ Never or Rarely
- ❍ Sometimes
- ❍ Often
- ❍ Very Often

Q11 Avoids tasks (eg, schoolwork, homework) that require sustained mental effort.

- ❍ Never or Rarely
- ❍ Sometimes
- ❍ Often
- ❍ Very Often

Q12 Talks excessively.

- ❍ Never or Rarely
- ❍ Sometimes
- ❍ Often
- ❍ Very Often

Q13 Loses things necessary for tasks or activities.

- ❍ Never or Rarely
- ❍ Sometimes
- ❍ Often
- ❍ Very Often

Q14 Blurts out answers before questions have been completed.

- ❍ Never or Rarely

- ❍ Sometimes
- ❍ Often
- ❍ Very Often

Q15 Is easily distracted.
- ❍ Never or Rarely
- ❍ Sometimes
- ❍ Often
- ❍ Very Often

Q16 Has difficulty awaiting turn.
- ❍ Never or Rarely
- ❍ Sometimes
- ❍ Often
- ❍ Very Often

Q17 Is forgetful in daily activities.
- ❍ Never or Rarely
- ❍ Sometimes
- ❍ Often
- ❍ Very Often

Q18 Interrupts or intrudes on others
- ❍ Never or Rarely
- ❍ Sometimes
- ❍ Often
- ❍ Very Often

Appendix D

Strengths and Difficulties Questionnaire (SDQ): Conduct Problems and Emotional Problems Subscales

For each item, please mark the box for Not True, Somewhat True or Certainly True. It would help us if you answered all items as best you can even if you are not absolutely certain. Please give your answers on the basis of the child's behavior over the last six months or this school year.

Conduct Problems Subscale

Q1 Often has temper tantrums or hot tempers
- ❍ Not True
- ❍ Somewhat True
- ❍ Certainly True

Q2 Generally obediant
- ❍ Not True
- ❍ Somewhat True
- ❍ Certainly True

Q3 Often fights with other children
- ❍ Not True
- ❍ Somewhat True
- ❍ Certainly True

Q4 Often lies or cheats
- ❍ Not True
- ❍ Somewhat True
- ❍ Certainly True

Q5 Steals from home, school, or elsewhere
- ❍ Not True
- ❍ Somewhat True
- ❍ Certainly True

Emotional Problems Subscale

Q1 Often complains of headaches
- ❍ Not True
- ❍ Somewhat True
- ❍ Certainly True

Q2 Many worries
- ❍ Not True
- ❍ Somewhat True
- ❍ Certainly True

Q3 Often unhappy, downhearted
- ❍ Not True
- ❍ Somewhat True
- ❍ Certainly True

Q4 nervous or clingy in new situations
- ❍ Not True
- ❍ Somewhat True
- ❍ Certainly True

Q5 Many fears, easily scared
- ❍ Not True
- ❍ Somewhat True
- ❍ Certainly True

Appendix E

Parenting Stress Index – 4- Short Form (PSI)

Q1 I often feel that I cannot handle things very well.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q2 I find myself giving up more on my life to meet my children's needs than I ever expected.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q3 I feel trapped by responsibilities as a parent.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q4 Since having this child, I have been unable to do new and different things

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q5 Since having this child, I feel that I am almost never able to do things that I like to do.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q6 I am unhappy with the last purchase of clothing I made for myself.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q7 There are quite a few things that bother me about my life.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q8 Having a child has caused more problems that I expected in my relationship with my spouse/parenting partner.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q9 I feel alone and without friends.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q10 When I go to a party, I usually expect not to enjoy myself.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q11 I am not interested in people as I used to be.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q12 I don’t enjoy things as I used to.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q13 My child rarely does things for me that make me feel good.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q14 When I do things for my child, I get the feeling that my efforts are not appreciated very much.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q15 My child smiles at me much less that I expected.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q16 Sometimes I feel my child doesn't like me and doesn't want to be close to me.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q17 My child is very emotional and gets upset easily.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q18 My child doesn't seem to learn as quickly as most children.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q19 My child doesn't seem to smile as much as most children.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q20 My child is not able to do as much as I expected.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q21 It takes a long time and it is very hard for my child to get used to new things.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q22 I feel that I am: (Choose a response from the choices below).

