

**AN INVESTIGATION OF THE STUDENT-TEACHER RELATIONSHIP FOR
CHILDREN WITH ATTENTION DEFICIT/HYPERACTIVITY DISORDER: A
DEVELOPMENTAL SYSTEMS THEORY PERSPECTIVE**

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Abstract

The student-teacher relationship quality has shown to predict academic and social outcomes (Crosnoe, Johnson, & Elder, 2004), and relatively recent research suggests its protective nature for children who are academically at-risk, such as those with Attention Deficit Hyperactivity Disorder (ADHD; Ewe, 2019). Unfortunately, children with ADHD often have strained relationships with their teachers (Rogers & Tannock, 2013). Aside from our understanding of this association, little is known about the developmental trajectory of the association, nor other systemic mechanisms that could be contributing to it. Therefore, three related studies were executed to enhance our understanding of the complexities of the student-teacher relationship for children with ADHD.

The first study of the three targeted preschool children in the community (n=113) and their daycare providers (n=55), and assessed the association between early ADHD symptoms and concurrent and later student-teacher relationships in kindergarten (n=67). Findings revealed that higher inattention in preschool was associated with more conflict with daycare providers/educators, whereas higher hyperactivity/impulsivity symptoms in kindergarten children were associated with higher student-teacher conflict.

The second study compared the student-teacher relationship of children with clinical diagnoses of ADHD and typically developing peers (n=76). Additionally, family-school relations and communication were investigated as a potential contribution to the student-teacher relationship quality. Non-significant differences of the parent-teacher relationship for children with ADHD versus those without the disorder were identified. However, home-school communication was established as a mediator between both inattention and hyperactivity/impulsivity symptoms and student-teacher conflict.

Utilizing the same research methods as study two, study three evaluated the contribution of teacher-level characteristics on the student-teacher relationship for children with clinical diagnoses of ADHD. Teacher stress, self-efficacy, and knowledge of ADHD were assessed as mediators between ADHD symptoms and the student-teacher relationship quality. Significant main findings revealed that teacher stress significantly mediated the relationship between children's ADHD symptoms and student-teacher conflict, whereas teacher efficacy and knowledge of ADHD did not.

As a whole, this dissertation research project established and enhanced our understanding of developmental and systemic mechanisms contributing to the student-teacher relationship quality for children exhibiting ADHD symptomology. Future research directives and practical implications are reviewed.

Keywords: ADHD; student-teacher relationship; teacher education; prevention; development; education; intervention

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Chapter One: Background

Children with Attention Deficit/Hyperactivity Disorder (ADHD) experience significant impairments in a wide variety of areas, including the educational domain (Barkley, 1996; DuPaul & Stoner, 2014). The majority of children with ADHD tend to have difficulties in the school setting related to academic outcomes and relationships with peers and teachers (DuPaul & Stoner, 2014; Kellner, Houghton, & Douglas, 2003; Kos, Richdale, & Hay, 2006). They are susceptible to academic underachievement (Barry, Lyman, & Klinger, 2002; Massetti et al., 2008) and tend to perform below their skill level on measures of academic performance (Birchwood, & Daley, 2012; Daley, & Birchwood, 2010; Langberg et al., 2011; Wu, & Gau, 2013). Additionally, within the classroom setting, children with ADHD appear to be less engaged during teacher-directed instruction (Junod, DuPaul, Jitendra, Volpe, & Lorah, 2006), and oftentimes show avoidance and have difficulty working collaboratively with peers (Chiang, & Gau, 2014; Zentall & Beike, 2012). Their short attentive states, frequent off-task behaviors, and disruptive behaviors (Kofler, Rapport, & Alderson, 2008; Rapport, Kofler, Alderson, Timko, & DuPaul, 2009) pose significant challenges within the classroom, and further impede their chances of school success (Hamre & Pianta, 2001).

Given all the aforementioned learning difficulties that children with ADHD endure, it is not surprising that they tend to display a lack of motivation compared to typically developing peers. Research has revealed that the symptoms of ADHD influence children's academic motivation, and consequently, future academic achievement (Volpe et al., 2006). They also tend to prefer easy work, have low levels of persistence, and require external rewards to put forth effort in academic activities (Volpe et al., 2006).

The research evidence is clear: Children with ADHD are at significant risk for a multitude of negative academic outcomes. Furthermore, we have understood for some time how such academic outcomes impact an individual's functioning across the lifespan from preschool to adulthood (Harpin, 2005). Therefore, to improve overall functioning and increase chances of school success for children with ADHD, efforts must be directed towards identifying effective intervention strategies to prevent the onslaught and exacerbation of classroom and education-related difficulties.

Developmental Systems Theory

Developmental systems theory (Bronfenbrenner, 1979) posits that interventions that only target child-level characteristics (i.e., ADHD symptomology) will fail to address significant environmental influences, and as such, be unsuccessful. This theoretical framework describes the child as a system that evolves and develops through interactions with people and things within their various environments, such as home and school. Within developmental systems theory, the various systems and environmental variables that influence a child's development are organized into five levels: (a) *microsystem*: direct environmental influences, such as home and school; (b) *mesosystem*: interconnections between the various microsystems, such as relationships and interactions between parents and teachers; (c) *exosystem*: connections and links between environments that the child may not be directly involved in but still distally has impact on the child, such as parents' workplaces or the neighborhood; (d) *macrosystem*: distal factors that influence a child's development and functioning, such as community and culture; and (e) *chronosystem*: the influence of changes and constancy in a child's environment over time. This framework provides an understanding of how development is a result of interactions between

individual characteristics and influential factors within their environments (Gutman, Sameroff, & Eccles, 2002).

To reiterate, the current research investigating the link between ADHD and academic outcomes is limited to risk factors that are child-level, and more recently, factors within the home setting. However, we know far less about relevant factors within the classroom setting and interactional effects between environments. Developmental systems theory would state that our current understanding of the link between ADHD and academic outcomes is inadequate, in that it virtually ignores potentially significant influences within an important system: The education setting. One influential factor within the education setting that has received heightened attention in recent years is the student-teacher relationship quality.

Student-Teacher Relationship

Researchers have suggested that the student-teacher relationship is a crucial component of a child's academic and social development, and is similar to the parent-child relationship (Zhang, 2011). However, in comparison to the breadth of the parent-child relationship literature, we have a limited understanding of the student-teacher relationship. Toste, Heath, and Dallaire (2010) indicated that children who feel close and supported by their teacher tend to feel more secure and motivated within the classroom. In addition, previous studies have revealed that positive student-teacher relationships, characterized by trust, open communication, and warmth, are associated with enhancements in academic performance and achievement (Crosnoe, Johnson, & Elder, 2004), improvements in peer relationships (Hughes & Kwok, 2006; Zhang, & Nurmi, 2012), and reductions in externalizing behaviors (Silver, Measelle, Armstrong, & Essex, 2010). Several researchers have also suggested that the student-teacher relationship may be of even higher importance and serve as a protective factor for children who are at risk of academic failure and

underachievement due to academic and behavioral difficulties, such as those with ADHD (Baker, 2006; Hamre & Pianta, 2001; Pianta, & Stuhlman, 2004).

In comparison to typically developing children, children with externalizing behaviors have been found to have less adaptive student-teacher relationships, laden with conflict and mistrust (Baker, 2006; Murray & Zvoch, 2011). Furthermore, Murray and Zvoch (2011) found that the quality of the student-teacher relationship was predictive of school adjustment. That is, students who reported poor relationships with their teachers at time one were subjected to school maladjustment and poor academic and social outcomes at time two. Similarly, in a large longitudinal study, Hamre and Pianta (2001) revealed that negativity in the student-teacher relationship for children with high levels of behavioral difficulties at the kindergarten level predicted academic and behavioral outcomes through to the eighth grade. However, it appears that children with similar difficulties who report supportive and trusting relationships with their teachers are no longer at risk for developing less close and maladaptive relationships with their teachers and peers later on (Buyse, Verschueren, Doumen, Van Damme, & Maes, 2008). Further, Baker (2006) revealed that children with behavioral problems and learning challenges, who also had a positive student-teacher relationship were significantly advantaged compared to similar peers who did not have a positive relationship with their teacher. Specifically, reductions in externalizing behavior and increases in prosocial behavior were noted. Interestingly, children with exclusive learning challenges did not significantly benefit from having a positive student-teacher relationship, as those who also had externalizing behavioral problems did. Pianta and Stuhlman (2004) also determined that the student-teacher relationship had a significant impact on many child outcomes assessed (i.e., behavior, adaptability, academic achievement, social skills) above and beyond the effects of prior social and academic skills, as well as other demographic

variables. This area of research suggests that positive and close student-teacher relationships are particularly protective and beneficial for children who are at-risk of negative academic outcomes due to behavioral/emotional difficulties.

Dissertation Rationale

Given the evidenced long-term academic difficulties for children with ADHD and documented protective nature of the student-teacher relationship (Baker, 2006; Buyse, Verschueren, Doumen, Van Damme, & Maes, 2008; Hamre & Pianta, 2001; Pianta, & Stuhlman, 2004), targeting the student-teacher relationship for this population may be a crucial point of prevention/intervention for improving academic, social, and emotional functioning across the lifespan. However, aside from ADHD symptomology, the complexities and the contributing factors to the student-teacher relationship for children with ADHD has virtually been untouched in the literature. As such, the purpose of this dissertation research was to investigate the student-teacher relationship quality for children exhibiting subclinical and clinical levels of ADHD symptomology from preschool to elementary ages. In order to shed light on this area of research, using the conceptual framework of developmental systems theory, three related correlational studies pertaining to the student-teacher relationship for this population were executed.

The first study of the research project investigated ADHD symptomology and the student-teacher relationship at the preschool and kindergarten levels, as well as the impact of parental involvement in education on the student-teacher relationship for kindergarteners. The second study investigated the impact of parental involvement and family-school interactions on the student-teacher relationship for elementary-aged children with and without clinical diagnoses of ADHD. The final study aimed to evaluate the influence of teacher-level variables on the student-teacher relationship quality for children with and without clinical diagnoses of ADHD.

Importantly, the association between ADHD symptoms and the student-teacher relationship quality lends itself to bidirectionality, in that ADHD symptoms negatively impact the way the teacher views the student, which further influences how the teacher rates the student's behaviors (Portilla, Ballard, Adler, Boyce, & Obradović, 2014; Silver, Measelle, Armstrong, & Essex, 2005). For the purposes of the present dissertation, ADHD symptoms were viewed as the predictor variable.

Chapter Two: ADHD Symptoms and the Student-Teacher Relationship in Preschoolers

Abstract

The student-teacher relationship and parent involvement in education are factors that have been identified as determinants of positive academic and social outcomes, especially for students who are at-risk of school drop-out or failure, such as those with ADHD. Unfortunately, previous research suggests that elementary-aged students with ADHD often have poor relationships with their teachers, and inconsistent parental involvement; however, this has yet to be confirmed for younger children. As such, this study examined the impact of ADHD symptomology on the student-teacher relationship in preschool, as well as explored the longitudinal impact on the student-teacher relationship in kindergarten. Furthermore, this study evaluated the influence of parental involvement at the kindergarten level (i.e., school-based involvement and home-school communication) on the assumed connection between ADHD symptomology and the student-teacher relationship. A cross-sectional and longitudinal design was employed using a community sample of preschool children (n=107) and their daycare providers (n=55) at time one, with follow-up one year later when the children were in kindergarten (n=67). Findings revealed that higher inattention in preschool was associated with more conflict with daycare providers/educators; ADHD symptomology in preschool did not significantly predict closeness or conflict with teachers in kindergarten, but higher hyperactivity/impulsivity symptoms in kindergarten was significantly associated with higher student-teacher conflict; and lastly, parent involvement did not significantly mediate the relationship between child ADHD symptomology and the student-teacher relationship in kindergarten. Future directions and implications are discussed.

Introduction

The link between ADHD symptomology and poor academic and social outcomes for school-aged children has long been established in the literature (DuPaul & Stoner, 2014; Kellner, Houghton, & Douglas, 2003; Kos, Richdale, & Hay, 2006). Additionally, relatively recent research has confirmed the most efficacious intervention plan for children with ADHD include both psychopharmacology and environment adaptations through parent management training (Faraone & Buitelaar, 2010; Webster-Stratton, Reid, & Beauchaine, 2013; Zito et al., 2008). To reframe, researchers and clinicians have determined effective interventions for the home setting and for the symptoms themselves; however, we know far less about potential targets for intervention within the education setting and interactional effects between environments. Using the developmental systems theory framework (Bronfenbrenner, 1979), our current understanding of the link between ADHD and academic/social outcomes is inadequate, in that it virtually ignores potentially significant influences within an important system: The education setting. Specifically, the student-teacher relationship for children with ADHD is a primary focus of the present study.

Student-teacher relationship.

Extensive research has identified the student-teacher relationship as being highly influential in children's academic, social, and emotional development. It has also been suggested that positive student-teacher relationships are a prerequisite for children's learning, in that those who feel close and supported by their teacher are more likely available for learning (Camp, 2011). Furthermore, positive student-teacher relationships have been associated with increased academic achievement (Crosnoe, Johnson, & Elder, 2004), improvements in social interactions (Zhang, & Nurmi, 2012), and reductions in externalizing and disruptive behaviors in the

classroom (Silver, Measelle, Armstrong, & Essex, 2010). Several researchers have also suggested that the student-teacher relationship may be of even higher importance and serve as a protective factor for children who are at risk of academic failure and underachievement due to academic and behavioral difficulties, such as those with ADHD (Baker, 2006; Hamre & Pianta, 2001; Pianta, & Stuhlman, 2004).

Although it has been established that the student-teacher relationship is a protective factor for at-risk children, recent research suggests that the vast majority of children who struggle in the classroom due to ADHD symptoms, such as inattention, hyperactivity, and impulsivity, do not have positive relationships with their teachers. Teachers report that managing students with ADHD in their classroom is difficult (Kos, 2008), that ADHD-related symptoms negatively impact the classroom and relationships (Ohan, Visser, Strain, & Allen, 2011), and that teachers themselves experience increased stress and decreased confidence when managing the behaviors of students with ADHD in their classrooms (Ohan, Visser, Strain, & Allen, 2011).

Preschool-aged students.

The above findings have been explored for elementary-aged children and older; however, the correlation between ADHD symptoms and the student-teacher relationship quality has yet to be investigated at the preschool level. Furthermore, the longitudinal predictive value of ADHD symptoms on the student-teacher relationship has received no attention in the literature. Identifying and targeting areas for intervention (i.e., the student-teacher relationship quality) for children exhibiting ADHD symptoms as young as possible will assist in the prevention of future academic and social difficulties. Therefore, replicating the findings within the student-teacher relationship literature for elementary-aged children with ADHD symptomology for children at

the preschool level, as well as establishing the longitudinal impact of ADHD symptoms on the student-teacher relationship for this population, was a primary focus for the present study.

Parental involvement in education.

Another protective factor that has shown promise for children with ADHD is parental involvement in their child's education (Rogers, Weiner, Marton, & Tannock, 2009).

Unfortunately, it appears that parents of children with ADHD face increased obstacles to their involvement than parents of typically developing children. Research finds that parents of children with ADHD symptoms report greater challenges to involvement and report feeling lower levels of self-efficacy in their ability to help their children, despite holding strong values regarding the importance of parental involvement (Rogers, Wiener, Marton, & Tannock, 2009). These challenges may also be related to the high prevalence of ADHD symptoms in parents themselves of children with the disorder. Specifically, nearly 50 percent of children with ADHD also have a parent with the disorder (Smalley et al., 2000; Takeda et al., 2010; Starck, Gruenwald, & Schlarb, 2016).

Areas of parental involvement in education can be categorized as activities at school, home, and activities related to parenting style. The present study focused on parental involvement activities at school, which include: parental participation in school-based social and extracurricular activities, communication with school officials, attending parent-teacher meetings, and volunteering at school (Barnard, 2004; Dearing et al., 2006; Englund et al., 2004; Hill & Taylor, 2004). In general, the results of previous studies that have investigated parental involvement within the school environment have suggested that increased involvement is associated with more positive academic outcomes for students (Dearing et al., 2006; Englund et al., 2004).

Furthermore, as developmental systems theory would suggest, the role of the parent and their involvement in education has shown to be a significant contributing factor to children's academic success, achievement, and development (Hoover-Dempsey & Sandler, 1997; Power, Dombrowski, Watkins, Mautone, & Eagle, 2007; Jeynes, 2012; Badri, Al Qubaisi, Al Rashedi, & Yang, 2014). Evidence suggests that parental involvement in education is particularly crucial at younger ages when children are introduced to schooling and developing their academic and social skills (Clarke et al., 2015). In fact, the literature reveals that parental involvement in education at a young age is predictive of increased confidence, higher academic performance, advanced social skills, enhanced academic achievement, and stronger pre-literacy skills (Hilado, Israel, Kallemeyn, Leow, & Lundy, 2011; Mowen, 2015). In addition, parental involvement at the preschool and kindergarten levels has been associated with children's interest in learning, academic competency, and effort (Hilado, Israel, Kallemeyn, Leow, & Lundy, 2011).

Although there is an abundance of research that points to the positive developmental outcomes and protective nature of parental involvement in education for children, the literature is limited in its investigation of the impact of parental involvement on the student-teacher relationship. Further, the protective value of these relationships for children who are at-risk of having poor relationships with their teachers, such as those with ADHD, remains unclear.

Study Objectives

The purpose of the present study was to address the aforementioned gaps in the existing literature by investigating the impact of ADHD symptomology on the student-teacher relationship in preschool, as well as explore the longitudinal impact on the student-teacher relationship in kindergarten. Furthermore, this study aimed to evaluate the influence of parental involvement at the kindergarten level (i.e., school-based involvement and home-school

communication) on the assumed connection between ADHD symptomology and the student-teacher relationship. Specifically, the study focused on the following research questions: 1) What is the nature of the relationship between student ADHD symptomology and the student-teacher relationship quality in preschool-aged children and their daycare providers?; 2) Does ADHD symptomology in preschool predict the student-teacher relationship quality in kindergarten?; and 3) Does maternal involvement in kindergarten mediate the relationship between ADHD symptomology in preschool and the student-teacher relationship quality in kindergarten?

Based on previous research, the following hypotheses were made: 1) The first hypothesis stated that increased ADHD symptoms (both inattentive and hyperactivity/impulsivity symptoms) in preschoolers would predict increased conflict and reduced closeness with their daycare providers; 2) the second hypothesis stated that increased ADHD symptoms (both inattentive and hyperactivity/impulsivity symptoms) in preschoolers would predict increased conflict and reduced closeness with their kindergarten teachers one year later; and 3) the third hypothesis predicted that maternal involvement in kindergarten would negatively mediate the relationship between child ADHD symptoms and the student-teacher relationship quality.

This study will be the first step in determining the longitudinal predictive nature of ADHD symptomology on the student-teacher relationship quality for preschoolers, as well as the effects of maternal involvement in education on the student-teacher relationship for kindergarteners exhibiting ADHD symptomology. Furthermore, it will assist in identifying intervention targets that may serve to improve the student-teacher relationship through the child's environment.

Method

Participants.

This study was a component of a larger research study investigating emotion regulation in preschool children and school readiness. There was a total of 113 children (54 boys, 59 girls) between the ages of 2.6 and 5.2 years ($M = 3.58$, $SD = .58$) and 107 mothers (6 sets of siblings) who participated in the study at time one. To control for six mothers counting twice in the analyses, one sibling of each of the six sets were randomly selected and removed, resulting in a sample size of 107 children (50 boys, 57 girls) between the ages of 2.6 and 4.8 years ($M = 3.6$, $SD = .49$). According to maternal reports, one (.9%) child had a diagnosis of ADHD (slightly less than North American statistic of 2.4% prevalence for two to five year olds; see Danielson et al., 2018), 102 (90.3%) did not have a diagnosis of ADHD, and 10 (8.8%) did not report whether the child had a diagnosis. Of the responding guardians, 101 (94.6%) were biological mothers of the children, 3 (2.7%) were adoptive mothers, 1 (.9%) was a grandmother, and 2 (1.8%) reported “other” pertaining to their relationship with the child that participated. Additionally, 55 (49%) daycare providers of the participating children participated in the study at time one; 7 (6%) chose not to participate; and 51 (45%) of the parents who participated did not provide contact information for a daycare provider for reasons unknown.

Of the 107 children and their mothers who participated in the study at time one (preschool), there was a total of 68 children (35 boys, 33 girls) between the ages of 3.51 and 5.71 years ($M = 4.47$, $SD = .52$) and 68 parents who participated in the study at time two, which occurred approximately one year later when the children were in kindergarten. Sixty-seven (98.5%) kindergarten teachers participated.

Study design.

This study employed both a cross-sectional and longitudinal design. Mothers completed the questionnaires of interest assessing their child’s symptoms of ADHD at time one (preschool),

and time two (kindergarten), as well as their involvement in the school at time two. Further, the child's preschool daycare provider (time one) and later kindergarten teacher (time two) also completed a questionnaire pertaining to their perspectives of their relationship with the child.

Measures.

Child ADHD symptoms.

Children's ADHD symptomology (at time one) was measured with the ADHD IV Rating Scale (Appendix A; McGoey, DuPaul, Haley, & Shelton, 2007). This is a short 18-item parent-report measure of symptoms of ADHD in children. Parents rate their child's behaviour in the past 6-months on a 4-point Likert scale ranging from 1 (*rarely or never*) to 4 (*very often*). For example, parents rate the degree to which, in the past 6 months, their child "runs about or climbs excessively in situations in which it is inappropriate". This measure was normed on a large sample of 3-5 year old children and generates T-scores ($M = 50$, $SD = 10$) for Overall ADHD symptoms, Inattention, and Hyperactivity/Impulsivity scales. Higher scores represent increased symptoms of ADHD. This measure has shown good convergent validity (strong correlations to the Conner's Parent Rating Scales for ADHD) and has demonstrated good internal consistency in the norming sample, with Cronbach's alphas ranging from 0.86 to 0.96 (McGoey et al., 2007).

Parental involvement.

The Family Involvement Questionnaire (Appendix B; FIQ; Fantuzzo, Tighe, & Childs, 2000) was used to assess parents' involvement in their child's education at time two (kindergarten). On a 4-point Likert scale, primary caregivers rate the extent of their involvement in their child's education from *Rarely* to *Always*. The scale is composed of 42 items, which comprises three subscales: School-based involvement, home-based involvement, and home-school conferencing (referred to using *home-school communication* hereinafter; Cronbach's $r =$

.85, .85, and .81, respectively); however, only the school-based involvement and home-school communication dimensions were used in this study. The school-based involvement subscale consists of 12 items, and assesses activities and behaviors that caregivers demonstrate within the school setting to benefit their children. Example items include “I volunteer in my child’s classroom” and “I participate in parent and family social activities with the teacher”. The home-school communication subscale consists of 11 items and evaluates communication between parents and teachers regarding the child’s education. Example items include “I talk to my child’s teacher about his/her difficulties in school” and “The teacher and I write notes about my child or school activities”. Concurrent validity was established between the FIQ and parent reports who participated in Head Start (Fantuzzo, Lamb-Parker, Watson, & Christenson, 1999).

Student-teacher relationship.

The Student-Teacher Relationship Scale- Short form (Appendix C; STRS-SF; Pianta, 2001) was used to assess the quality of the student-teacher relationship (at time one and time two) on two scales: Closeness and conflict. The measure is completed by teachers or childcare providers and consists of 15 items, with 8 items addressing student-teacher conflict and 7 items addressing student-teacher closeness. Teacher-rated items for conflict include “this child and I always seem to be struggling with each other” and “this child is sneaky or manipulative with me”. Teacher-rated items for closeness include “I share an affectionate, warm relationship with this child” and “this child values his/her relationship with me”. On a 5-point Likert scale ranging from 1 (*definitely does not apply*) to 5 (*definitely applies*), teachers report on their relationship with the child of interest. This scale has been empirically evaluated and determined to have adequate reliability and validity as a measure of student-teacher relationship quality for children aged 3

and older (Tsigilis & Gregoriadis, 2008; Griggs, Gagnon, Huelsman, Kidder-Ashley, & Ballard, 2009; Koomen, Verschueren, Van Schooten, Jak, & Pianta, 2012).

Demographic questionnaire.

Child and parent demographic information was collected. It included parent and child age, gender, health status, and parental socioeconomic status and education.

Procedure.

Recruitment for this study was facilitated through poster advertisements and email/telephone communications to a variety of community agencies, including day cares, libraries, community centres, and university settings. Additionally, recruitment commenced through an established community partnership with Mothercraft Ottawa-Carleton (a not-for-profit early learning and parent support program) and the Bethany Hope Centre.

Inclusion and exclusion criteria.

All families with a preschooler in his/her year before kindergarten were eligible to participate, provided the family spoke English (because measures were in English) and neither parents nor child had a diagnosis of a developmental delay or other disability that may have prevented testing. ADHD symptomology was measured as a continuous variable, therefore a diagnosis of ADHD was not a requirement to participate (a normal distribution of attentional functioning was sought). Only one parent was required to participate.

Families who responded to recruitment advertisements were invited to the laboratory at the University of Ottawa to participate in the study. Each family came to the laboratory separately. Upon arrival, families were informed about the study's goals and procedures. Informed consent was ascertained from parents and verbal assent to participate was attained from the child. Children were provided with opportunities to play with toys while their parent completed

questionnaires. The order in which families completed the questionnaires and an experimental task of the broader research study was counterbalanced (i.e., completed questionnaires and then task or completed task and then questionnaires).

The children's daycare providers were contacted after the parent participated and consented. The daycare providers were informed of the nature of the study and were provided with an electronic link to the questionnaire.

All families who participated at time one (preschool phase) were contacted approximately one year later, when the child was in kindergarten. If parents and the kindergarten teachers consented to participate in the second phase, they were then asked to complete a series of online measures.

Statistical Analyses

The preliminary analyses included an examination of the descriptive statistics for all relevant variables: Demographic variables, parent reports of ADHD symptomology (inattention and hyperactivity/impulsivity) at time one and time two, parent reports of school involvement (school-based involvement and home-school communication), and teacher reports of the student-teacher relationship constructs (closeness and conflict) at time one and time two.

Given the specific analyses executed for the individual research questions (outlined below), initial correlation analyses were conducted to determine the linear relationships between the predictor variables and criterion variables. In addition, utilizing Hayes' Process Model for mediation (Hayes, 2017), multiple regression analyses were conducted on the relevant linear relationships between the symptomology variables and the student-teacher relationship constructs, with the parent involvement constructs as the mediators for the third research question.

Research question one. *What is the nature of the relationship between student ADHD symptomology and the student-teacher relationship quality in preschool-aged children and their daycare providers?*

A multiple linear regression model was utilized to answer the first research question. Parent reports of their child's inattention and hyperactivity/impulsivity at time one (preschool) were identified as the predictor variables in the model, and the daycare providers' reports of the student-teacher relationship constructs at time one (preschool) were identified as the criterion variables.

Research question two. *Does ADHD symptomology in preschool predict the student-teacher relationship quality in kindergarten?*

A separate multiple linear regression model that assessed the longitudinal nature of the constructs was used to answer the second research question. Parent reports of their child's ADHD symptomology (inattention and hyperactivity/impulsivity) at time one were used as the predictor variables and the kindergarten teachers' reports of the student-teacher relationship at time two were used as the criterion variables.

Research question three. *Does parental involvement in school mediate the relationship between child ADHD and the student-teacher relationship quality in kindergarten?*

School-based involvement and home-school communication were tested as mediators between the parent-reported child ADHD symptomology constructs (inattention, hyperactivity/impulsivity) and the teacher-reported student-teacher relationship constructs in kindergarten (time two).

Results

An examination of the skewness and kurtosis indices revealed that three of the variables were found to violate the normality assumption ($>1/-1$ skewness; Bulmer, 1979): Conflict at time two was positively skewed, and closeness at time one and at time two were negatively skewed. As a result, a logarithmic transformation was conducted on the positively skewed variable, and reflection and logarithmic transformations were conducted on the negatively skewed variables, which was successful in significantly changing the distribution for all three variables.

Multicollinearity was assessed using calculated Variance Inflation Factor (VIF) and Tolerance statistics (Jaccard, Guilamo-ramos, Johansson, & Bouris, 2006). VIF cut-offs of greater than three and tolerance cut-off values of less than .2 were used to determine if there could be a problem of linear relationships among the predictor variables (Tabachnick & Fidell, 2007). The analysis revealed tolerance scores greater than .2 and VIF scores of less than 3 for all variables.

Independent samples t-tests revealed no significant differences in age ($t(112) = 1.58, p = .12$), gender ($t(112) = .99, p = .33$), inattentive symptoms ($t(112) = -.40, p = .69$), and hyperactivity/impulsivity symptoms ($t(112) = -.41, p = .68$), between the group of participants who did not provide contact information for the daycare and the group who did. Significantly correlated demographic variables with variables of interest were controlled for in subsequent analyses (i.e., parent education, family income, marital status, child gender, time elapsed between time one and time two). Descriptive statistics and Pearson correlation coefficients for the relationships between all relevant variables and demographic variables can be found in Table 1.

Research question one. *What is the nature of the relationship between student ADHD symptomology and the student-teacher relationship quality in preschool-aged children and their daycare providers?*

Calculation of Pearson correlation coefficients for the relationships between the predictor (inattention and hyperactivity/impulsivity at time one) and criterion variables (closeness and conflict at time one) revealed a non-significant correlation between inattention and closeness, as well as hyperactivity/impulsivity and closeness. There was a significant correlation between inattention and conflict and between hyperactivity/impulsivity and conflict. As a result, multiple regression analysis was conducted on the significant correlations only. The results of the regression indicated the two predictors (inattention and hyperactivity/impulsivity) explained 15% of the variance ($R^2 = .15$, $F(2, 51) = 4.61$, $p < .01$). It was found that inattention significantly predicted student-teacher conflict ($\beta = .36$, $p = .05$), whereas hyperactivity/impulsivity did not ($\beta = .04$, n.s.).

Research question two. *Does ADHD symptomology in preschool predict the student-teacher relationship quality in kindergarten?*

Calculation of Pearson correlation coefficients for the relationships between the predictor (inattention and hyperactivity/impulsivity at time one) and criterion variables (closeness and conflict at time two) revealed non-significant correlations between all variables (see Table 1).

Additional exploratory analyses using inattention and hyperactivity/impulsivity at time two (kindergarten) also revealed non-significant correlations between inattention and closeness, hyperactivity/impulsivity and closeness, and inattention and conflict; however, a significant correlation between hyperactivity/impulsivity and conflict was identified. The results of the regression analysis using inattention and hyperactivity/impulsivity at time two revealed that the

predictors explained 9% of the variance ($R^2 = .09$, $F(2, 58) = 2.68$, n.s.). It was found that hyperactivity/impulsivity at time two significantly predicted student-teacher conflict ($\beta = .37$, $p < .05$), whereas inattention expectedly did not ($\beta = -.14$, n.s.).

Research question three. *Does parental involvement in kindergarten mediate the relationship between ADHD symptomology and the student-teacher relationship quality in kindergarten?*

Home-school communication and school-based involvement were tested as mediators by calculating bias-corrected 95% confidence intervals (CIs) using bootstrapping with 5000 resamples (Preacher & Hayes, 2004; Preacher & Hayes 2008) via the Process procedure for SPSS (v3.3), conceptual model 6 (Hayes, 2017).

First, it was found that the standardized regression coefficient between inattention and student-teacher conflict in kindergarten was not statistically significant (path c; $\beta = .03$, $t(65) = .89$, $p = .38$). Further, the standardized regression coefficient between inattention and home-school communication was also not statistically significant (path a_1 ; $\beta = .21$, $t(65) = 1.67$, $p = .10$), but the coefficient between inattention and school-based involvement was significant in the negative direction (path a_2 ; $\beta = -.30$, $t(65) = -2.47$, $p = .02$). Lastly, the results indicated that the mediator, home-school communication, was positively associated with student-teacher conflict (path b_1 ; $\beta = .39$, $t(65) = 2.95$, $p < .001$), whereas school-based involvement was negatively associated with student-teacher conflict (path b_2 ; $\beta = -.30$, $t(65) = -2.28$, $p = .03$). Evaluation of the indirect effects confirmed an indirect negative effect of inattentive symptoms on student-teacher conflict through school-based involvement ($a_2b_2 = .09$, 95% CIs [.01, .20]), but not home-school communication ($a_1b_1 = .08$, 95% CIs [-.01, .23]). See Figure 1 for a visual representation of the mediation model.

The second mediation analyses simply substituted the dependent variable with student-teacher closeness, and as such paths a_1 and a_2 were the same as the previous mediation model (path a_1 ; $\beta = .21$, $t(65) = 1.67$, $p = .10$; path a_2 ; $\beta = -.30$, $t(65) = -2.47$, $p = .02$). It was found that the standardized regression coefficient between inattention and student-teacher closeness in kindergarten was not statistically significant (path c ; $\beta = -.01$, $t(65) = -.27$, $p = .79$). Further, the results indicated that the mediator, home-school communication, was positively associated with student-teacher closeness (path b_1 ; $\beta = .31$, $t(65) = 2.21$, $p = .03$), whereas school-based involvement was not significantly associated with student-teacher closeness (path b_2 ; $\beta = -.18$, $t(65) = -1.28$, $p = .21$). Therefore, these results indicate that a mediation model is not supported for neither home-school communication nor school-based involvement. See Figure 2 for a visual representation of the mediation model.

The third mediation analyses investigated home-school communication and school-based involvement as mediators between child hyperactivity/impulsivity symptoms and student-teacher conflict. First, it was found that the standardized regression coefficient between hyperactivity/impulsivity and student-teacher conflict in kindergarten without controlling for the mediators was statistically significant (path c ; $\beta = .06$, $t(65) = 2.18$, $p = .03$). Further, the standardized regression coefficient between hyperactivity/impulsivity and school-based involvement was also significant in the negative direction (path a_2 ; $\beta = -.28$, $t(65) = -2.34$, $p = .02$), but home-school communication was also not statistically significant (path a_1 ; $\beta = .07$, $t(65) = .52$, $p = .61$). Therefore, these results indicate that a mediation model is not supported for neither home-school communication nor school-based involvement. See Figure 3 for a visual representation of the mediation model.

Finally, the fourth mediation analyses simply substituted the dependent variable with student-teacher closeness, and as such paths a_1 and a_2 were the same as the third mediation analyses (path a_1 ; $\beta = .07$, $t(65) = .52$, $p = .61$; path a_2 ; $-.28$, $t(65) = -2.34$, $p = .02$). It was found that the standardized regression coefficient between hyperactivity/impulsivity and student-teacher closeness in kindergarten was not statistically significant (path c ; $\beta = -.03$, $t(65) = -1.08$, $p = .28$). Further, the results indicated that the mediator, home-school communication, was positively associated with student-teacher closeness (path b_1 ; $\beta = .30$, $t(65) = 2.25$, $p = .03$), whereas school-based involvement was not significantly associated with student-teacher closeness (path b_2 ; $\beta = -.20$, $t(65) = -1.45$, $p = .15$). Therefore, these results indicate that a mediation model is not supported for neither home-school communication nor school-based involvement. See Figure 4 for a visual representation of the mediation model.

The overall results of this study indicate that higher inattention in preschool is associated with more conflict with daycare providers/educators; ADHD symptomology in preschool does not significantly predict closeness or conflict with teachers in kindergarten, but higher hyperactivity/impulsivity symptoms in kindergarten is significantly associated with higher student-teacher conflict; and lastly, parent involvement does not significantly mediate the relationship between child ADHD symptomology; however, there was an indirect negative effect of inattentive symptoms on student-teacher conflict through school-based involvement in kindergarten.

Discussion

The present study had three primary goals: 1) establishing the nature of the relationship between ADHD symptomology in preschool children and the student-teacher relationship quality with preschoolers' daycare providers; 2) exploring the longitudinal predictability of ADHD

symptomology in preschoolers on the student-teacher relationship quality with their future kindergarten teachers; and 3) establishing the mediating role of parent involvement in kindergarten. The results of this study revealed a mixture of expected and unexpected findings, which will be discussed in further detail below.

In terms of the relationship between ADHD symptomology and the student-teacher relationship quality in preschool and kindergarten, differing patterns of results were found. Specifically, a positive significant relationship between inattention in preschoolers and conflict with the daycare provider was identified, which is consistent with recent research conducted with kindergarten students (Portilla, Ballard, Adler, Boyce, & Obradović, 2014). However, the findings of the present study suggest that ADHD symptomology in preschoolers has limited predictability of the future student-teacher relationship quality for the transition into kindergarten. Granted, certain limitations of the study, which will be discussed in further detail below, may have impacted these findings; yet, other variables pertaining to the preschool to kindergarten transition warrant analysis. Namely, children of the preschool age develop as they learn and grow, so it is plausible that their symptomatic presentation could transform from preschool to kindergarten. For example, a child exhibiting inattention in preschool may in fact display more attention and focus as their brain develops, which will influence the types of interactions they have with their teachers, and ultimately impact the quality of these relationships. Additionally, the preschool/daycare environments have differing expectations than that of the kindergarten environment, which may also contribute to how the daycare providers view their relationships with the children versus kindergarten teachers. Furthermore, resources, such as other professionals within the school system, are more readily available within the kindergarten setting, and so ADHD symptoms are more likely to be targeted and addressed,

which would reduce the impact on the student-teacher relationship with the kindergarten teacher. Importantly, differences between the type and quality of daycare that the children participated in could potentially reflect incomparable responses from the daycare providers and the future kindergarten teachers. Specifically, a home daycare consisting of fewer children has the potential to foster stronger relationships between the children and the daycare provider compared to some center daycare settings and the kindergarten classrooms, which consist of larger numbers. Unfortunately, the specifics of the daycare settings that the child participants were involved in were not measured, and therefore, not controlled in the present study. As such, future research investigating the student-teacher relationship for preschool aged children should aim to control for the types and quality of care implemented.

Further exploratory analyses revealed that the relationships between ADHD symptomology and the student-teacher relationship quality differed when the children were in kindergarten. Instead of inattention predicting student-teacher conflict, as was indicated in the first analyses using the preschool data, hyperactivity/impulsivity significantly predicted student-teacher conflict when the children were in kindergarten a year later. These findings are consistent with previous research linking ADHD symptoms and associated behavioural challenges with student-teacher conflict (Rogers & Tannock, 2013).

The exploration of the mediating role of parent involvement in kindergarten between ADHD symptomology and the student-teacher relationship determined to be non-significant; however, promising findings were identified. Specifically, an indirect negative effect of inattention on student-teacher conflict through school-based involvement was established, meaning that reduced parental school-based involvement in kindergarten results in increased student-teacher conflict for children exhibiting inattentive symptoms. The pattern of these findings does reveal

similarities with existing research. Namely, the literature has consistently shown the positive impact that parental involvement in school has on child development, as well as a variety of academic outcomes (Jeynes, 2012; Badri, Al Qubaisi, Al Rashedi, & Yang, 2014), and our findings suggest that minimal parent involvement in school-based activities for kindergarteners experiencing inattentive symptoms perpetuates student-teacher conflict. Therefore, the results support the notion that parental involvement in school-based activities has predictive potential of the student-teacher relationship quality for children experiencing inattentive symptoms in kindergarten.