- ❍ 1. A very good parent.
- ❍ 2. A better-than-average parent.
- ❍ 3. An average parent.
- ❍ 4. A person who has some trouble being a parent.
- ❍ 5. Not very good at being a parent.

Q23 I expected to have closer and warmer feelings for my child than I do and this bothers me.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q24 Sometimes my child does things that bother me just to be mean.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q25 My child seems to cry or fuss more often than most children.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q26 My child generally wakes up in a bad mood.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q27 I feel that my child is very moody and easily upset.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q28 Compared to the average child, my child has a great deal of difficulty in getting used to changes in schedules or changes around the house.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q29 My child reacts very strongly when something happens that my child doesn't like.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q30 When playing, my child doesn't often giggle or laugh.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q31 My child's sleeping or eating schedule was much harder to establish than I expected.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q32 I have found that getting my child to do something or stop doing something is (Choose a response from the choices below.).

- ❍ Much harder than I expected.
- ❍ Somewhat harder than I expected.
- ❍ About as hard as I expected.
- ❍ Somewhat easier than I expected.
- ❍ Much easier than I expected.

Q33 Think carefully and count the number of things which your child does that bothers you. For example, dawdles, refuses to listen, overactive, cries, interrupts, fights, wines, etc. (Choose a response from the choices below.)

- ❍ 1-3
- ❍ 4-5
- ❍ 6-7
- ❍ 8-9
- ❍ 10+

Q34 There are some things my child does that really bother me alot.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q35 My child's behaviour is more of a problem that I expected.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Q36 My child makes more demands on me than most children.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Not Sure
- ❍ Disagree
- ❍ Strongly Disagree

Appendix F

Social Communication Questionnaire (SCQ)

Please answer each question by selecting yes or no. A few questions ask about several related behaviours; please select yes if any of these behaviours were present during the past 3 months. Although you may be uncertain about whether some behaviours were present or not, please answer yes or no to every question on the basis of what you think.

Q1 Is she/he now able to talk using short phrases or sentences? If no, skip to question 8.

- ❍ Yes
- ❍ No

Q2 Do you have a to and fro "conversation" with her/him that involves taking turns or building on what you have said?

- ❍ Yes
- ❍ No

Q3 Does she/he ever use odd phrases or say some thing over and over in almost exactly the same way (either phrases that she/he hears other people use or ones that she/he makes up?)

- ❍ Yes
- ❍ No

Q4 Does she/he ever use socially inappropriate questions or statements? For example, does she/he ever regularly ask personal questions or make personal comments at awkward times?

- ❍ Yes
- ❍ No

Q5 Does she/he ever get her/his pronouns mixed (e.g., saying you or she/he for I)?

- ❍ Yes
- ❍ No

Q6 Does she/he ever use words that she/he seems to have invented r made up her/himself; put things in odd, indirect ways; or use metaphorical ways of saying things (e.g., saying hot rain for steam)?

- ❍ Yes
- ❍ No

Q7 Does she/he ever say the same thing over and over in exactly the same way or insist that you say the same thing over and over again?

- ❍ Yes
- ❍ No

Q8 Does she/he ever have things that she/he seems to have to do in a very particular way or order or rituals that she/he insists that you go through?

- ❍ Yes
- ❍ No

Q9 Does er/his facial expression usually seem appropriate to the particular situation, as far as you can tell?

- ❍ Yes
- ❍ No

Q10 Does she/he ever use your hand like a tool or as if it were part of her/his own body (e.g pointing with your finger or putting your hand on a doorknob to get you to open the door)?