Additionally, home-school involvement positively predicted both student-teacher conflict and closeness, suggesting that increased home-school communication is associated with more student-teacher conflict, as well as closeness. The association between home-school communication and student-teacher closeness was expected, as previous research has identified the connection between parent involvement in school and positive academic outcomes (Dearing et al., 2006; Englund et al., 2004) and therefore, it was hypothesized that increased communication between parents and teachers would be associated with positive student-teacher relationships. However, the link between home-school communication and student-teacher conflict was unexpected. It is plausible that the reversed effect is true, in that increased student-teacher conflict leads to increased communication between parents and teachers. Future research should aim to further investigate this linkage.

Barriers & Limitations

Although the proposed study was designed to minimize threats to validity, there are barriers and limitations that warrant discussion. Primarily, the non-experimental nature of the study prevents inferences about causality. Results from this study established specific relationships

between ADHD symptomology and the student-teacher relationship, but experimental studies to establish temporal precedence and causality will be needed in the future. Related to the previous point, the study does not control for other contextual factors that may account for unknown variance. For example, research has shown that marital conflict and life stressors significantly contribute to preschoolers' behavioral problems, as well as parent psychopathology (e.g., Goldstein et al., 2007; e.g., Baker, Loukas, Zucker, Fitzgerald, & Krull, 2003), but these variables were not assessed in the present study.

Importantly, the sample size was likely a limitation and impacted the results of the present study. A sample size of approximately 74 families (along with the daycare providers at time one and kindergarten teachers at time two) was desired based on a *power analysis* for a linear multiple regression model with three predictors at a given time (ADHD symptomology variable, two mediators) to produce a statistical power value of 0.80 (Green, 1991). However, sample sizes of 55 at time one and 67 at time two were ascertained, which likely influenced the non-significant findings. As such, future research should aim increase the sample size.

Chapter Three: Investigating the impact of parent involvement in education on the student-teacher relationship for school-aged children with ADHD

Abstract

The student-teacher relationship has shown promise as being a protective factor for children with ADHD; however, the research suggests that these children often have conflictual and negative relationships with their teachers (Ewe, 2019). Furthermore, aside from linking ADHD symptoms to relationship quality, little is known of the complexities and other contributing factors to the student-teacher relationship, such as the impact of parental involvement. Specifically, consistent and collaborative interactions between parents and teachers enhance children's academic achievement and learning; however, comparison to other social relationships, such as the student-teacher relationship quality, is largely unknown. As such, this study investigated the influence of parental involvement and parent-teacher interactions on the student-teacher relationship for school-aged children with clinical diagnoses of ADHD. Further, the mediating role of parental involvement (e.g., home-school communication) on students' ADHD symptomology and the student-teacher relationship was evaluated. A between subjects cross-sectional design was employed comparing the student-teacher relationship of children with clinical diagnoses of ADHD and typically developing peers (n=76). Additionally, family-school relations and communication were investigated as a potential contribution to the student-teacher relationship quality. Findings indicated non-significant differences of the parent-teacher relationship for children with ADHD versus those without the disorder, and home-school communication significantly mediated the relationship between ADHD symptomology (both inattention and hyperactivity/impulsivity) and student-teacher conflict. Future directions and implications are discussed.

Introduction

To reiterate, children with ADHD experience significant academic and social impairments (Barkley, 1996; DuPaul & Stoner, 2014). Many children with ADHD tend to experience poor academic outcomes such as school failure, underachievement, and disengagement, as well as challenges in relationships with peers and teachers (DuPaul & Stoner, 2014; Kellner, Houghton, & Douglas, 2003; Kos, Richdale, & Hay, 2006; Massetti et al., 2008; Wu, & Gau, 2013). Inattention, distractibility, off-task and disruptive behaviors – common characteristics of ADHD—are often contradictory of classroom expectations, and associated with increased student-teacher conflict and risk for poor academic outcomes (Hamre & Pianta, 2001).

In sum, children with ADHD are at significant risk for a multitude of negative academic outcomes, which has been associated with long-term consequences effecting functioning across the lifespan (Harpin, 2005). Compelling efforts have been made by clinicians and researchers to identify effective intervention strategies for children with the disorder in the attempt to prevent the onslaught of negative outcomes for this population. At present, the recommended intervention approach often includes a combination of psychotropic medication and parent management training (Webster-Stratton, Reid, & Beauchaine, 2013; Zito et al., 2008). Whilst there exists an area of research that has identified effective school-based interventions for children with ADHD, there is limited evidence that explores the notion of the student-teacher relationship as being a point of intervention, and even further, the impact of home-school communication and parent-teacher relationship quality is unknown. As such, the primary focus of this study was to shed light on the student-teacher relationship quality for children with clinical diagnoses of ADHD, as well as compare the parent-teacher relations for children with ADHD versus their typically developing counterparts.

School-based interventions.

Relatively recent research suggests that school-based interventions which focus on teacher training are effective in reducing problematic ADHD behaviors in the classroom setting (DuPaul, Weyandt, & Janusis, 2011). Such interventions include daily report cards, rewards programs, chunking material, providing extra time for school work, providing frequent feedback, and teaching organizational skills (Evans, Owens, & Bunford, 2014). The research indicates that in order for these intervention strategies to be effective, they must be individualized to fit the children's unique needs, be implemented consistently, and continue until children have internalized the strategies (Rajwan, Chacko, Moeller, & Roberts, 2012); however, it is evident that barriers, such as lack of consistency and fidelity to the program, exist that prevent such implementation from occurring (Parker, Wales, Chalhoub, & Harpin, 2013).

Therefore, the research directive has now turned to investigating contextual factors that are present within a child's life that have the potential to influence change and provide a more comprehensive approach to intervention for children with ADHD (DuPaul & Jimerson, 2014). One such directive that has shown promise in the literature is the influence of the student-teacher relationship.

Student-teacher relationship.

Relatively recent research has suggested that the student-teacher relationship is similar to the parent-child relationship, and has a strong impact on a child's academic and social development (Zhang, 2011). However, far less attention has been given to the significance of the student-teacher relationship within the literature compared to the parent-child relationship, and as such, our understanding of this relationship is limited. Nonetheless, the growing literature on the student-teacher relationship has identified some promising results. Specifically, researchers have

indicated that children who feel close and supported by their teachers tend to feel more secure and motivated within the classroom (Toste, Heath, & Dallaire, 2010). Furthermore, previous studies have revealed that positive student-teacher relationships, characterized by trust, open communication, and warmth, are associated with enhancements in academic performance and achievement (Crosnoe, Johnson, & Elder, 2004), improvements in peer relationships (Hughes & Kwok, 2006; Zhang, & Nurmi, 2012), and reductions in externalizing behaviors (Silver, Measelle, Armstrong, & Essex, 2010). Many experts have further proposed that the student-teacher relationship is a strong protective factor for children who are at risk of academic failure and underachievement due to academic and behavioral difficulties, such as those with ADHD (Baker, 2006; Hamre & Pianta, 2001; Pianta, & Stuhlman, 2004). Unfortunately, these at-risk children frequently have less adaptive student-teacher relationships compared to their typically developing peers (Murray & Zvoch, 2011), which has been predictive of long-term negative academic and behavioral consequences (Hamre & Pianta, 2001). However, it appears that children with similar difficulties who report supportive and trusting relationships with their teachers are no longer at risk for developing less close and maladaptive relationships with their teachers and peers later on (Buyse, Verschueren, Doumen, Van Damme, & Maes, 2008). This area of research suggests that positive and close student-teacher relationships are particularly protective and beneficial for children who are at-risk of negative academic outcomes due to behavioral/emotional difficulties.

Although it has been established that the student-teacher relationship is a protective factor for at-risk children, recent research suggests that the vast majority of children who struggle in the classroom due to ADHD symptoms, such as inattention, hyperactivity, and impulsivity, do not have positive relationships with their teachers (Kos, 2008; Ohan, Visser, Strain, & Allen, 2011).

Children with high levels of ADHD symptomology report feeling less relatedness to their teacher, less supported, and less competent in the classroom compared to their peers with lower levels of ADHD symptomology (Rogers & Tannock, 2013). Similarly, an investigation of the classroom working alliance, which involves the emotional connection (i.e., bond) and the working relationship (i.e., collaboration) between student and teacher, revealed that children with higher ADHD symptomology reported lower scores on both their bond and collaborative relationship with their teacher compared to peers with lower ADHD symptomology (Rogers, Bélanger-Lejarsa, Toste, & Heath, 2015). Importantly, a positive student-teacher relationship for children with high levels of symptomology was predictive of increased academic motivation, which provides further evidence of the protective qualities that this relationship can have for children at risk of poor academic outcomes.

The role of family-school communication/relationship.

According to developmental systems theory, multiple systems in a child's environment and the interplay between these systems contribute to children's development (Bronfenbrenner, 1979; Pianta & Walsh, 1996). In particular, research has suggested that consistent and collaborative interactions between teachers and parents enhance children's academic, social and emotional functioning (Adams & Christenson, 2000; Mautone, Lefler, & Power, 2011; Minke, 2006; Sheridan, Bovaird, Glover, Garbacz, Witte, & Kwon, 2012). Sheridan, Kratochwill, and Burt (2008) emphasize the importance of fostering positive and constructive relationships between school and families for the purposes of utilizing resources and developing mutual goals to maximize academic success for the child. In fact, the authors indicate that positive collaboration between family and school is a priority for the development of the child.

Furthermore, the family-school relationship and parents' involvement in educational activities are found to be predictive of student academic performance and achievement (Adams & Christenson, 2000; Dearing, Kreider, Simpkins, & Weiss, 2006; Power, Dombrowski, Watkins, Mautone, & Eagle, 2007; Fan & Williams, 2010), which is particularly crucial for children with ADHD (Mautone, Marcelle, Tresco, & Power, 2015). Interventions that utilize family-school collaboration (i.e., daily report cards) and target the family-school relationship (i.e., Family School Success; Conjoint Behavioral Consultation) have shown considerable effectiveness in improving academic outcomes and reducing behavioral difficulties associated with ADHD (Power et al., 2012; Richardson et al., 2015; Hogue & Bobek, 2016).

Unfortunately, it has been hypothesized that the interactions between parents and teachers for children with ADHD are conflictual and strained due to the increased challenges and difficulties of the children seen in the classroom by teachers (Mautone, Carson, & Power, 2014; Mautone, Marcelle, Tresco, & Power, 2015; Rogers, Wiener, Marton, & Tannock, 2009; Gwernan-Jones et al., 2015). As such, families of children with the disorder may have more difficulty supporting their child's education compared to families of children without, which may lead to poor academic achievement and engagement. Furthermore, parents and teachers of children with ADHD may have increased contact/communication as a result of the child's increased difficulties within the classroom; however, this is not to say that the quality of the communication is beneficial or productive. As such, the present studies aims to differentiate between parental involvement in school (i.e., involvement in school-based activities, home-school communication) and the parent-teacher relationship quality (i.e., quality of the relationship itself, as well as interactions between the parties) as a means of investigating the concepts individually.

Overall, although the link between family-school relationships/communications and child academic outcomes has been established, less is known about the influence of the family-school relationship on social outcomes, such as the quality of the student-teacher relationship.

Therefore, given the significant influence that parental involvement in learning has on students in general, the present study aimed to investigate the impact of parental involvement and family-school interactions on the student-teacher relationship quality for children with ADHD. These children are already susceptible to a variety of environmental stressors that impede academic and social success, therefore, it is crucial that we identify and target areas such as parental involvement in education and the student-teacher relationship that could potentially have a positive impact and reduce the onslaught of negative outcomes for children with ADHD.

Study Objectives

The purpose of the study was to investigate the influence of parental involvement and parent-teacher interactions on the student-teacher relationship for school-aged children with clinical diagnoses of ADHD. Specifically, the following research questions were of primary focus: 1) What is the impact of the parent-teacher relationship on the student-teacher relationship quality for children with ADHD versus children without the disorder?; and 2) Does parental involvement in school and education mediate the relationship between ADHD symptomology and the student-teacher relationship quality for children exhibiting ADHD symptomology?

Based on previous research, the following hypotheses were made: 1) The first hypothesis stated that children with a diagnosis of ADHD would have increased student-teacher conflict and poor parent-teacher relationships; and 2) the second hypothesis predicted that parental involvement in school would negatively mediate the relationship between child ADHD symptoms and the student-teacher relationship quality.

Method

Participants.

There was a total of 113 children (63 boys, 50 girls) between the ages of 6 and 13 years ($M = 9.6$, $SD = 1.9$) and 113 parents/caregivers who participated in the study. Based on qualitative parent reports of a previous ADHD diagnosis, as well as corroborating support of T-scores above 60 on the Conners 3 Parent and Teacher rating scales (either or both the hyperactivity/impulsivity and inattention subscales), 55 (48.7%) children had a clinical diagnosis of ADHD, 55 (48.7%) children were considered part of the community sample (no diagnosis), and 3 (2.7%) parents did not report whether their child had a diagnosis (evaluation of Conners 3 T-scores revealed <60 on both subscales of interest, and as such, they were subsequently considered part of the community sample). Of the parents who participated, 77 (87%) were biological mothers of the children, 9 (8%) were biological fathers, 12 (10.6%) were step-fathers, 2 (1.8%) were grandmothers, 1 (.9%) was a grandfather, and 2 (1.8%) did not report their relationship with the participating child.

Additionally, 76 (67.3%) teachers of the 113 participating children also participated in the study. Of the teachers who participated, 40 (52.6%) of the corresponding children had a diagnosis of ADHD, and 36 (47.4%) did not have ADHD. The teachers were between the ages of 27 and 69 years; 60 (78.9%) were female and 16 (21.1%) were male. Their experience in the teaching field ranged from 2 to 31 years. Forty-two teachers (55.3%) reported receiving some information pertaining to ADHD in their training, whereas 9 (11.8%) reported no training, and 8 (10.5%) reported extensive training pertaining to ADHD.

Study design.

The current study employed a cross-sectional between subjects design. Parents and teachers completed a series of questionnaires assessing their individual perspectives and personal characteristics that potentially served as mediating variables to the relationship between ADHD and the student-teacher relationship quality.

Measures.

Child ADHD symptoms.

Children's ADHD symptomology was measured using the Conner's 3rd Edition Parent and Teacher Rating Scales (Conners, 2008), which is used as a screening measure for ADHD in children between the ages of 6 and 18. The parent form contains 110 items, whereas the teacher form contains 115 items. Parents and teachers rate the child's symptoms on a 4- point Likert scale, ranging from 0 (*not at all present*) to 3 (*very much present*). Raw scores are converted into T-scores ($M = 50$, $SD = 10$), which are interpreted as being of concern when the T-score is above 60. This measure has very good test-retest reliability and internal consistency, with coefficients ranging from .77 to .97 (Kao & Thomas, 2010).

Parent involvement.

The Family Involvement Questionnaire (Appendix B; FIQ; Fantuzzo, Tighe, & Childs, 2000) was used to assess parents' involvement in their child's education. On a 4-point Likert scale, primary caregivers rate the extent of their involvement in their child's education from *Rarely* to *Always*. The scale is composed of 42 items, which comprises three subscales: School-based involvement, home-based involvement, and home-school conferencing (Cronbach's $r = .85$, $.85$, and $.81$, respectively); however, only the school-based involvement and home-school conferencing dimensions were used in this study. The school-based involvement subscale consists of 12 items, and assesses activities and behaviors that caregivers demonstrate within

the school setting to benefit their children. Example items include “I volunteer in my child’s classroom” and “I participate in parent and family social activities with the teacher”. The home-school conferencing subscale consists of 11 items and evaluates communication between parents and teachers regarding the child’s education; the term *home-school communication* will be used hereinafter to refer to home-school communication. Example items include “I talk to my child’s teacher about his/her difficulties in school” and “The teacher and I write notes about my child or school activities”. Concurrent validity was established between the FIQ and parent reports who participated in Head Start (Fantuzzo, Lamb-Parker, Watson, & Christenson, 1999).

Parent-teacher relationship.

The Parent-Teacher Relationship Scale (Appendix D; PTRS; Vickers & Minke, 1995) was developed to assess the quality of the parent-teacher relationship. Parent and teacher versions exist; however, only parent reports were used in the present study. The scale consists of 24 items, which respondents are required to indicate on a 5-point scale, ranging from 1 (*almost never*) to 5 (*almost always*), the degree to which they agree with the item. Responses are summed to create an overall score reflecting the parent-teacher relationship. Additionally, there are two subscales that evaluate the quality of the parent-teacher relationship: Joining and communication to other. Higher scores on the joining subscale indicate greater perceptions of affiliation and support, and shared expectations and beliefs in the parent-teacher relationship. Higher scores on the communication to other subscale indicate more sharing of emotions and information in the relationship.

Student-teacher relationship.

The Student-Teacher Relationship Scale- Long form (Appendix E; STRS-LF; Pianta, 2001) was used to assess the quality of the student-teacher relationship on two of the three scales:

Closeness and conflict. The measure is completed by teachers or childcare providers and consists of 28 items, with 12 items addressing student-teacher conflict and 11 items addressing student-teacher closeness. Teacher-rated items for conflict include “this child and I always seem to be struggling with each other” and “this child is sneaky or manipulative with me”. Teacher-rated items for closeness include “I share an affectionate, warm relationship with this child” and “this child values his/her relationship with me”. On a 5-point Likert scale ranging from 1 (*definitely does not apply*) to 5 (*definitely applies*), teachers report on their relationship with the child of interest. This scale has been shown to have adequate reliability and validity as a measure of student-teacher relationship quality (Tsigilis & Gregoriadis, 2008).

Demographics.

Child, parent, and teacher demographic information was collected, and included age, gender, and health status of all participants. Information was collected regarding family income, number of children, parental marital status, education, and occupation.

Procedure.

Recruitment for this study was facilitated through poster advertisements and email/telephone communications to a variety of community agencies, including pediatrician offices, libraries, community centres, and university settings, as well as postings to online parent forums and social media pages. Advertisements explicitly reflected the need for both children who had been diagnosed with ADHD, as well as typically developing children.

Inclusion and exclusion criteria.

All parents of children with and without ADHD between the ages of 6 and 13 were eligible for participation in this study, provided that they were proficient in English or French and did not have a diagnosis of a developmental delay or other disability that may prevent testing. Children

were also eligible if they had diagnoses of comorbid psychiatric disorders that commonly occur with ADHD. These included: oppositional defiant, conduct, elimination, transient tic, major depressive disorder, and anxiety disorders (except panic, obsessive compulsive and anxiety disorders related to a medical condition or substance abuse). However, children with a diagnosis of a psychiatric disorder other than those previously listed, and those with secondary ADHD following a head injury or medical condition affecting brain development were excluded from participation.

Last, participating teachers were required to be a teacher of a child who participated in the study and were also required to be proficient in English or French.

Families who responded to community recruitment advertisements were invited to the laboratory at the University of Ottawa to participate in the study. Each family came in to the laboratory separately. Upon arrival, families were informed about the study's goals and procedures. Informed consent, as well as consent to contact teachers was ascertained from parents and assent to participate was attained from the child. The order in which questionnaire measures were completed was counterbalanced.

Teachers were contacted by telephone or email and provided with a brief explanation of the study, and they were also sent an information letter outlining the details of the study through email. Teachers who agreed to participate were sent a password-protected electronic link to a battery of questionnaires. Upon completion of the measures, the teachers were sent an electronic gift certificate to Chapters/Indigo for \$20.00 as compensation for their time and participation.

Statistical Analyses

The preliminary analyses included an examination of the descriptive statistics for all of the relevant variables: Demographic variables, parent reports of child ADHD symptomology

(inattention and hyperactivity/impulsivity), parent reports of the parent-teacher relationship quality, parent reports of school involvement (school-based involvement and home-school communication), and teacher reports of the student-teacher relationship constructs (closeness and conflict).

Research question one. *What is the impact of the parent-teacher relationship on the student-teacher relationship quality for children with ADHD versus children without the disorder?*

Two regression models were used to answer the first research question (Berenson, Levine, & Goldstein, 1983). The regression coefficients between the ADHD group and the community sample group were compared for each outcome variable (conflict and closeness). A dichotomous variable was created to identify the children with a diagnosis of ADHD (1= yes, 0=no), which was multiplied by the predictors in the equation (parent-teacher relationship quality variables: Joining and communication to other) and resulted in an interaction term. The significance of the interaction determined the differences between the ADHD and non-ADHD groups for each outcome variable.