- ❍ Yes
- ❍ No

Q11 Does she/he ever have any interests that preoccupy her/him and might seem odd to other people (e.g, traffic lights, drainpipes, or timetables)?

- ❍ Yes
- ❍ No

Q12 Does she/he ever seem to be more interested in parts of a toy or an object (e.g., spinning the wheels of a car), rather than in using the object as it was intended?

- ❍ Yes
- ❍ No

Q13 Does she/he have any special interest that are unusual in their intensity but otherwise appropriate for her/his age and peer group (e.g, trains or dinosaurs)?

- ❍ Yes
- ❍ No

Q14 Does she/he ever seem to be unusually interest in the sight, feel, sound, taste, or smell of things or people?

- ❍ Yes
- ❍ No

Q15 Does she/he ever have any mannerisms or odd ways of moving her/his hands or fingers, such as flapping or moving her/his fingers in front of her/his eyes?

- ❍ Yes
- ❍ No

Q16 Does she/he ever have any complicated movements of her/his whole body, such as spinning or repeatedly bouncing up and down?

- ❍ Yes
- ❍ No

Q17 Does she/he ever injure her/himself deliberately, such as by biting her/his arm or banging her/his head?

- ❍ Yes
- ❍ No

Q18 Does she/he ever have any objects (other than a soft toy or comfort blanket) that she/he has to carry around?

- ❍ Yes
- ❍ No

Q19 Does she/he have any particular friends or a best friend?

- ❍ Yes
- ❍ No

Q20 Does she/he ever talk with you just to be friendly (rather than to get something)?

- ❍ Yes
- ❍ No

Q21 Does she/he ever spontaneously copy you (or other people) or what you are doing (such as vacuuming, gardening, or mending things)?

- ❍ Yes
- ❍ No

Q22 Does she/he ever spontaneously point at things around her/him just to show you things (not because she/he wants them)?

- ❍ Yes
- ❍ No

Q23 Does she/he ever use gestures, other than pointing or pulling your hand, to let you know what she/he wants?

- ❍ Yes
- ❍ No

Q24 Does she/he nod her/his head to indicate *yes*?

- ❍ Yes
- ❍ No

Q25 Does she/he nod her/his head to indicate *no*?

- ❍ Yes
- ❍ No

Q26 Does she/he usually look at you directly in the face when doing things with you or talking to you?

- ❍ Yes
- ❍ No

Q27 Does she/he smile back if someone smiles at her/him?

- ❍ Yes

- ❍ No

Q28 Does she/he ever show you things that interest her/him to engage your attention?
- ❍ Yes
- ❍ No

Q29 Does she/he ever offer to share things other than food with you?
- ❍ Yes
- ❍ No

Q30 Does she/he ever seem to want you to join in her/his enjoyment of something?
- ❍ Yes
- ❍ No

Q31 Does she/he ever try to comfort you if you are sad or hurt?
- ❍ Yes
- ❍ No

Q32 If she/he wants something or wants help, does she/he look at you and use gestures with sounds or words to get your attention?
- ❍ Yes
- ❍ No

Q33 Does she/he show a normal range of facial expressions?
- ❍ Yes
- ❍ No

Q34 Does she/he ever spontaneously join in and try to copy the actions in social games, such as *The Mulberry Bush* or *London Bridge is Falling Down*?
- ❍ Yes
- ❍ No

Q35 Does she/he play any pretend or make-believe games?
- ❍ Yes
- ❍ No

Q36 Does she/he seem interested in other children of approximately the same age whom she/he does not know?
- ❍ Yes
- ❍ No

Q37 Does she/he respond positively when another child approaches her/him?
- ❍ Yes
- ❍ No

Q38 If you come into a room and start talking to her/him without calling her/his name, does she/her usually look up and pay attention to you?

- ❍ Yes
- ❍ No

Q39 Does she/he ever play imaginative games with another child in such a way that you can tell that each child understands what the other child is pretending?

- ❍ Yes
- ❍ No

Q40 Does she/he play cooperatively in games that need some form of joining in with a group of other children such as hide-and-seek or ball games?

- ❍ Yes
- ❍ No

Appendix G

Parental Depression Symptoms

The Centre for Epidemiologic Studies Depression Scale CES-D (Radloff, 1977) was used to contextualize the mental health of parents in my sample. The CES-D is a 20-item scale designed to measure depression symptomology in the general population (Radloff, 1977). It has excellent reliability and validity (Radloff, 1977) and has been used among parents (Dol et al., 2020). Mean levels of parental depression symptoms were compared between diagnostic groups using a one-way ANOVA. Symptoms of depression differed significantly across diagnostic groups, F (3, 282) = 7.537, $p < .001$. Pairwise comparisons revealed that symptoms were significantly lower in the no-ADHD group compared to the diagnosed, $p < .001$, and undiagnosed, $p = .009$, groups. Parental depression symptoms were also lower in the low-symptom group compared to the diagnosed group, $p = .024$.

Appendix H

Results with Outliers Excluded

Conduct problems

ANCOVAs Testing Differences in Conduct Problems by Diagnostic Group

	df	*F*	*p*
Diagnostic Status			
Child Age	1, 267	4.06	.045
Diagnostic Status x Child Age	3, 267	18.48	< .001
Diagnostic Status X Child Gender			
Child Age	1, 263	10.52	.001
Diagnostic Status X Child Gender X Child Age	7, 263	11.41	< .001
Diagnostic Status X Medication Use			
Child Age	1, 264	.17	.682
Diagnostic Status X Medication Use X Child Age	6, 264	10.83	< .001
Diagnostic Status X Psychosocial Intervention Use			
Child Age	1, 263	2.18	.141
Diagnostic Status X Psychosocial Intervention Use X Child Age	7, 263	9.57	< .001

Pairwise Comparisons

Diagnostic Status. Problems were significantly lower in the no-ADHD group than the low-symptom, $p = .013$, and diagnosed groups, $p < .001$. Problems were significantly higher in the diagnosed group than all three.

Child Gender X Diagnostic Status. There were no significant differences between non-males and males in any of the diagnostic groups. Among non-males, problems were significantly higher in the diagnosed group than the no-ADHD, $p < .001$, and undiagnosed groups, $p = .016$. Among males, problems were significantly higher in the diagnosed group than the no-ADHD group, $p < .001$, and low-symptom groups, $p = .004$.

Medication Use X Diagnostic Status. Problems were significantly higher for those who accessed medications compared to those who had not in the no-ADHD group, $p = .025$. Among

children who had not accessed medications, problems were significantly lower in the no-ADHD group than the low-symptom, $p = .050$, and diagnosed groups, $p < .001$. Among those who had accessed medications, problems were significantly higher in the diagnosed group than the low-symptom group, $p < .001$.

Psychosocial Intervention Use X Diagnostic Status. Problems were significantly higher for those who accessed psychosocial treatments compared to those who had not in the no-ADHD group, $p = .037$. Among those who had not accessed psychosocial treatments, problems were significantly higher in the diagnosed group than the no-ADHD, $p < .001$, and low-symptom groups, $p = .014$. Among those who had accessed psychosocial treatments, problems were significantly higher in the diagnosed group than the no-ADHD group, $p = .049$.

Emotional problems

ANCOVAs Testing Differences in Emotional Problems by Diagnostic Group

	df	*F*	*p*
Diagnostic Status			
Child Age	1, 267	.11	.742
Diagnostic Status	3, 267	22.13	< .001
Diagnostic Status X Child Gender			
Child Age	1, 263	.012	.931
Diagnostic Status X Child Gender X Child Age	7, 263	10.02	< .001
Diagnostic Status X Medication Use			
Child Age	1, 263	2.31	.130
Diagnostic Status X Medication Use	7, 263	10.60	< .001
Diagnostic Status X Psychosocial Intervention Use			
Child Age	1, 263	.07	.793
Diagnostic Status X Psychosocial Intervention Use	7, 263	13.03	< .001

Pairwise Comparisons

Diagnostic Status. Problems were significantly higher in the diagnosed and undiagnosed groups than in the no-ADHD and low-symptom groups, all $p < .001$.