Research question two. *Does parental involvement in school and education mediate the relationship between ADHD symptomology and the student-teacher relationship quality for children exhibiting ADHD symptomology?*

School-based involvement and home-school communication were tested as mediators between the parent-reported child ADHD symptomology constructs (inattention, hyperactivity/impulsivity) and the teacher-reported student-teacher relationship constructs.

Results

An examination of the skewness and kurtosis indices indicated that all variables of interest were normally distributed (between 1/-1 skewness; Bulmer, 1979). Multicollinearity was assessed using calculated Variance Inflation Factor (VIF) and Tolerance statistics (Jaccard, Guilamo-ramos, Johansson, & Bouris, 2006). VIF cut-offs of greater than three and tolerance cut-off values of less than .2 were used to determine if there could be a problem of linear relationships among the predictor variables (Tabachnick & Fidell, 2007). The analysis revealed tolerance scores greater than .2 and VIF scores of less than 3 for the majority of the predictor variables; however, the VIF score for ADHD status, as well as the interaction terms, ADHD status*joining and ADHD status*communication to other, were significantly greater than 3 (>50), suggesting that these variables are highly correlated and that multicollinearity is violated. This was not a surprising finding, as the interaction terms were derived from the ADHD status variable. Nonetheless, the violation of multicollinearity is acknowledged as a limitation of the study.

Descriptive statistics and Pearson correlation coefficients for the relationships between demographic variables and relevant study variables can be found in Table 2.

Research question one. *What is the impact of the parent-teacher relationship on the student-teacher relationship quality for children with ADHD versus children without the disorder?*

The results of the regression using conflict as the criterion variable indicated the three predictors/main effects (ADHD status, joining, communication to other) explained 18.8% of the variance ($R^2 = .19$, $F(3, 73) = 5.33$, $p < .01$). Adding the two interaction terms (ADHD status X joining; ADHD status X communication to other) increased the variance accounted for by 1.6% ($R^2 = .02$, $F(2, 71) = .69$, n.s). It was found that ADHD status significantly predicted student-

teacher conflict ($\beta = .30, p = .01$), and all other variables were non-significant. These findings indicated that adding the interaction effects did not significantly account for variance above and beyond the main effects, which therefore means that there were no differential effects across the ADHD and non-ADHD groups in relation to the parent-teacher relationship quality.

The results of the regression using closeness as the criterion variable revealed non-significant findings, which was not surprising given the absence of significant linear correlations among the predictors and criterion variable. Specifically, the three predictors/main effects (ADHD status, joining, communication to other) explained 3.7% of the variance ($R^2 = .037, F(3, 73) = .88, n.s$), and adding the two interaction terms (ADHD status X joining; ADHD status X communication to other) increased the variance accounted for by 2.1% ($R^2 = .02, F(2, 71) = .76, n.s$). These findings indicated that the main predictors or the interaction do not significantly correlate with student-teacher closeness, and therefore do not account for significant variance in the regression model. As such, there were no differential effects across the ADHD and non-ADHD group when using student-teacher closeness as the criterion variable.

Research question two. *Does parental involvement in school and education mediate the relationship between ADHD symptomology and the student-teacher relationship quality for children exhibiting ADHD symptomology?*

Home-school communication and school-based involvement were tested as mediators by calculating bias-corrected 95% confidence intervals (CIs) using bootstrapping with 5000 resamples (Preacher & Hayes, 2004; Preacher & Hayes 2008) via the Process procedure for SPSS (v3.3), conceptual model 6 (Hayes, 2017). Age and gender were controlled for in all models.

First, it was found that the standardized regression coefficient between inattention and student-teacher conflict in the school-aged sample was statistically significant (path c; $\beta = .31$, $t(66) = 5.32$, $p < .001$). Further, the standardized regression coefficient between inattention and home-school communication was also statistically significant (path a_1 ; $\beta = .40$, $t(66) = 3.75$, $p < .001$), but the coefficient between inattention and school-based involvement was non-significant (path a_2 ; $\beta = .02$, $t(66) = .13$, $p = .89$). Lastly, the results indicated that the mediator, home-school communication, was positively associated with student-teacher conflict (path b_1 ; $\beta = .37$, $t(66) = 3.39$, $p < .001$), whereas school-based involvement was non-significant (path b_2 ; $\beta = .08$, $t(66) = .76$, $p = .45$). Evaluation of the indirect effects confirmed the mediating role of home-school communication ($a_1b_1 = .15$, 95% CIs [.03, .28]). Therefore, these results indicate that home-school communication does in fact positively mediate the relationship between inattention and student-teacher conflict in a school-aged sample, whereas school-based involvement does not. See Figure 5 for a visual representation of the mediation model.

The second mediation analyses simply substituted the dependent variable with student-teacher closeness, and as such paths a_1 and a_2 were the same as the previous mediation model (path a_1 ; $\beta = .40$, $t(66) = 3.75$, $p < .001$; path a_2 ; $\beta = .02$, $t(66) = .13$, $p = .89$). It was found that the standardized regression coefficient between inattention and student-teacher closeness in a school-aged sample was not statistically significant (path c; $\beta = .01$, $t(66) = .28$, $p = .78$). Further, the results indicated that the mediator, home-school communication, was not significantly associated with student-teacher closeness (path b_1 ; $\beta = -.13$, $t(66) = -.90$, $p = .37$), as was school-based involvement (path b_2 ; $\beta = -.03$, $t(66) = -.25$, $p = .80$). Therefore, these results indicate that a mediation model is not supported for neither home-school communication nor school-based involvement. See Figure 6 for a visual representation of the mediation model.

The third mediation analyses investigated home-school communication and school-based involvement as mediators between child hyperactivity/impulsivity symptoms and student-teacher conflict. First, it was found that the standardized regression coefficient between hyperactivity/impulsivity and student-teacher conflict in the school-aged sample without controlling for the mediators was statistically significant (path c; $\beta = .31$, $t(66) = 5.07$, $p < .001$). Further, the standardized regression coefficient between hyperactivity/impulsivity and home-school communication was also statistically significant (path a₁; $\beta = .35$, $t(66) = 3.12$, $p < .001$), but the coefficient between hyperactivity/impulsivity and school-based involvement was non-significant (path a₂; $\beta = .05$, $t(66) = .39$, $p = .70$). Lastly, the results indicated that the mediator, home-school communication, was positively associated with student-teacher conflict (path b₁; $\beta = .40$, $t(66) = 3.76$, $p < .001$), whereas school-based involvement was non-significant (path b₂; $\beta = .05$, $t(66) = .56$, $p = .58$). Evaluation of the indirect effects confirmed the mediating role of home-school communication ($a_1b_1 = .14$, 95% CIs [.03, .25]). Therefore, these results indicate that home-school communication does in fact positively mediate the relationship between hyperactivity/impulsivity and student-teacher conflict in a school-aged sample, whereas school-based involvement does not. See Figure 7 for a visual representation of the mediation model.

Finally, the fourth mediation analyses simply substituted the dependent variable with student-teacher closeness, and as such paths a₁ and a₂ were the same as the third mediation analyses (path a₁; $\beta = .35$, $t(66) = 3.12$, $p < .001$; path a₂; $\beta = .05$, $t(66) = .39$, $p = .70$). It was found that the standardized regression coefficient between hyperactivity/impulsivity and student-teacher closeness was not statistically significant (path c; $\beta = -.03$, $t(66) = -.57$, $p = .57$). Further, the results indicated that neither mediators were significantly associated with student-teacher closeness (path b₁; $\beta = -.07$, $t(66) = -.53$, $p = .59$; path b₂; $\beta = -.04$, $t(66) = -.34$, $p = .73$).

Therefore, these results indicate that a mediation model is not supported for neither home-school communication nor school-based involvement. See Figure 8 for a visual representation of the mediation model.

The overall results of this study indicate that there are no significant differences of the parent-teacher relationship for children with ADHD versus those without the disorder. Additionally, the results of the second research question revealed that home-school communication positively mediates the relationship between ADHD symptoms (both inattention and hyperactivity/impulsivity) and student-teacher conflict for school-aged children.

Discussion

The present study had two primary goals: 1) comparing the influence of the parent-teacher relationship quality on the student-teacher relationship quality for children with ADHD versus their typically developing peers; and 2) establishing the mediating role of parent involvement in school on the relationship between school-aged children's ADHD symptomology and the student-teacher relationship quality. The results of this study in the context of existing literature will be discussed in detail below.

Previous research suggests that the parent-teacher relationship can be characteristically different for parents of children with ADHD, which is hypothesized due to the parent-teacher interactions often involving negative feedback pertaining to the child's behavior or progress (Mautone, Marcelle, Tresco, & Power, 2015). Additionally, the parent-teacher relationship quality seems to hold influential properties on children's academic achievements in general (Adams & Christenson, 2000; Dearing, Kreider, Simpkins, & Weiss, 2006; Power, Dombrowski, Watkins, Mautone, & Eagle, 2007; Fan & Williams, 2010); however, when comparing the influence of the parent-teacher relationship quality on the student-teacher relationship quality in

the present study, no significant differences were found between the children diagnosed with ADHD and their typically developing peers. Despite these findings, a significant positive main effect of ADHD status on student-teacher conflict was identified, meaning that children diagnosed with ADHD had significantly more conflict with their teachers than their typically developing peers, which is consistent with the existing research (Kos, 2008; Ohan, Visser, Strain, & Allen, 2011; Rogers & Tannock, 2013). The present study did not differentiate ADHD presentations, but hyperactivity/impulsivity symptoms and inattentive symptoms have both been correlated with increased student-teacher conflict in the classroom. Interestingly, there were no significant differences of student-teacher closeness between the groups. Future research should aim to investigate the student-teacher relationship quality while differentiating between ADHD presentations in a clinical population.

In terms of the investigation of the mediating role of parental involvement in school, mixed findings were identified. Specifically, home-school communication positively mediates the relationship between ADHD symptoms and student-teacher conflict, whereas school-based involvement does not. The home-school communication subscale taps into the quality and frequency of parent-teacher communications regarding the child's education, whereas, the school-based involvement subscale evaluates parent-level involvement in the school or classroom (i.e., volunteering in the class or school). The directionality of the mediation model using home-school communication was unexpected, as it was hypothesized that the relationship would be negatively associated; however, upon reflection, the association is not completely surprising within the context of the school system. Specifically, increased disruptive behaviors and inattentiveness leads to increased conflict with teachers, which subsequently prompts more communication with parents. To rephrase, when a child is developing typically and does not

cause issues within the classroom, less frequent communication occurs between parent and teacher; whereas, children who struggle within the classroom, especially due to behavioral challenges, necessitates increased communication between parents and the teacher.

Overall, the results of the study suggest that home-school communication significantly explains at least some of the variance between child ADHD symptoms and student-teacher conflict. Given that the ADHD symptomology variables remained significant predictors when including home-school communication as a mediator, it is likely that the ADHD symptomology variables are strong predictors of student-teacher conflict.

To conclude, the results of the present study indicate that the parent-teacher relationship quality does not significantly differ between children with ADHD compared to their typically developing counterparts, and home-school communication appears to be a significant mediator between ADHD symptomology and student-teacher conflict.

Barriers & Limitations

Although the proposed study was designed to minimize threats to validity, there are barriers and limitations that warrant discussion. Primarily, the non-experimental nature of the study prevents inferences about causality. Results from this study established specific relationships between ADHD symptomology, the parent-teacher relationship, and the student-teacher relationship, but experimental studies to establish temporal precedence and causality will be needed in the future.

Importantly, the recruitment method may have lent itself to biased results, which should be addressed in future research. Specifically, the clinical sample of children diagnosed with ADHD was recruited through posters and online advertisements in the community and required parents to initiate contact and follow through with participation. Recruitment through an outpatient clinic

at the local hospital was attempted; however, no families followed through with participation. As such, the sample obtained may not be representative of all families of children with ADHD. Similarly, the teachers who chose to participate in the study may be characteristically different than those who did not, including the quality of relationships they had with the parents and the students. To attempt to control for these limitations, it is recommended that future research exploring other recruitment avenues with both families and teachers be conducted to obtain representative samples.

Chapter Four: Investigating the impact of teacher-level factors on the student-teacher relationship for children with ADHD

Abstract

The student-teacher relationship has been identified as a critical contributor to children's academic, social, and emotional development (Ewe, 2019), and has been shown to serve as a protective factor for children with ADHD (Hamre & Pianta, 2001); however, little is known about the influential variables possibly contributing to the student-teacher relationship quality. As such, the primary focus of this study evaluated teacher-level variables as possible contributors to the student-teacher relationship. A between subjects cross-sectional design was employed evaluating the contribution of teacher-level characteristics (e.g., Teacher stress, self-efficacy, and knowledge of ADHD) on the student-teacher relationship for children with and without clinical diagnoses of ADHD (n=76). Significant main findings revealed that teacher stress significantly mediated the relationship between children's ADHD symptoms and student-teacher conflict, whereas teacher efficacy and knowledge of ADHD did not. Implications and future directions are discussed.

Introduction

The behavioral difficulties, emotion-regulation challenges, and characteristic symptoms of ADHD, such as hyperactivity, impulsivity, inattention, and distractibility have been associated with a multitude of negative long-term outcomes and consequences for children with the disorder. Specifically, within the education domain, the research has indicated that children with ADHD are at-risk of challenges with peers and teachers, avoidance, academic underachievement, and school drop-out, which can be predictive of a variety of future obstacles such as difficulties with job retention and relational problems. As such, substantial attention has been given to identify prevention and intervention strategies for children with the disorder to avoid the aforementioned obstacles. More recently, the research directive has now turned to investigating contextual factors that are present within a child's life that have the potential to influence change and provide a more comprehensive approach to intervention for children with ADHD (DuPaul & Jimerson, 2014). One such directive that has shown promise in the literature is the influence of the student-teacher relationship; however, this relationship tends to be negative and conflictual for children with ADHD (Murray & Zvoch, 2011). As such, identifying influential variables, such as teacher-level characteristics, is crucial for understanding the complexities of the student-teacher relationship, and for any hope of improving the quality of this relationship for at-risk children.

Student-teacher relationship.

Researchers have suggested that the student-teacher relationship is a crucial component of a child's academic and social development (Zhang, 2011). In particular, previous research has indicated that positive student-teacher relationships are associated with improvements in academic performance and achievement (Crosnoe, Johnson, & Elder, 2004), more positive social

interactions and relationships (Hughes & Kwok, 2006; Zhang, & Nurmi, 2012), as well as reductions in externalizing behaviors (Silver, Measelle, Armstrong, & Essex, 2010). Further evidence suggests that the student-teacher relationship may be of even higher importance and serve as a protective factor for children who are at risk of academic failure and underachievement due to academic and behavioral difficulties, such as those with ADHD (Baker, 2006; Hamre & Pianta, 2001; Pianta, & Stuhlman, 2004). However, children with such challenges have been found to have less adaptive student-teacher relationships, laden with conflict and mistrust (Murray & Zvoch, 2011). Furthermore, teachers report that managing students with ADHD in their classroom is difficult (Kos, 2008), that ADHD-related symptoms negatively impact the classroom and relationships (Ohan, Visser, Strain, & Allen, 2011), and that teachers themselves experience increased stress and decreased confidence when managing the behaviors of students with ADHD in their classrooms (Ohan, Visser, Strain, & Allen, 2011). Additionally, children with high levels of ADHD symptomology report feeling less relatedness to their teacher, less supported, and less competent in the classroom compared to their peers with lower levels of ADHD symptomology (Rogers & Tannock, 2013). However, a positive student-teacher relationship for children with high levels of symptomology has been shown to be predictive of increased academic motivation, which provides further evidence of the protective qualities that this relationship can have for children who are at risk of poor academic outcomes (Rogers, Bélanger-Lejarsa, Toste, & Heath, 2015).

Despite promising findings identifying the student-teacher relationship as protective and potentially preventative for at-risk children, there are a variety of confounding and influential variables that require consideration. In particular, and a primary focus of the present study, is the influence of teacher-level characteristics on the student-teacher relationship quality.

Teacher-level characteristics.

Much of the literature pertaining to individual-level influences on the student-teacher relationship has focused on the student; however, emerging research has unveiled the importance of teacher-level characteristics on a variety of other classroom-based prevention/intervention strategies. Specifically, teacher efficacy, teacher stress, and enhanced teacher knowledge appear to significantly impact classroom-based strategies and have shown promise in behavior change (Cook, Lyon, Kuberovic, Wright, & Zhang, 2015).

As previously mentioned, the literature indicates that teachers report feeling incompetent and inadequate in addressing the needs of students with ADHD in their classrooms (Reinke, Stormont, Herman, Puri, & Goel, 2011). Based on Bandura's (1977) theory of self-efficacy, he would suggest that feelings of incompetency relate to a lack of confidence and lowered sense of abilities, and therefore, teachers who feel incompetent would likely be subjected to a lowered sense of self-efficacy in their teaching abilities. Teacher efficacy is crucial for such tasks as delivering academic instructions, implementing evidence-based practices, and creating an adequate classroom environment that fosters learning (Pas, Bradshaw, Hersfeldt, 2012). Teacher efficacy has also been suggested to significantly impact teachers' emotions and cognitions (Pajares, 1997). With that in mind, negative emotional and cognitive states tend to impede social abilities and relationships (Lopes, Nezlek, Extremera, Hertel, Fernández-Berrocal, Schütz, & Salovey, 2011). Therefore, through this chain of thought, it would be realistic to conclude that low teacher efficacy has the potential to influence the student-teacher relationship quality; however, this hypothesis has yet to be tested within the research.

In addition, the amount of stress that a teacher experiences, either pertaining to their jobs in general or working with a particular student, has also shown to have a significant impact on

teachers' overall well-being, and subsequently, their ability to effectively execute their jobs. Similar to efficacy, teacher stress impacts teachers' cognitive abilities, emotional state, and social interactions (Cook, Lyon, Kubergovic, Wright, & Zhang, 2015). Furthermore, within the student-teacher relationship literature, previous research using typically developing children has indicated that teachers' experienced stress negatively predicts the student-teacher relationship quality (Yoon, 2002); but this correlation has not been explored for children with ADHD. We do know, however, that teachers rate students with ADHD as more challenging to teach (Greene, Beszterczey, Katzenstein, Park, & Goring, 2002), and that having a student with ADHD in the classroom appears to compound teachers' stress (Bell, Long, Garvan, & Bussing, 2011; Ohan, Visser, Strain, & Allen, 2011). In contrast, teachers' knowledge and understanding of ADHD shows promising protective benefits including reduction in students' ADHD symptoms and changes in attitudes towards students with ADHD (Ohan, Visser, Strain, & Allen, 2011; Froelich, Breuer, Doepfner, & Amonn, 2012); however, the direct impact of teachers' knowledge of the disorder on the quality of their relationships with the students is currently unknown.

Targeting teacher-level characteristics to improve student-teacher relationship.

To restate, the student-teacher relationship shows promise in being preventative of long-term consequences for children who are at-risk of poor academic achievement, school failure and drop-out, and other related ramifications, such as those with ADHD (Baker, 2006; Hamre & Pianta, 2001; Pianta, & Stuhlman, 2004). Unfortunately, due to the defining characteristics and symptoms of ADHD, the student-teacher relationship tends to be negative and conflictual for children exhibiting ADHD symptomology (Murray & Zvoch, 2011). As such, attention has been directed to other influential variables of the relationship, and strategies that serve to improve it. For example, the research has begun to unveil teacher-level characteristics as being influential in

other classroom-based prevention/intervention strategies (Cook, Lyon, Kubergovic, Wright, & Zhang, 2015). Specifically, teacher efficacy, stress, and knowledge/awareness of a particular issue have an impact on teachers' effectiveness in the classroom and program implementation. As such, the purpose of the present study is to explore the impact of these factors within the context of the student-teacher relationship for with and without ADHD. The research suggests that by mitigating teacher-level factors, such as teacher stress, schools can more effectively support teachers in their jobs, enhance overall well-being, improve implementation of school-based interventions, and also improve academic and social outcomes for students. As an extension, one would hypothesize that addressing the aforementioned factors would also facilitate positive change in teachers' relationships with their students as well.

Study Objectives

The purpose of this was to investigate the role of teacher characteristics on the student-teacher relationship for children with clinical diagnoses of ADHD. Specifically, the following research questions were asked: 1) How does teachers' stress impact the student-teacher relationship quality for children with clinical diagnoses of ADHD versus their typically developing peers?; 2) Does teachers' knowledge of ADHD act as a protective factor and positively mediate the relationship between ADHD symptomology and the student-teacher relationship?; and 3) Does teachers' sense of efficacy mediate the relationship between ADHD symptomology and the student-teacher relationship?

Based on previous research, the following hypotheses were made: 1) The first hypothesis stated that children with a diagnosis of ADHD would have increased student-teacher conflict, as well as increased teacher-reported stress; 2) the second hypothesis predicted that teachers' knowledge of ADHD would positively mediate the relationship between child ADHD symptoms

and the student-teacher relationship quality; and 3) the third hypothesis predicted that teachers' sense of efficacy would positively mediate the relationship between child ADHD symptoms and the student-teacher relationship quality.

This study will assist in enhancing our knowledge of teachers' contributions to the student-teacher relationship for children with ADHD, which will be valuable in identifying intervention strategies to improve the relationship by targeting teacher-level variables.

Method

Identical methods of Study 2 were also employed for Study 3; however, the variables of interest differed, as did the measures. For ease of readability, a replication of the information pertaining to the participants, study design, and procedure can be found in the following sections.

Participants.

There was a total of 113 children (63 boys, 50 girls) between the ages of 6 and 13 years ($M = 9.6$, $SD = 1.9$) and 113 parents/caregivers who participated in the study. Based on qualitative parent reports of a previous ADHD diagnosis, as well as corroborating support of T-scores above 60 on the Conners 3 Parent and Teacher rating scales (either or both the hyperactivity/impulsivity and inattention subscales), 55 (48.7%) children had a clinical diagnosis of ADHD, 55 (48.7%) children were considered part of the community sample (no diagnosis), and 3 (2.7%) parents did not report whether their child had a diagnosis (evaluation of Conners 3 T-scores revealed <60 on both subscales of interest, and as such, they were subsequently considered part of the community sample). Of the parents who participated, 77 (87%) were biological mothers of the children, 9 (8%) were biological fathers, 12 (10.6%) were step-fathers, 2 (1.8%) were grandmothers, 1 (.9%) was a grandfather, and 2 (1.8%) did not report their relationship with the participating child.

Additionally, 76 (67.3%) teachers of the 113 participating children also participated in the study. Of the teachers who participated, 40 (52.6%) of the corresponding had a diagnosis of ADHD, and 36 (47.4%) did not have ADHD. The teachers were between the ages of 27 and 69 years; 60 (78.9%) were female and 16 (21.1%) were male. Their experience in the teaching field ranged from 2 to 31 years. Forty-two teachers (55.3%) reported receiving some information pertaining to ADHD in their training, whereas 9 (11.8%) reported no training, and 8 (10.5%) reported extensive training pertaining to ADHD.

Study design.

The current study employed a cross-sectional between subjects design. Parents and teachers completed a series of questionnaires assessing their individual perspectives and personal characteristics that potentially served as mediating variables to the relationship between ADHD and the student-teacher relationship quality.

Measures.

Child ADHD symptoms.

Children's ADHD symptomology was measured using the Conner's 3rd Edition Parent and Teacher Rating Scales (Conners, 2008), which is used as a screening measure for ADHD in children between the ages of 6 and 18. The parent form contains 110 items, whereas the teacher form contains 115 items. Parents and teachers rate the child's symptoms on a 4- point Likert scale, ranging from 0 (*not at all present*) to 3 (*very much present*). Raw scores are converted into T-scores ($M = 50$, $SD = 10$), which are interpreted as being of concern when the T-score is above 60. This measure has very good test-retest reliability and internal consistency, with coefficients ranging from .77 to .97 (Kao & Thomas, 2010).

Teacher stress.

The Index of Teaching Stress (ITS; Greene, Abidin, & Kmetz, 1997) was designed to evaluate teachers' level of stress related to working with a specific student. The ITS generates a total score, and also assesses three domains: ADHD symptoms, student characteristics, and teacher characteristics. Further, each domain evaluates subscales within it. For example, the student characteristics subscale evaluates emotional lability of the student, learning limitations, aggressiveness, and anxiety. The ADHD subscale evaluates ADHD-specific symptoms. Finally, the teacher characteristics subscale evaluates teachers' perceptions related to loss of satisfaction, frustration working with the student's parents, sense of support, sense of competence, and disruption of the teaching process. The internal consistency of the total score and the subscales is high, with coefficients ranging from .75 to .97, and discriminant validity analyses using Bonferroni corrections revealed significant differences between behaviourally challenged children and comparison children. The questionnaire consists of 90 items, and takes approximately 25 minutes to complete. Given the exploratory nature of the current study, the total score was used for analyses.

Teacher knowledge of ADHD.

The ADHD Knowledge Survey (Appendix F; Martinussen, Tannock, McInnes, & Chaban, 2005) was originally developed as a component of the *TeachADHD: Teacher's Resource Manual* issued by the SickKids Hospital of Toronto, Ontario. It is a 20-item survey that was designed to assess teachers' knowledge of ADHD. The format is true/false response to statements about ADHD, including common myths.

Teachers' sense of efficacy.

The Teachers' Sense of Efficacy Scale- Short form (Appendix G; TSES; Tschannen-Moran, & Woolfolk Hoy, 2001) was used to assess teachers' sense of efficacy related to their teaching

abilities. The measure consists of 12 items, and respondents are required to indicate how much they believe they are capable of addressing each item on a 9-point Likert scale, ranging from (1) *Nothing* to (9) *A Great Deal*. An overall score is generated by summing the responses, as well as factor analysis has revealed three subscales of the TSES: Efficacy in student engagement, efficacy in classroom management, and efficacy in instructional strategies (Cronbach's $\alpha = .81, .86, \text{ and } .86$, respectively). For the purposes of the current study, the overall score was used.

Student-teacher relationship.

The Student-Teacher Relationship Scale- Long form (Appendix E; STRS-LF; Pianta, 2001) was used to assess the quality of the student-teacher relationship on two of the three scales: Closeness and conflict. The measure is completed by teachers or childcare providers and consists of 28 items, with 12 items addressing student-teacher conflict and 11 items addressing student-teacher closeness. Teacher-rated items for conflict include “this child and I always seem to be struggling with each other” and “this child is sneaky or manipulative with me”. Teacher-rated items for closeness include “I share an affectionate, warm relationship with this child” and “this child values his/her relationship with me”. On a 5-point Likert scale ranging from 1 (*definitely does not apply*) to 5 (*definitely applies*), teachers report on their relationship with the child of interest. This scale has been shown to have adequate reliability and validity as a measure of student-teacher relationship quality (Tsigilis & Gregoriadis, 2008).

Demographics.

Parent, child, and teacher demographic information was also collected.

Procedure.

Recruitment for this study was facilitated through poster advertisements and email/telephone communications to a variety of community agencies, including pediatrician offices, libraries, community centres, and university settings, as well as postings to online parent forums and social media pages. Advertisements explicitly reflected the need for both children who had been diagnosed with ADHD, as well as typically developing children.

Inclusion and exclusion criteria.

All parents of children with and without ADHD between the ages of 6 and 13 were eligible for participation in this study, provided that they were proficient in English or French and did not have a diagnosis of a developmental delay or other disability that may prevent testing. Children were also eligible if they had diagnoses of comorbid psychiatric disorders that commonly occur with ADHD. These included: oppositional defiant, conduct, elimination, transient tic, major depressive disorder, and anxiety disorders (except panic, obsessive compulsive and anxiety disorders related to a medical condition or substance abuse). However, children with a diagnosis of a psychiatric disorder other than those previously listed, and those with secondary ADHD following a head injury or medical condition affecting brain development were excluded from participation.

Last, participating teachers were required to be a teacher of a child who participated in the study and were also required to be proficient in English or French.

Families who responded to community recruitment advertisements were invited to the laboratory at the University of Ottawa to participate in the study. Each family came in to the laboratory separately. Upon arrival, families were informed about the study's goals and procedures. Informed consent, as well as consent to contact teachers was ascertained from

parents and assent to participate was attained from the child. The order in which parents and children completed questionnaire measures was counterbalanced.

Teachers were contacted by telephone or email and provided with a brief explanation of the study, and they were also sent an information letter outlining the details of the study through email. Teachers who agreed to participate were sent a password-protected electronic link to a battery of questionnaires. Upon completion of the measures, the teachers were sent an electronic gift certificate to Chapters/Indigo for \$20.00 as compensation for their time and participation.

Statistical Analyses

The preliminary analyses included an examination of the descriptive statistics for all the relevant variables: Gender, age, parent reports of ADHD symptomology (inattention and hyperactivity/impulsivity), teacher reported stress (total), teacher reported knowledge of ADHD, teacher reported overall sense of efficacy, and teacher reports of the student-teacher relationship constructs (closeness and conflict).

Research question one. *How does teachers' stress impact the student-teacher relationship quality for children with clinical diagnoses of ADHD versus their typically developing peers?*

Two regression models were used to answer the first research question (Berenson, Levine, & Goldstein, 1983). The regression coefficients between the ADHD group and the community sample group were compared for each outcome variable (conflict and closeness). A dichotomous variable was created to identify the children with a diagnosis of ADHD (1= yes, 0=no), which was multiplied by the predictor in the equation (teacher stress) and resulted in an interaction term. The significance of the interaction determined the differences between the ADHD and non-ADHD groups for each outcome variable.

Research question two. *Does teachers' knowledge of ADHD act as a protective factor and positively mediate the relationship between ADHD symptomology and the student-teacher relationship?*

Utilizing Hayes' Process Model for mediation (Hayes, 2017), multiple linear regression analyses were conducted on the parent-reported child ADHD symptomology constructs and the teacher-reported student-teacher relationship constructs, with teacher-reported ADHD knowledge as the mediator.

Research question three. *Does teachers' sense of efficacy mediate the relationship between ADHD symptomology and the student-teacher relationship?*

Hayes' Process Model for mediation (Hayes, 2017) was also used to answer the final research question. Multiple linear regression analyses were conducted on the parent-reported child ADHD symptomology constructs and the teacher-reported student-teacher relationship constructs, with teachers' overall sense of efficacy as the mediator. Further exploratory analysis investigated teachers' overall stress as a mediator between the ADHD symptomology constructs and student-teacher relationship constructs.

Results

An examination of the skewness and kurtosis indices indicated that two of the variables was found to violate the normality assumption ($>1/-1$ skewness; Bulmer, 1979). Specifically, teacher stress was positively skewed, whereas teacher efficacy was negatively skewed. As a result, a logarithmic transformation was conducted on the positively skewed variable, and a reflection and logarithmic transformation was conducted on the negatively skewed variable, which was successful in significantly changing the distribution of both variables.

Multicollinearity was assessed using calculated Variance Inflation Factor (VIF) and Tolerance statistics (Jaccard, Guilamo-ramos, Johansson, & Bouris, 2006). VIF cut-offs of greater than three and tolerance cut-off values of less than .2 were used to determine if there could be a problem of linear relationships among the predictor variables (Tabachnick & Fidell, 2007). The analysis revealed tolerance scores greater than .2 and VIF scores of less than 3 for the majority of the predictor variables; however, the VIF score for ADHD status, as well as the interaction term, ADHD status*teacher stress were significantly greater than 3 (>50), suggesting that these variables are highly correlated and that multicollinearity is violated. This was not a surprising finding, as the interaction terms were derived from the ADHD status variable. Nonetheless, the violation of multicollinearity is acknowledged as a limitation of the study.

Descriptive statistics and Pearson correlation coefficients for the relationships between all relevant variables can be found in Table 3.

Research question one. *How does teachers' stress impact the student-teacher relationship quality for children with clinical diagnoses of ADHD versus their typically developing peers?*

The results of the regression using conflict as the criterion variable indicated the two predictors/main effects (ADHD status, teacher stress) explained 49% of the variance ($R^2 = .49$, $F(2, 66) = 25.96$, $p < .001$). Adding the interaction term (ADHD status X teacher stress) increased the variance accounted for by 0.2% ($R^2 = .002$, $F(1, 67) = .03$, $p = .87$). It was found that teacher stress significantly predicted student-teacher conflict ($\beta = .65$, $p < .001$); however, ADHD status was a non-significant predictor of student-teacher conflict ($\beta = .13$, $p = .21$). These findings revealed that adding the interaction effect did not significantly account for variance above and beyond the main effects, which therefore means that there were no differential effects across the ADHD and non-ADHD groups in relation to overall teacher stress.

The results of the regression using closeness as the criterion variable revealed non-significant findings, which was not surprising given the absence of significant linear correlations among the predictors and criterion variable. Specifically, the two predictors/main effects (ADHD status, teacher stress) explained 2.4% of the variance ($R^2 = .024$, $F(2, 66) = .67$, $p = .51$), and adding the interaction term (ADHD status X teacher stress) increased the variance accounted for by 2.6% ($R^2 = .026$, $F(1, 67) = .09$, $p = .76$). These findings revealed that the main predictors or the interaction did not significantly correlate with student-teacher closeness, and therefore did not account for significant variance in the regression model. As such, there were no differential effects across the ADHD and non-ADHD group when using student-teacher closeness as the criterion variable.

Research question two. *Does teachers' knowledge of ADHD act as a protective factor and positively mediate the relationship between ADHD symptomology and the student-teacher relationship?*

Teacher knowledge of ADHD was tested as a mediator by calculating bias-corrected 95% confidence intervals (CIs) using bootstrapping with 5000 resamples (Preacher & Hayes, 2004; Preacher & Hayes 2008) via the Process procedure for SPSS (v3.3), conceptual model 4 (Hayes, 2017). Age and gender were controlled for in all models.

First, it was found that the standardized regression coefficient between inattention and student-teacher conflict in the school-aged sample was statistically significant (path c; $\beta = .31$, $t(66) = 5.32$, $p < .001$). Further, the standardized regression coefficient between inattention and teacher ADHD knowledge was non-significant (path a; $\beta = .21$, $t(66) = 1.82$, $p = .07$), as was the coefficient between teacher ADHD knowledge and student-teacher conflict (path b; $\beta = .04$, t

(66) = .41, $p = .68$). Therefore, these results indicate that a mediation model is not supported. See Figure 9 for a visual representation of the model.

The second mediation analysis substituted the dependent variable with student-teacher closeness, and as such path a was the same as the previous analyses ($\beta = .21$, $t(66) = .21$, $p = .07$). It was found that the standardized regression coefficient between inattention and student-teacher closeness was non-significant (path c; $\beta = .01$, $t(66) = .28$, $p = .78$), as was the coefficient between teacher ADHD knowledge and student-teacher closeness (path b; $\beta = .04$, $t(66) = .41$, $p = .68$). Therefore, these results indicate that a mediation model is not supported. See Figure 10 for a visual representation of the model.

The third mediation analysis investigated teacher ADHD knowledge as a mediator between child hyperactivity/impulsivity symptoms and student-teacher conflict. First, it was found that the standardized regression coefficient between hyperactivity/impulsivity and student-teacher conflict in the school-aged sample without controlling for the mediators was statistically significant (path c; $\beta = .31$, $t(66) = 5.07$, $p < .001$). Further, the standardized regression coefficient between hyperactivity/impulsivity and teacher ADHD knowledge was non-significant (path a; $\beta = .11$, $t(66) = .94$, $p = .35$), as was the coefficient between teacher ADHD knowledge and student-teacher conflict (path b; $\beta = .11$, $t(66) = .99$, $p = .32$). Therefore, these results indicate that a mediation model is not supported. See Figure 11 for a visual representation of the model.

The fourth mediation analysis substituted the dependent variable with student-teacher closeness, and as such path a was the same as the previous analyses (path a; $\beta = .11$, $t(66) = .94$, $p = .35$). It was found that the standardized regression coefficient between hyperactivity/impulsivity and student-teacher closeness was non-significant (path c; $\beta = -.03$, t

(66) = $-.57, p = .57$), as was the coefficient between teacher ADHD knowledge and student-teacher closeness (path b; $\beta = .02, t(66) = .19, p = .85$). Therefore, these results indicate that a mediation model is not supported. See Figure 12 for a visual representation of the model.

Overall, these results revealed that teacher knowledge of ADHD did not explain nor significantly contribute to the relationship between the student ADHD symptoms and the student-teacher relationship quality.

Research question three. *Does teachers' sense of efficacy or stress mediate the relationship between ADHD symptomatology and the student-teacher relationship?*

Teacher efficacy and teacher stress were tested as mediators by calculating bias-corrected 95% confidence intervals (CIs) using bootstrapping with 5000 resamples (Preacher & Hayes, 2004; Preacher & Hayes 2008) via the Process procedure for SPSS (v3.3), conceptual model 6 (Hayes, 2017). Age and gender were controlled for in all models.

First, it was found that the standardized regression coefficient between inattention and student-teacher conflict in the school-aged sample was statistically significant (path c; $\beta = .31, t(66) = 5.32, p < .001$). Further, the standardized regression coefficient between inattention and teacher stress was positively associated (path a₁; $\beta = .45, t(66) = 4.34, p < .001$), whereas the coefficient between inattention and teacher efficacy was negatively associated (path a₂; $\beta = -.25, t(66) = -2.19, p = .03$). Lastly, the results indicated that the mediator, teacher stress, was positively associated with student-teacher conflict (path b₁; $\beta = .76, t(66) = 10.02, p < .001$), whereas teacher efficacy was non-significantly associated in the negative direction (path b₂; $\beta = -.02, t(66) = -.36, p = .72$). Evaluation of the indirect effects confirmed the mediating role of teacher stress ($a_1b_1 = .34, 95\% \text{ CIs } [.20, .48]$), and not teacher efficacy ($a_2b_2 = .01, 95\% \text{ CIs } [-.03, .05]$). Therefore, these results indicate that teacher stress does in fact positively mediate the

relationship between inattention and student-teacher conflict in a school-aged sample, whereas teacher efficacy does not. See Figure 13 for a visual representation of the mediation model.

The second mediation analyses simply substituted the dependent variable with student-teacher closeness, and as such paths a_1 and a_2 were the same as the previous mediation model (path a_1 ; $\beta = .45$, $t(66) = 4.34$, $p < .001$; path a_2 ; $\beta = -.25$, $t(66) = -2.19$, $p = .03$). It was found that the standardized regression coefficient between inattention and student-teacher closeness in the school-aged sample was not statistically significant (path c ; $\beta = .01$, $t(66) = .28$, $p = .78$). Further, the results indicated that the mediator, teacher stress, was non-significantly associated with student-teacher closeness in the negative direction (path b_1 ; $\beta = -.02$, $t(66) = -.18$, $p = .86$), as was teacher efficacy in the positive direction (path b_2 ; $\beta = .09$, $t(66) = .75$, $p = .46$). Therefore, these results indicate that a mediation model is not supported for neither teacher stress nor teacher efficacy. See Figure 14 for a visual representation of the mediation model.