Child Gender X Diagnostic Status. There were no significant differences between non-males and males in any of the diagnostic groups. Among non-males, problems were significantly higher in the diagnosed group than the no-ADHD group, $p < .001$, and significantly higher in the undiagnosed group compared to the no-ADHD, $p < .001$, and low-symptom groups, $p = .031$. Among males, problems were significantly lower in the no-ADHD group than other groups. Problems were also significantly higher among males in the diagnosed group compared to the low-symptom group, $p = .022$.

Medication Use X Diagnostic Status. There were no significant differences between children who did and did not use medication in any of the diagnostic groups. Among those who did not use medications, problems were significantly lower in the no-ADHD group than the other three groups. Among children who used medications, problems were significantly higher in the diagnosed group compared to the no-ADHD, $p = .032$, and the low-symptom group, $p < .001$.

Psychosocial Intervention Use X Diagnostic Status. Problems were significantly higher among children who accessed psychosocial interventions than those who had not in the no-ADHD, $p = .012$, diagnosed, $p = .015$, and undiagnosed groups, $p = .008$. Among those who had not accessed psychosocial services, problems were higher in the diagnosed and undiagnosed groups than the no-ADHD and low-symptom groups. Among those who had accessed psychosocial services, problems were higher in the undiagnosed group than all three groups. Problems were also significantly higher in the diagnosed group than the low-symptom, $p = .004$, group.

Parenting Stress

ANCOVAs Testing Differences in Parenting Stress by Diagnostic Group

	df	*F*	*p*
Diagnostic Status			
Child Age	1, 211	.01	.942
Diagnostic Status	3, 211	21.13	< .001
Diagnostic Status X Child Gender			
Child Age	1, 207	.08	.781
Diagnostic Status X Child Gender	7, 207	11.32	< .001
Diagnostic Status X Medication Use			
Child Age	1, 208	.01	.924
Diagnostic Status X Medication Use	6, 208	12.52	< .001
Diagnostic Status X Psychosocial Intervention Use			
Child Age	1, 207	.01	.916
Diagnostic Status X Psychosocial Intervention Use	7, 207	9.56	< .001

Pairwise Comparisons

Diagnostic Status. Problems were significantly higher in the diagnosed group than other groups and significantly lower in the no-ADHD group than other groups.

Child Gender X Diagnostic Status. Levels of stress were significantly higher among parents of male children in the no-ADHD group, $p = .002$. Among parents of non-male children, stress was significantly higher in the low-symptom and diagnosed groups compared to the no-ADHD and undiagnosed groups. Among parents of male children, stress in the diagnosed group was significantly higher than stress in the no-ADHD, $p < .001$, and low-symptom groups, $p = .003$.

Medication Use X Diagnostic Status. Stress was significantly higher among parents of children taking medications, but only in the no-ADHD group. Among parents of children who were not using medications, stress was significantly lower in the no-ADHD group compared to all three other groups. Stress was also higher in the diagnosed group compared to the undiagnosed group. Among parents of children taking medications, stress was significantly higher in the diagnosed group compared to the low-symptom group, $p < .001$.

Psychosocial Intervention Use X Diagnostic Status. There were no significant differences in parental stress between those who had and had not accessed psychosocial interventions in any of the diagnostic groups. Among those who had not accessed psychosocial interventions, stress was significantly higher in the diagnosed group compared to the other groups, and significantly lower in the no-ADHD group compared to the other groups. Among those who had accessed psychosocial treatment, stress was significantly higher in the diagnosed group compared to the low-symptom group, $p = .038$.