The third mediation analysis investigated teacher stress and teacher efficacy as mediators between child hyperactivity/impulsivity symptoms and student-teacher conflict. First, it was found that the standardized regression coefficient between hyperactivity/impulsivity and student-teacher conflict in the school-aged sample without controlling for the mediators was statistically significant (path c ; $\beta = .31$, $t(66) = 5.07$, $p < .001$). Further, the standardized regression coefficient between hyperactivity/impulsivity and teacher stress was positively associated (path a_1 ; $\beta = .41$, $t(66) = 3.59$, $p < .001$), whereas the coefficient between hyperactivity/impulsivity and teacher efficacy was negatively associated (path a_2 ; $\beta = -.42$, $t(66) = -3.90$, $p < .001$). Lastly, the results indicated that the mediator, teacher stress, was positively associated with student-teacher conflict (path b_1 ; $\beta = .79$, $t(66) = 10.61$, $p < .001$), whereas teacher efficacy was non-significantly associated in the negative direction (path b_2 ; $\beta = -.01$, $t(66) = -.19$, $p = .85$).

Evaluation of the indirect effects confirmed the mediating role of teacher stress ($a_1b_1 = .32$, 95% CIs [.16, .48]), and not teacher efficacy ($a_2b_2 = .01$, 95% CIs [-.05, .07]). Therefore, these results indicate that teacher stress does in fact positively mediate the relationship between hyperactivity/impulsivity and student-teacher conflict in a school-aged sample, whereas teacher efficacy does not. See Figure 15 for a visual representation of the mediation model.

Finally, the fourth mediation analysis simply substituted the dependent variable with student-teacher closeness, and as such paths a_1 and a_2 were the same as the third mediation analyses (path a_1 ; $\beta = .41$, $t(66) = 3.59$, $p < .001$; path a_2 ; $\beta = -.42$, $t(66) = -3.90$, $p < .001$). It was found that the standardized regression coefficient between hyperactivity/impulsivity and student-teacher closeness was not statistically significant (path c ; $\beta = -.03$, $t(66) = -.57$, $p = .57$). Further, the results indicated that neither mediators were significantly associated with student-teacher closeness (path b_1 ; $\beta = -.02$, $t(66) = -.14$, $p = .89$; path b_2 ; $\beta = .10$, $t(66) = .80$, $p = .43$). Therefore, these results indicate that a mediation model is not supported for neither teacher stress nor teacher efficacy. See Figure 16 for a visual representation of the mediation model.

The overall results of this study identified several main findings: The teachers of students with ADHD reported similar levels of stress compared to the teachers of typically developing students; neither teachers' knowledge of ADHD or teacher efficacy mediated the relationship between child ADHD symptomology and the student-teacher relationship; however, teacher stress significantly mediated the relationship between child ADHD symptomology and student-teacher conflict.

Discussion

The present study initially had three primary goals: 1) comparing the influence of teachers' reported stress on the student-teacher relationship quality for children with ADHD versus their

typically developing peers; and establishing the mediating role of 2) teachers' knowledge of ADHD and 3) teachers' efficacy and teachers' stress on the relationship between school-aged children's ADHD symptomology and the student-teacher relationship quality. The results of this study in the context of existing literature will be discussed in detail below.

The impact of teacher-level characteristics on a variety of classroom-based program implementation, prevention strategies, as well as other interventions has recently received increased attention in the literature (Larson, Cook, Fiat, & Lyon, 2018); however, until now, teacher-level characteristics had yet to be explored in the context of the student-teacher relationship quality, let alone for students with ADHD. Therefore, the findings of the present study have the potential to be instrumental in addressing some of the challenges related to the student-teacher relationship for children with ADHD, and even further, enhancing prevention strategies for this population.

Significant mental stress has shown to have detrimental effects on one's overall well-being and functioning (Palmer, 2013). Not surprisingly, the teaching profession has been identified as a high stress job (Cooper & Travers, 2012), and unfortunately, research has linked a variety of negative consequences to teachers' stress (Cook, Lyon, Kubergovic, Wright, & Zhang, 2015). Results of the present study has added to the research and revealed that teacher stress significantly predicted student-teacher conflict; however, there were no significant differences in stress levels of teachers of children with ADHD versus teachers of children without the disorder. This was an unexpected finding given that teachers have historically reported that children with ADHD are more stressful and challenging to teach (Greene, Beszterczey, Katzenstein, Park, & Goring, 2002; Bell, Long, Garvan, & Bussing, 2011; Ohan, Visser, Strain, & Allen, 2011). A possible explanation for this discrepancy relates to the management and/or severity of symptoms

of the clinical sample within the present study compared to clinical samples in previous studies. Specifically, clinical samples recruited from other settings (i.e., hospitals) or demographic areas may present with increased severity of ADHD symptoms, which would result in increased challenges within the classroom setting, and therefore, be more stressful for teachers. In fact, despite the efforts and persistence of the researchers, we were unable to recruit and retain any participants with ADHD from the Mental Health Outpatient Unit at the local hospital, suggesting the possibility of fundamental differences between families of children with ADHD in this setting, versus the community setting. In light of this, future research directives should continue to pursue investigation of clinical samples from other settings/demographics. Nonetheless, the results of the present study support the notion that teacher stress negatively impacts relational interactions with students (i.e., increased teacher reported stress predictive of increased student-teacher conflict), regardless of ADHD symptomology.

Furthermore, critical findings pertaining to teacher stress were identified through the mediation analyses using teacher stress as a mediator. Specifically, teachers' reported stress was found to significantly mediate the relationship between children's ADHD symptomology and student-teacher conflict. As mentioned, previous research has determined that teachers' stress can have significant negative impact on their teaching abilities, as well as program implementation (Cook, Lyon, Kubergovic, Wright, & Zhang, 2015), and now it also appears that teachers' reported stress explains some of the relationship between students' increased ADHD symptomology and conflict with their teachers. That is, the origin of the student-teacher conflict for children exhibiting ADHD symptoms (i.e., inattention and hyperactivity/impulsivity) pertains to the increased stress that their teachers report experiencing. This finding is instrumental as it

suggests that teacher-level characteristics, such as stress, have significant influence on the relationship between ADHD symptoms and the student-teacher relationship quality.

Although the preliminary analyses revealed a negative association between child ADHD symptomology and teacher efficacy (i.e., increased inattention and/or hyperactivity/impulsivity is associated with reduced teachers' efficacy in their teaching abilities), teacher efficacy did not account for significant variance in the mediation models when controlling for teacher stress. With that being said, future directives should aim to address the finding that teachers feel less efficacious when dealing with a child with ADHD symptoms, as it has previously established that teacher efficacy is crucial for delivery of academic instructions and implementation evidence-based practices within the classroom (Pas, Bradshaw, & Hersfeldt, 2012).

Finally, the results of the study also revealed non-significant correlations between teachers' knowledge of ADHD and children's ADHD symptomology, as well as the student-teacher relationship quality constructs. This finding was unexpected given that previous research has suggested that teachers' knowledge and understanding of ADHD has been associated with a reduction in students' ADHD symptoms and changes in teachers' attitudes towards students with the disorder (Ohan, Visser, Strain, & Allen, 2011; Froelich, Breuer, Doepfner, & Amonn, 2012). As such, it had been hypothesized that teachers who reported accurate knowledge of the disorder would have less conflictual relationships with children exhibiting ADHD symptoms; however, the findings did not support this. With that being said, an association between teachers' attitudes towards students and the student-teacher relationship was not established in the present study, so it is plausible that these constructs are not significantly related. Future research directives pertaining to the student-teacher relationship quality for children with ADHD and teachers' knowledge should aim to include a measure of teachers' attitudes. Nonetheless, the findings

suggest that the student-teacher relationship quality for children with elevated ADHD symptoms is not significantly impacted by teachers' knowledge of ADHD, despite previous findings indicating positive changes in teachers' attitudes towards children with the disorder (Froelich, Breuer, Doepfner, & Amonn, 2012).

To reiterate, some of the findings from the present study corroborate previous research. In particular, teacher stress appears to have profound implications for a variety of outcomes, including the student-teacher relationship quality. As such, efforts to reduce teacher stress would benefit teachers' relationships with their students, and potentially prevent the onslaught of negative academic outcomes for students with ADHD. In fact, the literature suggests that targeting teacher stress with positive psychological practices (i.e., mindfulness; principles of Acceptance and Commitment Therapy; principles of Cognitive Behavioral Therapy) has shown improvements in teachers' ability to manage stress, and notice and respond to student behaviors, which subsequently improved student behaviors and resulted in positive change (Biglan, Layton, Jones, Hankins, & Rusby, 2011; Singh, Lancioni, Winton, Karazsia, & Singh, 2013; Larson, Cook, Fiat, & Lyon, 2018). It would be logical to assume that such practices would also improve the student-teacher relationship quality; however, this theory has yet to be explored.

Barriers & Limitations

Although the proposed study was designed to minimize threats to validity, there are barriers and limitations that warrant discussion. Primarily, the non-experimental nature of the study prevents inferences about causality. Results from this study established specific relationships between students' ADHD symptomology, teacher –level characteristics (i.e., stress, knowledge of ADHD, efficacy), and the student-teacher relationship, but experimental studies to establish temporal precedence and causality will be needed in the future. Related to the previous point,

the study does not control for other contextual factors that may account for unknown variance. For example, research has shown that teachers of schools within disadvantaged geographical areas experience increased stress (Larson, Cook, Fiat, & Lyon, 2018), and classroom size has an impact on teachers' stress and efficacy (Cooper & Travers, 2012); however, these variables were not assessed in the present study.

Importantly, the recruitment method may have lent itself to biased results, which should be addressed in future research. Specifically, the clinical sample of children diagnosed with ADHD was recruited through posters and online advertisements in the community and required parents to initiate contact and follow through with participation. Recruitment through an outpatient clinic at the local hospital was attempted; however, no families followed through with participation. As such, the sample obtained may not be representative of all families of children with ADHD. Similarly, the teachers who chose to participate in the study may be characteristically different than those who did not, including the quality of relationships they had with the parents and the students. To attempt to control for these limitations, it is recommended that future research exploring other recruitment avenues with both families and teachers be conducted to obtain representative samples.

Chapter Five: General Discussion

The student-teacher relationship for children with ADHD has only recently been given attention (Rogers & Tannock, 2013), and given the strong evidence that supports the benefits of a positive student-teacher relationship on children's academic, behavioral, and social functioning (Pianta, 1994; Hughes, Cavell, & Wilson, 2001; Murray & Greenberg, 2001; Furrer & Skinner, 2003), it was logical to pursue an investigation of this area for children with ADHD. Although the individual studies identified relevant findings, which are outlined in the discussion sections of each chapter, the dissertation project as a whole also unveiled several broad findings that warrant discussion.

Main Findings

The findings of this project replicated previous research in that ADHD symptoms significantly impacted the student-teacher relationship. Specifically, increased ADHD symptoms were associated with increased student-teacher conflict. Surprisingly, student-teacher closeness was not significantly predictive of children's ADHD symptoms throughout all three studies. Throughout the studies, both children's inattentive and hyperactivity/impulsivity symptoms were predictive of student-teacher conflict in preschool and school-aged children; however, only hyperactivity/impulsivity was predictive of student-teacher conflict in kindergarten-aged children.

Another main finding of the dissertation project points to other variables that significantly perpetuate student-teacher conflict, aside from children's ADHD symptomology. As mentioned, the existing literature establishes the connection between increased children's ADHD symptomology and maladaptive student-teacher relationships; however, our findings provide evidence that increased parent communication with teachers/school, as well as teacher-level

characteristics (i.e., teachers' sense of efficacy and their overall experience of stress in their jobs) also contribute to increased student-teacher conflict for children exhibiting ADHD symptoms. Particularly, teachers' reported stress was found to fully explain the relationship between children's ADHD symptoms (i.e., both inattention and hyperactivity/impulsivity) and student-teacher conflict, suggesting that targeting this variable would be instrumental in improving the student-teacher relationship, especially for children who are at-risk of negative academic and social outcomes, such as those with ADHD. As a starting point, increasing awareness of the impact that teachers' stress has on factors that have been already identified (i.e., teachers' mental and physical health; teachers' sense of efficacy and teaching abilities), as well as factors that may be less obvious, such as the impact on their relationships with at-risk students may facilitate some change; however, significant change would likely be facilitated with emphasis on the impact of teachers' stress at a systemic level. Specifically, school boards and schools that promote teachers' health and mental well-being through manageable class sizes, provision of additional training opportunities, emphasizing self-care and compassion, and providing adequate and necessary supports to teachers would not only facilitate a positive approach to teaching, but also positive relationships with students, and in turn, increased student engagement and achievement.

Furthermore, another main finding of this dissertation consistently revealed home-school communication as a positive mediate between ADHD symptoms and student-teacher conflict. Although this finding was unexpected, as it was hypothesized that the relationship would be negatively associated (i.e., less home-school communication explaining the relationship between increased ADHD symptomology and increased student-teacher conflict), the directionality demonstrates logical sense within the context of the school system. Specifically, increased

disruptive behaviors and inattentiveness leads to increased conflict with teachers, which subsequently prompts more communication with parents. To rephrase, when a child is developing typically and does not cause issues within the classroom, less frequent communication occurs between parent and teacher; whereas, children who struggle within the classroom, especially due to behavioral challenges, necessitates increased communication between parents and the teacher.

Relationship-Driven Model

Relatedly, the overall results of this dissertation project serves as supporting evidence of a relationship-driven model for school engagement (Hosan & Hoglund, 2017). The relationship-driven model proposes that relationship quality contributes to prospective engagement in school, beyond individual characteristics of the child. Previous literature indicates that children's need for relatedness to others serve as motivation to participate and engage in school (Deci et al., 1991; Reeve, 2012), and children who perceive support from their teachers are more likely to feel secure in school and comfortable participating in activities (Verschueren & Koomen, 2012). Although student-teacher closeness was not a significant factor in any of the three studies, student-teacher conflict was, suggesting that poor quality relationships may have a negative impact on children's functioning and well-being in the classroom. Overall, the relationship-driven model posits that children who have higher quality relationships at school are likely to feel relatedness to school in general, and increased engagement, enjoyment, and motivation.

Future Research Directions

Not only has the results of this research brought forth information and an enhanced understanding of a concept that has been unexplored, they also provide directions for future

research on the student-teacher relationship quality for children with ADHD, and direction for potential interventions to address the identified complicated aspects of the relationship.

Specifically, this dissertation project was one of the first attempts at investigating the student-teacher relationship for children with clinical diagnosis of ADHD from the community; however, attempts at recruiting children from other settings/demographics proved to be futile. As such, future research should aim to include children with ADHD from a variety of settings/demographics to ensure a representative sample.

Additionally, the association between ADHD symptoms and the student-teacher relationship quality lends itself to bidirectionality, in that ADHD symptoms negatively impact the way the teacher views the student, which further influences how the teacher rates the student's behaviors (Portilla, Ballard, Adler, Boyce, & Obradović, 2014; Silver, Measelle, Armstrong, & Essex, 2005), and this dissertation research emphasised ADHD symptoms as the predictor variable. As such, future research should aim to explore the bidirectionality. Relatedly, future research should also aim to differentiate between ADHD presentations (i.e., Inattentive, Hyperactive/Impulsive, and Combined), as well as investigate potentially confounded variables, such as the presence of comorbid diagnoses.

Finally, the findings identified teacher stress as a significant contributor to increased student-teacher conflict, above and beyond children's ADHD symptoms. As such, efforts to reduce teacher stress as a point of intervention would not only improve teachers' relationships with their students, but also potentially prevent the onslaught of negative academic and social outcomes for children with ADHD. Current literature suggests that targeting teacher stress has shown improvements in teachers' ability to manage stress, and identify and respond to students' behaviors, which facilitated positive change and reductions in behaviors in the classroom.

Consequently, future research should aim to investigate the implications of reducing teacher stress and the impact on the student-teacher relationship quality, especially for children with ADHD.

Conclusion

To reiterate, children with ADHD experience a vast array of academic, behavioral, and social difficulties, and by researching influential contextual concepts such as the student-teacher relationship quality, we may be able to identify how we can lessen some of the impairments and improve the developmental trajectory of these children.

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Table 1

Study 1: Descriptive Statistics and Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1.Ethnicity	1																				
2.Education	-.04	1																			
3.Income	.05	.48 ***	1																		
4.MaritalStat	-.03	-.03	.03	1																	
5.ParentMH	-.03	-.05	-.05	-.10	1																
6.CGENDER	.04	.12	.05	.14	-.06	1															
7. Age(1)	-.04	-.02	-.11	.13	.05	-.22*	1														
8.Age(2)	.08	.01	-.04	.15	-.11	-.13	.71 ***	1													
9.Time	.21*	-.02	.17	.06	-.20*	.21*	-.36 ***	.24*	1												
10.ADHD	-.01	-.01	.07	-.01	-.05	.01	.07	.02	-.11	1											
11.Med	-.16	-.21*	-.16	-.05	.06	-.15	.07	.06	-.04	-.03	1										
12.IN(1)	.12	-.21*	-.11	.05	-.01	-.02	.02	-.04	-.07	.23*	.08	1									
13.HYP(1)	.11	-.16	-.11	-.06	.20*	-.09	-.02	-.07	-.12	.12	.15	.71 ***	1								
14.Con(1)	.10	-.18	-.01	.07	-.01	.04	-.08	-.14	-.18	.18	-.21	.39 **	.30*	1							
15.Close(1)	.03	-.28*	-.40 **	.40 **	.17	-.09	.07	-.06	-.08	-.16	.18	.04	.02	.20	1						

16.IN(2)	.16	-.03	-.07	.18	.19	-.28*	-.01	-.12	-.13	.24	.13	.70***	.70***	.34*	.29	1					
17.HYP(2)	.09	-.05	-.09	.20	.14	-.08	.26	.21	-.19	.23	.03	.61***	.70**	.42**	.24	.68***	1				
18.Con(2)	.01	-.21	-.08	-.03	.01	-.37**	.13	.01	-.29*	.26*	-.17	.09	.17	.30	-.08	.12	.27*	1			
19.Close(2)	-.17	.12	-.11	-.21	-.04	-.15	.15	.12	-.13	.01	-.10	-.10	-.11	-.09	.13	-.04	-.14	.14	1		
20.SBI(2)	-.15	-.03	.12	-.02	-.22	-.02	.01	-.01	.05	-.12	-.17	-.14	.11	-.19	-.46**	-.19	-.17	-.15	-.02	1	
21.HSC(2)	.01	-.16	-.20	-.08	-.01	-.14	.14	.02	-.26*	.29*	-.07	.10	-.10	.12	.05	.23	.21	.27*	.25*	.33**	1
<i>Mean</i>	4.06	4.03	6.01	3.02	.21	1.50	3.58	4.47	.92	.01	.11	.87	1.03	1.92	.16	.82	.89	.20	.25	1.83	2.04
<i>(SD)</i>	(.87)	(.92)	(1.5)	(.80)	(.41)	(.50)	(.58)	(.52)	(.26)	(.09)	(.31)	(.48)	(.60)	(.83)	(.14)	(.58)	(.66)	(.13)	(.11)	(.46)	(.61)
<i>Min</i>	1	1	1	1	0	1	2.6	3.5	.44	0	0	0	0	1	0	0	0	0	0	1	1
<i>Max</i>	6	5	7	8	1	2	4.8	5.7	1.4	1	1	2.1	2.4	4	.5	2.3	2.8	.5	.5	3.2	3.8

Note. Time one, $n = 113$. Time two, $n = 67$. * $p < .05$; ** $p < .01$; *** $p < .001$. 1-5=Parent demographic variables; 6-10=Child demographic variables; MaritalStat=Marital status of parent; ParentMH=diagnosis of mental health disorder; ADHD=child diagnosed with ADHD; Med=Child on medication; (1)=time one/preschool; (2)=time two/kindergarten; IN=Inattentive symptoms; HYP=Hyperactivity/Impulsivity symptoms; SBI=School-Based Involvement; HSC=Home-School Communication.

Table 2

Study 2: Descriptive Statistics and Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1.PGender	1																					
2.Education	-.04	1																				
3.Income	-.02	.12	1																			
4.MaritalStat	.05	.07	.18	1																		
5.ParentMH	.16	-.03	-.06	-.21	1																	
6.CGender	.15	-.01	.09	-.01	.09	1																
7. Age	-.03	-.03	-.12	.12	.23	-.07	1															
8.ADHD	.02	-.11	-.13	-.01	.12	-.23*	.07	1														
9.Med	-.12	.28*	.03	.01	-.23	.18	-.14	-.78***	1													
10.TGender	-.08	.01	.09	-.12	-.17	-.09	-.38*	-.04	.12	1												
11.YrsTeach	.21	.09	.06	-.01	.01	.01	-.19	-.14	.17	.09	1											
12.ADHD Ed	.10	.03	.15	-.06	.16	.15	.02	.03	-.10	-.10	-.25	1										
13.IN	-.07	.03	.07	.03	-.06	-.19	-.24*	.38**	-.22	.08	-.09	-.01	1									
14.HYP	-.24	-.14	.04	-.06	-.04	-.21	-.15	.46***	-.27*	.05	-.02	.03	.73***	1								
15.Conflict	-.01	-.03	.18	.12	-.10	-.38**	-.08	.36**	-.24*	.17	-.14	-.03	.51***	.46***	1							

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99

16.Close	-.15	.01	.15	-.09	-.01	-.03	-.19	-.15	.09	.28*	-.09	.17	.03	-.06	.05	1						
17.SBI	-.01	-.15	-.09	-.14	.14	-.15	-.05	.18	-.24*	-.17	-.04	-.05	-.02	.01	.19	-.07	1					
18.HSC	.06	-.12	.17	-.18	-.07	-.20	-.19	.33***	-.43***	.04	.04	-.10	.40**	.34**	.55***	-.10	.28*	1				
19.Join	.08	-.12	-.01	.04	-.08	-.19	-.11	.19	-.27*	.15	-.15	.16	.18	.16	.22	.14	.18	.27*	1			
20.Comm	.17	-.05	.09	.07	.07	.09	-.13	.34**	-.38**	.09	.12	.02	.17	.19	.19	-.09	.18	.56***	.29*	1		
21.ADHD X Join	.02	-.12	-.12	.20	.07	-.27*	.08	.98***	-.76***	-.01	-.18	.05	.39**	.45***	.40***	-.10	.17	.34**	.38**	.40**	1	
22.ADHD X Comm	.05	-.12	-.12	.02	.10	-.25*	.07	.98***	-.76***	-.04	-.16	.04	.39**	.45***	.41***	-.13	.20	.40**	.32**	.46**	.98***	1
Mean	1.89	3.77	8.24	3.01	1.59	1.47	9.73	.53	1.48	1.79	13.6	1.98	67.8	69.3	23.3	38.2	16.8	15.6	78.7	20.8	42.6	11.3
(SD)	(.31)	(.9) 1	(2.3)	(1.0)	(.5)	(.5)	(2.0)	(.5)	(.5)	(.4)	(7.0)	(.5)	(15)	(16)	(9.3)	(6.6)	(4.4)	(5.8)	(12)	(4.4)	(42)	(11)
Min	1	1	2	1	1	1	6	0	1	1	2	1	40	40	11	16	10	8	41	11	0	0
Max	2	5	12	6	2	3	13	1	2	2	31	3	90	90	51	47	25	32	95	41	95	25

Note. $n = 68$. * $p < .05$; ** $p < .01$; *** $p < .001$. 1-5=Parent demographic variables; 6-9=Child demographic variables; 10-12=Teacher demographic variables; MaritalStat=Marital status of parent; ParentMH=diagnosis of mental health disorder; ADHD=child diagnosed with ADHD; Med=Child on medication; YrsTeach=number of years teaching; ADHD Ed=Education/training received pertaining to ADHD; IN=Inattentive symptoms; HYP=Hyperactivity/Impulsivity symptoms; SBI=School-Based Involvement; HSC=Home-School Communication; Comm=Communication to Other; X=Interaction term.

Table 3

Study 3: Descriptive Statistics and Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1.PGender	1																			
2.Education	-.04	1																		
3.Income	-.02	.12	1																	
4.MaritalStat	.05	.07	.18	1																
5.ParentMH	.16	-.03	-.06	-.21	1															
6.CGender	.15	-.01	.09	-.01	.09	1														
7. Age	-.03	-.03	-.12	.12	.23	-.07	1													
8.ADHD	.02	-.11	-.13	-.01	.12	-.23*	.07	1												
9.Med	-.12	.28*	.03	.01	-.23	.18	-.14	-.78***	1											
10.TGender	-.08	.01	.09	-.12	-.17	-.09	-.38*	-.04	.12	1										
11.YrsTeach	.21	.09	.06	-.01	.01	.01	-.19	-.14	.17	.09	1									
12.ADHD Ed	.10	.03	.15	-.06	.16	.15	.02	.03	-.10	-.10	-.25	1								
13.IN	-.07	.03	.07	.03	-.06	-.19	-.24*	.38**	-.22	.08	-.09	-.01	1							
14.HYP	-.24	-.14	.04	-.06	-.04	-.21	-.15	.46***	-.27*	.05	-.02	.03	.73***	1						
15.Conflict	-.01	-.03	.18	.12	-.10	-.38**	-.08	.36**	-.24*	.17	-.14	-.03	.51***	.46***	1					

16.Close	-.15	.01	.15	-.09	-.01	-.03	-.19	-.15	.09	.28*	-.09	.17	.03	-.06	.05	1				
17.ADHD Knowledge	.08	.09	-.01	.01	-.03	-.14	-.04	.22	-.19	.04	.03	-.01	.21	.18	.15	-.06	1			
18.Efficacy	-.09	.02	-.04	-.05	.04	.13	-.01	-.18	.06	-.03	-.10	-.02	-.21	-.34**	-.20	.10	.21	1		
19.Stress	-.01	-.21	.20	.25*	-.01	-.24*	-.02	.24*	-.20	.18	.08	.07	.25*	.36**	.57***	.06	.11	-.27*	1	
20.ADHD X Stress	.17	.08	-.04	-.24	.17	-.06	-.17	-.17	.19	.03	-.06	-.06	.01	-.07	-.01	.01	-.08	-.12	.06	1
Mean	1.89	3.77	8.24	3.01	1.59	1.47	9.73	.53	1.48	1.79	13.6	1.98	67.8	69.3	23.3	38.2	12.8	87.2	134.8	1.1
(SD)	(.31)	(.9)	(2.3)	(1.0)	(.5)	(.5)	(2.0)	(.5)	(.5)	(.4)	(7.0)	(.5)	(15)	(16)	(9.3)	(6.6)	(3.3)	(10)	(55.5)	(1)
Min	1	1	2	1	1	1	6	0	1	1	2	1	40	40	11	16	2	66	89	0
Max	2	5	12	6	2	3	13	1	2	2	31	3	90	90	51	47	20	108	327	2.5

Note. $n = 68$. * $p < .05$; ** $p < .01$; *** $p < .001$. 1-5=Parent demographic variables; 6-9=Child demographic variables; 10-12=Teacher demographic variables; MaritalStat=Marital status of parent; ParentMH=diagnosis of mental health disorder; ADHD=child diagnosed with ADHD; Med=Child on medication; YrsTeach=number of years teaching; ADHD Ed=Education/training received pertaining to ADHD; IN=Inattentive symptoms; HYP=Hyperactivity/Impulsivity symptoms; X=Interaction term.

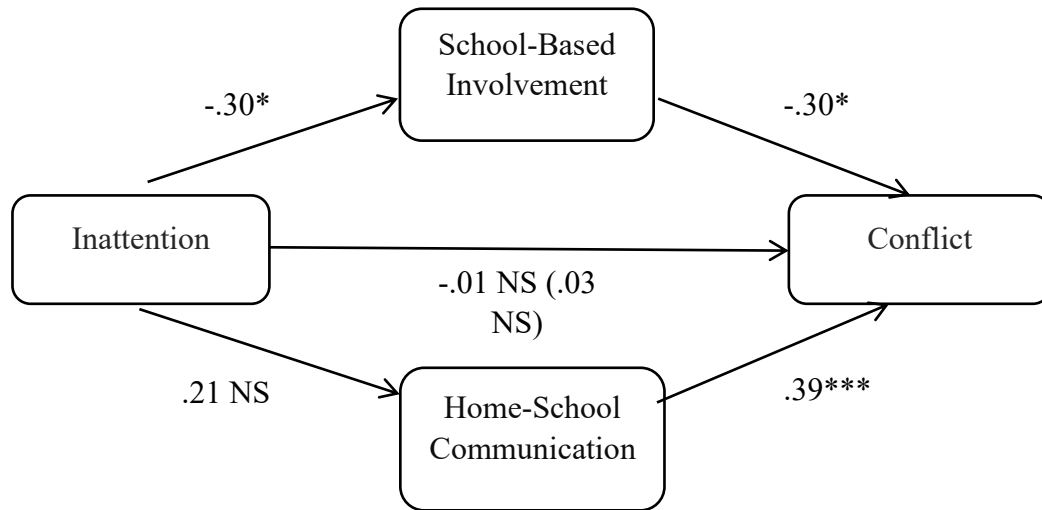
Figure 1 *Study 1: Mediation Model One*

Figure 1. Standardized regression coefficients for the relationship between inattentive symptoms and student-teacher conflict in kindergarten, testing for school-based involvement and home-school communication as mediators. The total standardized regression coefficient between inattentive symptoms and student-teacher conflict (without controlling for the mediators) is in parentheses.

* $p < .05$; ** $p < .01$; *** $p < .001$

NS. Not significant

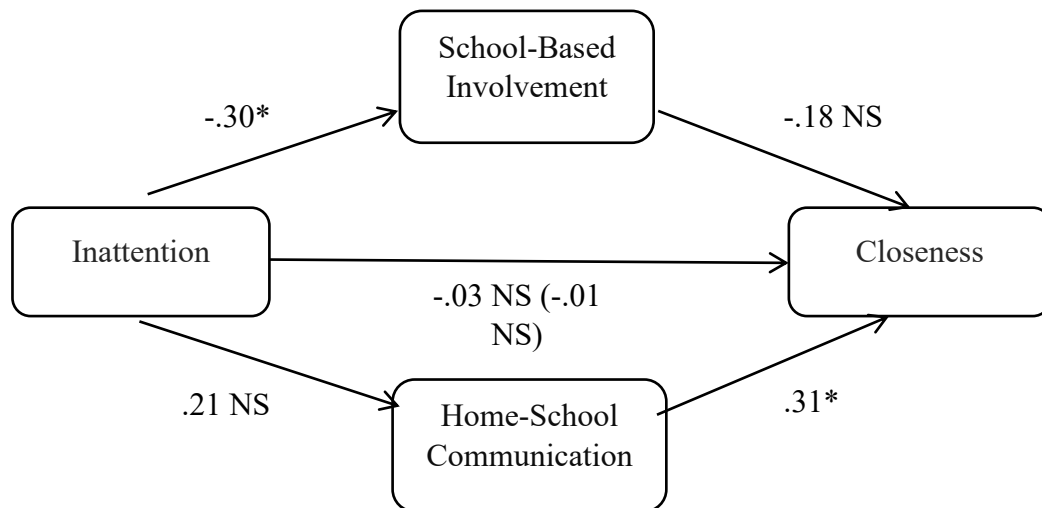
Figure 2 *Study 1: Mediation Model Two*

Figure 2. Standardized regression coefficients for the relationship between inattentive symptoms and student-teacher closeness in kindergarten, testing for school-based involvement and home-school communication as mediators. The total standardized regression coefficient between inattentive symptoms and student-teacher closeness (without controlling for the mediators) is in parentheses.

* $p < .05$; ** $p < .01$; *** $p < .001$

NS. Not significant

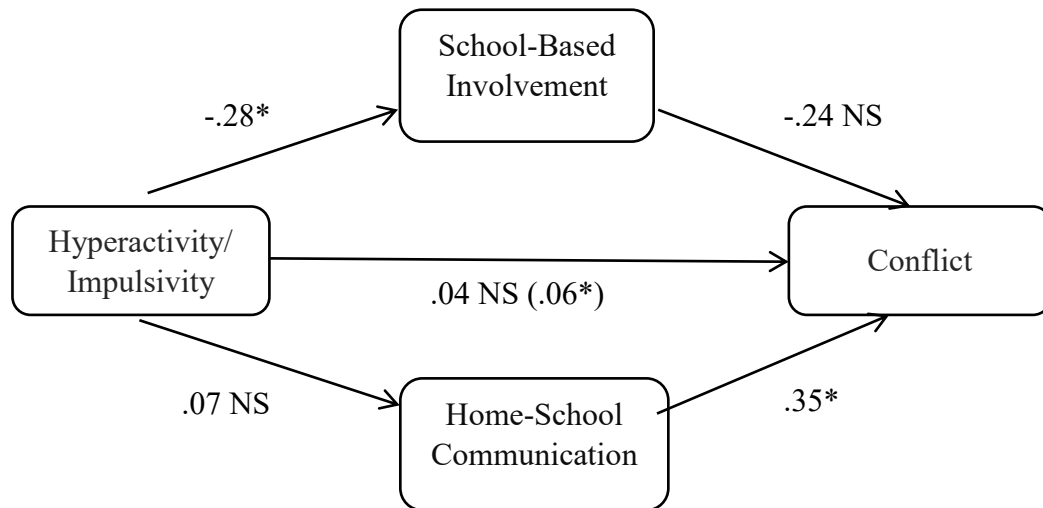
Figure 3 *Study 1: Mediation Model Three*

Figure 3. Standardized regression coefficients for the relationship between hyperactivity/impulsivity symptoms and student-teacher conflict in kindergarten, testing for school-based involvement and home-school communication as mediators. The total standardized regression coefficient between hyperactivity/impulsivity symptoms and student-teacher conflict (without controlling for the mediators) is in parentheses.

* $p < .05$; ** $p < .01$; *** $p < .001$

NS. Not significant

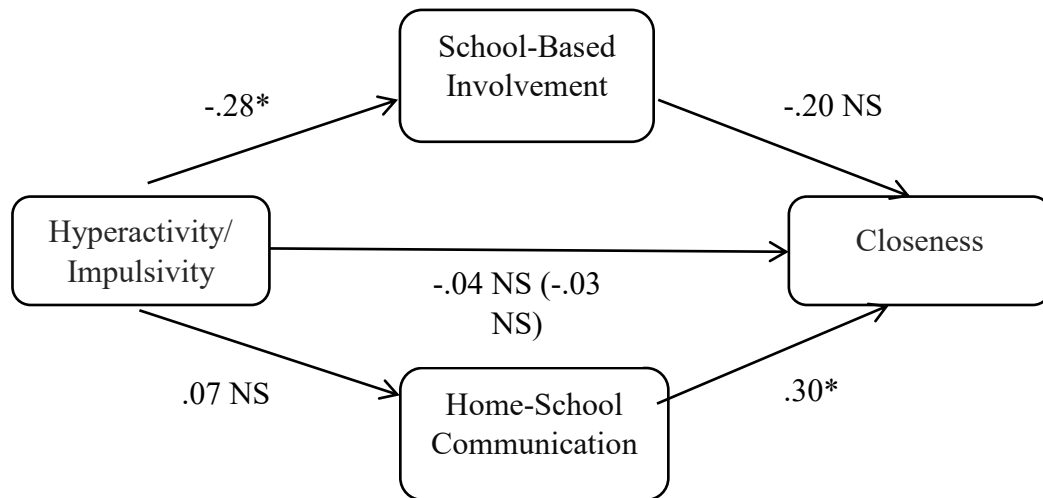
Figure 4 *Study 1: Mediation Model Four*

Figure 4. Standardized regression coefficients for the relationship between hyperactivity/impulsivity symptoms and student-teacher closeness in kindergarten, testing for school-based involvement and home-school communication as mediators. The total standardized regression coefficient between hyperactivity/impulsivity symptoms and student-teacher closeness (without controlling for the mediators) is in parentheses.

* $p < .05$; ** $p < .01$; *** $p < .001$

NS. Not significant

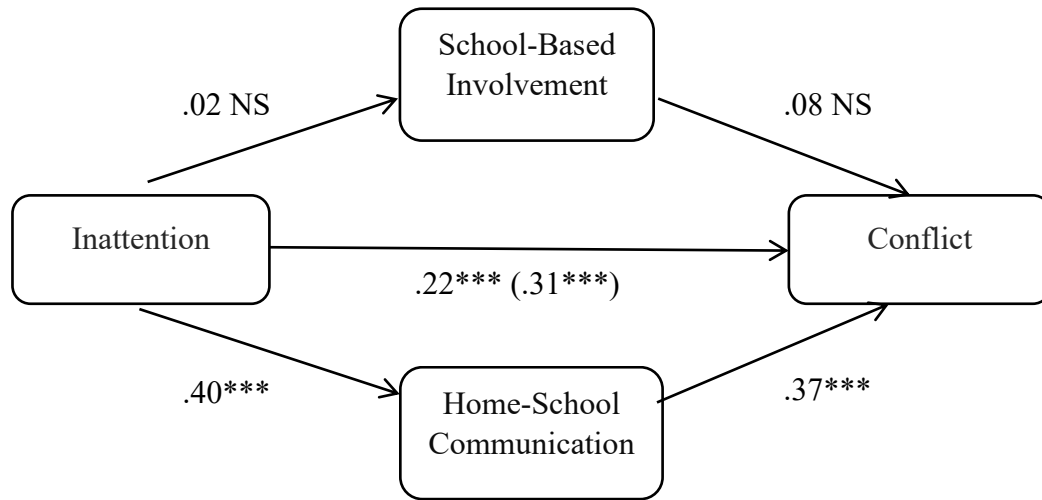
Figure 5 *Study 2: Mediation Model One*

Figure 5. Standardized regression coefficients for the relationship between inattentive symptoms and student-teacher conflict in school-aged children, testing for school-based involvement and home-school communication as mediators. The total standardized regression coefficient between inattentive symptoms and student-teacher conflict (without controlling for the mediators) is in parentheses.

* $p < .05$; ** $p < .01$; *** $p < .001$

NS. Not significant

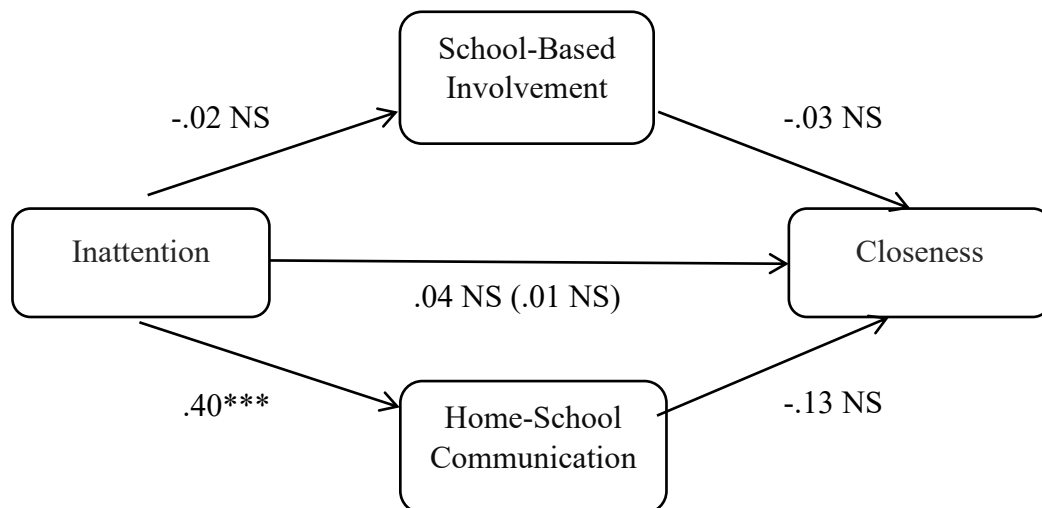
Figure 6 *Study 2: Mediation Model Two*

Figure 6. Standardized regression coefficients for the relationship between inattentive symptoms and student-teacher closeness in school-aged children, testing for school-based involvement and home-school communication as mediators. The total standardized regression coefficient between inattentive symptoms and student-teacher closeness (without controlling for the mediators) is in parentheses.

* $p < .05$; ** $p < .01$; *** $p < .001$

NS. Not significant

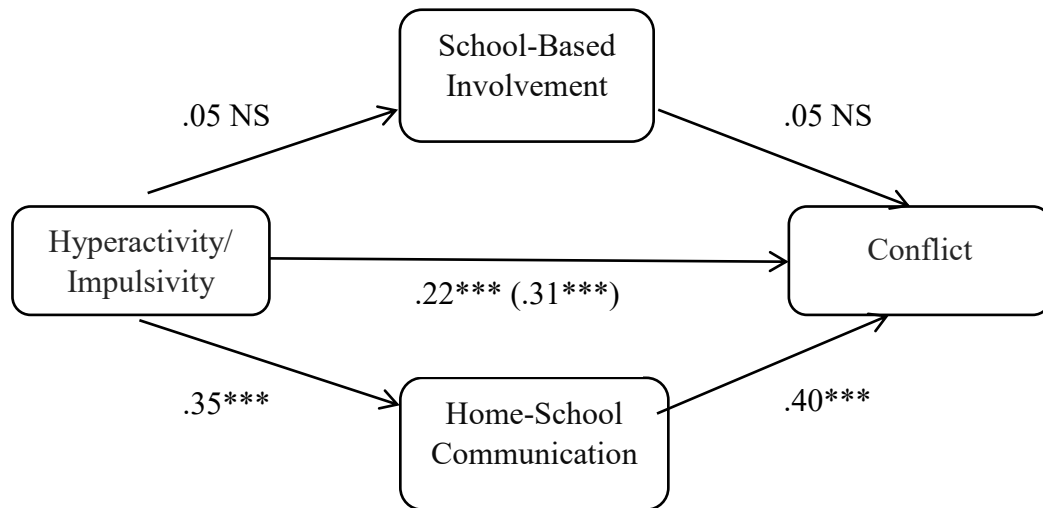
Figure 7 *Study 2: Mediation Model Three*

Figure 7. Standardized regression coefficients for the relationship between hyperactivity/impulsivity symptoms and student-teacher conflict in school-aged children, testing for school-based involvement and home-school communication as mediators. The total standardized regression coefficient between hyperactivity/impulsivity symptoms and student-teacher conflict (without controlling for the mediators) is in parentheses.

* $p < .05$; ** $p < .01$; *** $p < .001$

NS. Not significant

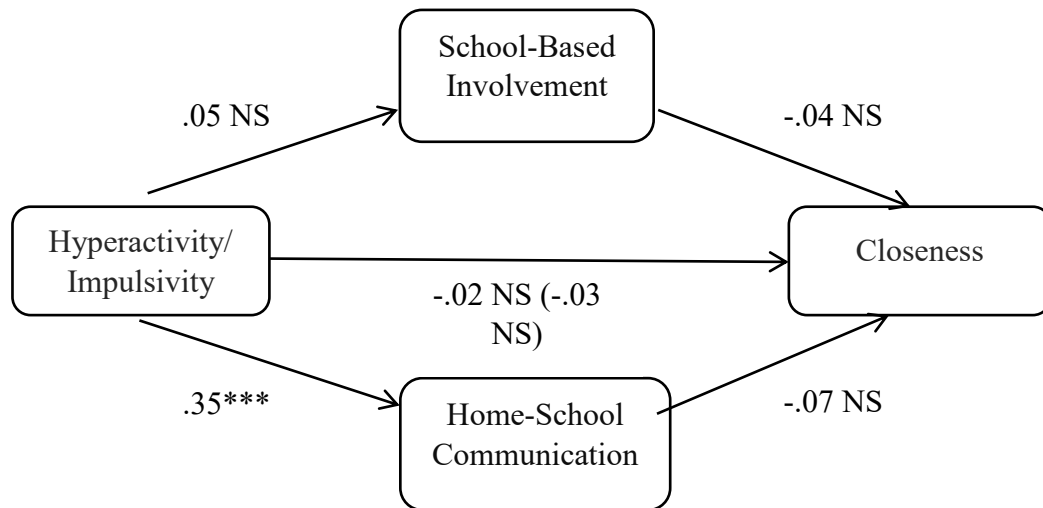
Figure 8 *Study 2: Mediation Model Four*

Figure 8. Standardized regression coefficients for the relationship between hyperactivity/impulsivity symptoms and student-teacher closeness in school-aged children, testing for school-based involvement and home-school communication as mediators. The total standardized regression coefficient between hyperactivity/impulsivity symptoms and student-teacher closeness (without controlling for the mediators) is in parentheses.

* $p < .05$; ** $p < .01$; *** $p < .001$

NS. Not significant

Figure 9 Study 3: Research Question 2: Mediation Model One

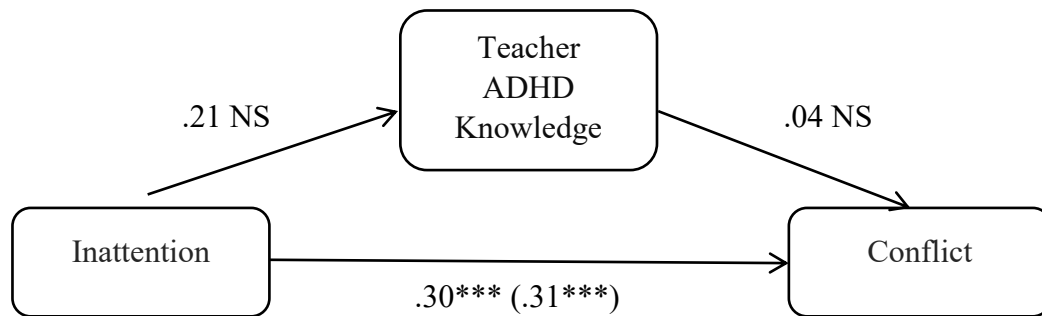


Figure 9. Standardized regression coefficients for the relationship between inattentive symptoms and student-teacher conflict in school-aged children, testing for teacher knowledge of ADHD as a mediator. The total standardized regression coefficient between inattentive symptoms and student-teacher conflict (without controlling for the mediator) is in parentheses.

* $p < .05$; ** $p < .01$; *** $p < .001$

NS. Not significant

Figure 10 Study 3: Research Question 2: Mediation Model Two

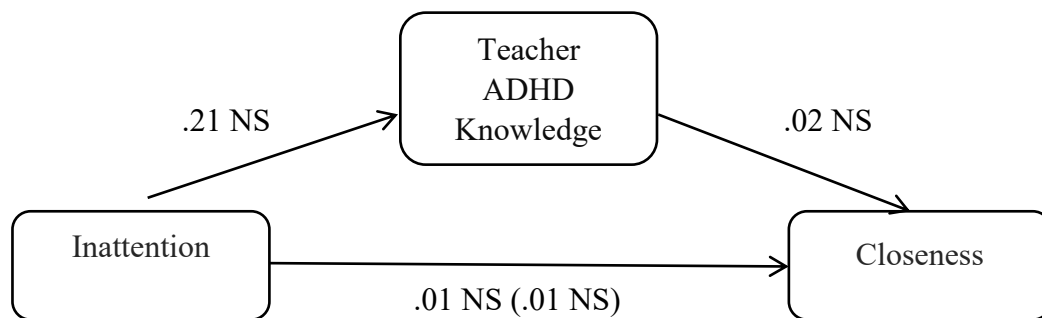


Figure 10. Standardized regression coefficients for the relationship between inattentive symptoms and student-teacher closeness in school-aged children, testing for teacher knowledge of ADHD as a mediator. The total standardized regression coefficient between inattentive symptoms and student-teacher closeness (without controlling for the mediator) is in parentheses.

* $p < .05$; ** $p < .01$; *** $p < .001$

NS. Not significant

Figure 11 Study 3: Research Question 2: Mediation Model Three

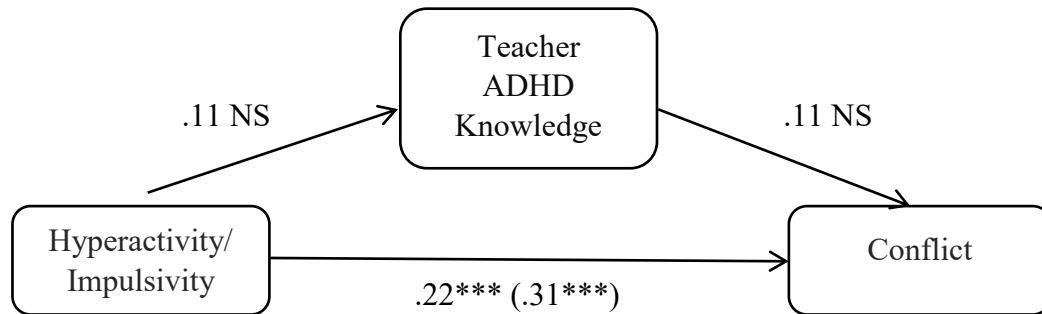


Figure 11. Standardized regression coefficients for the relationship between hyperactivity/impulsivity symptoms and student-teacher conflict in school-aged children, testing for teacher knowledge of ADHD as a mediator. The total standardized regression coefficient between hyperactivity/impulsivity symptoms and student-teacher conflict (without controlling for the mediator) is in parentheses.

* $p < .05$; ** $p < .01$; *** $p < .001$

NS. Not significant

Figure 12 Study 3: Research Question 2: Mediation Model Four

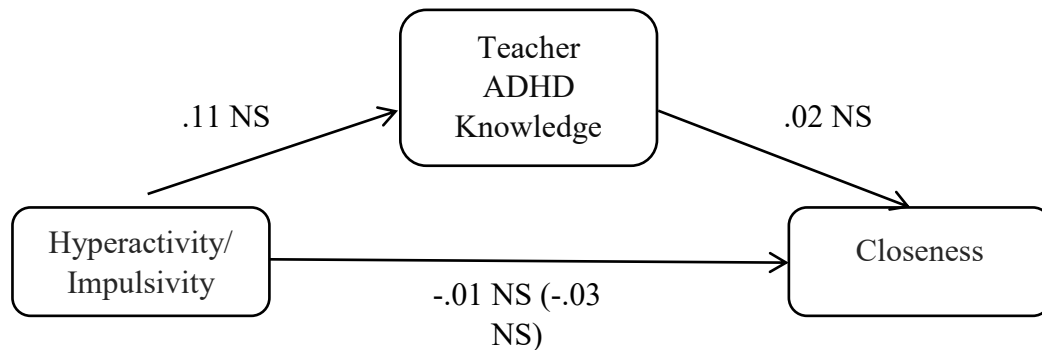


Figure 12. Standardized regression coefficients for the relationship between hyperactivity/impulsivity symptoms and student-teacher closeness in school-aged children, testing for teacher knowledge of ADHD as a mediator. The total standardized regression coefficient between hyperactivity/impulsivity symptoms and student-teacher closeness (without controlling for the mediator) is in parentheses.

* $p < .05$; ** $p < .01$; *** $p < .001$

NS. Not significant

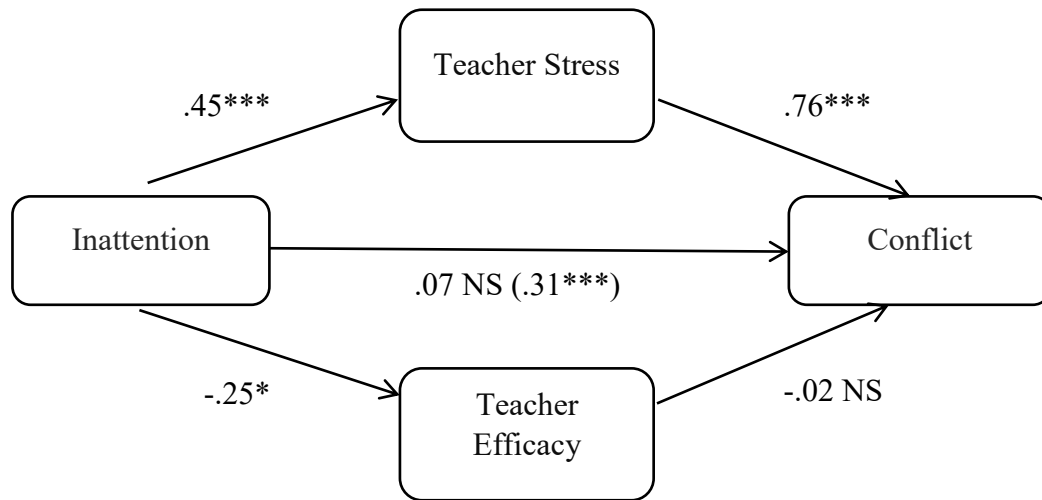
Figure 13 *Study 3: Research Question 3: Mediation Model One*

Figure 13. Standardized regression coefficients for the relationship between inattentive symptoms and student-teacher conflict in school-aged children, testing for teacher stress and teacher efficacy as mediators. The total standardized regression coefficient between inattentive symptoms and student-teacher conflict (without controlling for the mediators) is in parentheses.

* $p < .05$; ** $p < .01$; *** $p < .001$

NS. Not significant

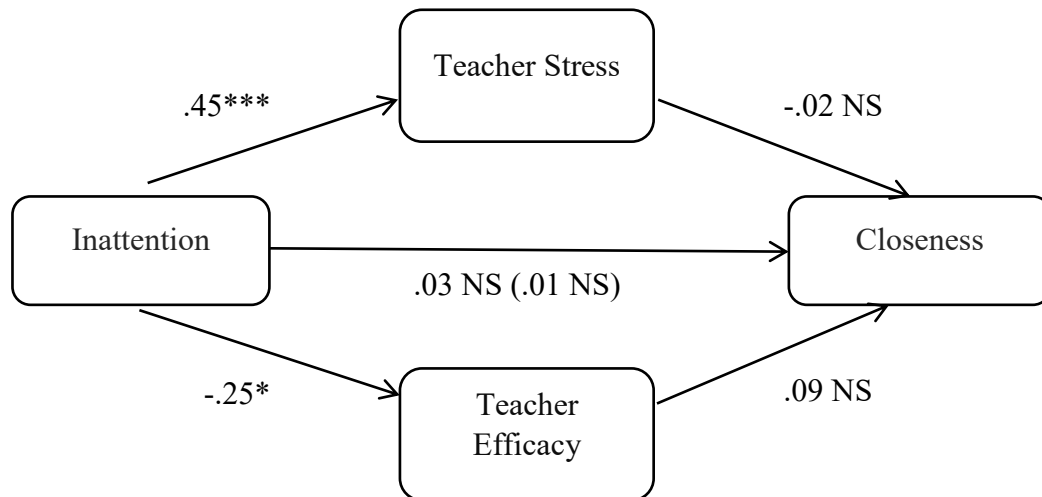
Figure 14 *Study 3: Research Question 3: Mediation Model Two*

Figure 14. Standardized regression coefficients for the relationship between inattentive symptoms and student-teacher closeness in school-aged children, testing for teacher stress and teacher efficacy as mediators. The total standardized regression coefficient between inattentive symptoms and student-teacher closeness (without controlling for the mediators) is in parentheses.

* $p < .05$; ** $p < .01$; *** $p < .001$

NS. Not significant

Figure 15 Study 3: Research Question 3: Mediation Model Three

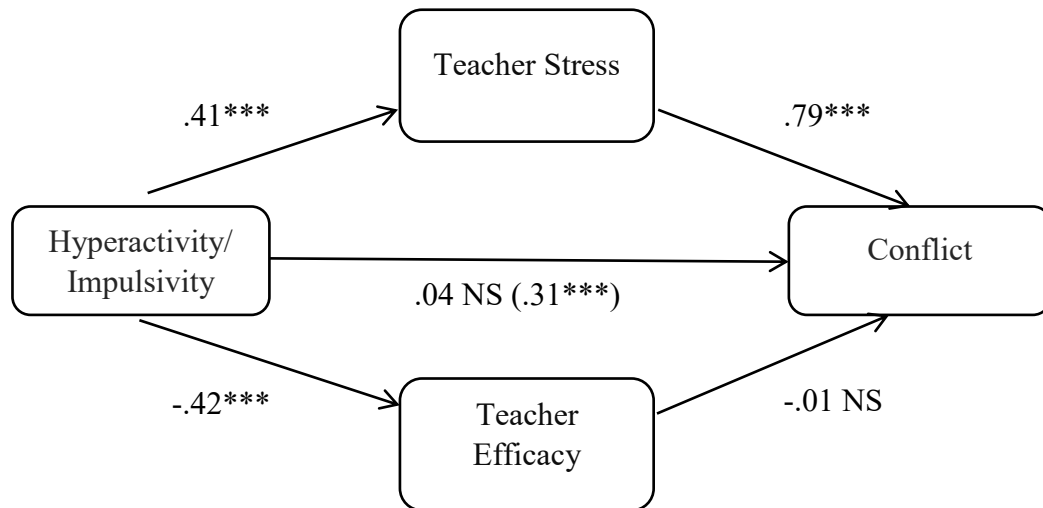


Figure 15. Standardized regression coefficients for the relationship between hyperactivity/impulsivity symptoms and student-teacher conflict in school-aged children, testing for teacher stress and teacher efficacy as mediators. The total standardized regression coefficient between hyperactivity/impulsivity symptoms and student-teacher conflict (without controlling for the mediators) is in parentheses.

* $p < .05$; ** $p < .01$; *** $p < .001$

NS. Not significant

Figure 16 Study 3: Research Question 3: Mediation Model Four

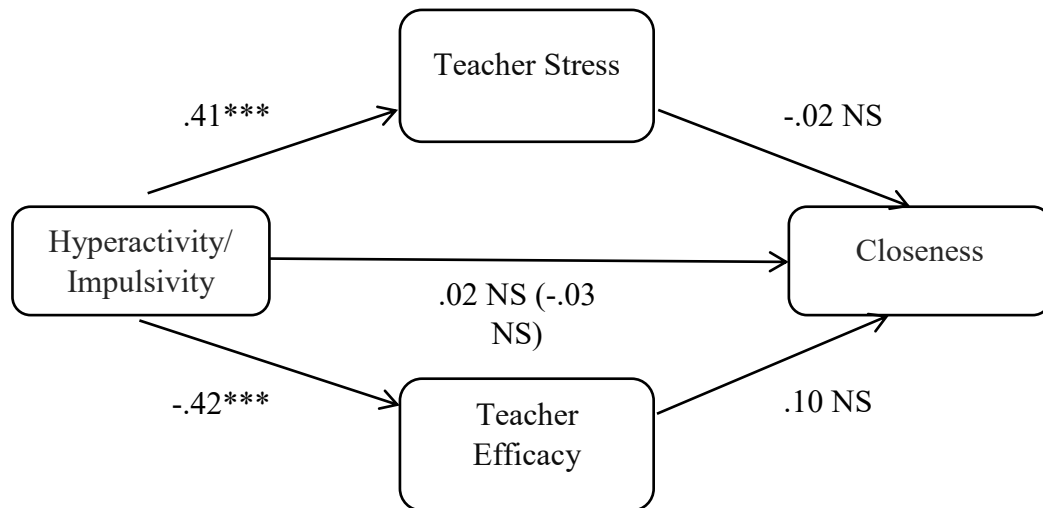


Figure 16. Standardized regression coefficients for the relationship between hyperactivity/impulsivity symptoms and student-teacher closeness in school-aged children, testing for teacher stress and teacher efficacy as mediators. The total standardized regression coefficient between hyperactivity/impulsivity symptoms and student-teacher closeness (without controlling for the mediators) is in parentheses.

* $p < .05$; ** $p < .01$; *** $p < .001$

NS. Not significant

Appendix A

ADHD Rating Scale IV- Preschool Version

ADHD Rating Scale IV - Preschool Version

Child's Name: _____ Sex: M F Age: _____

Completed By: _____ Relationship: _____

Circle the number that <u>best describes</u> the child's behavior over the past 6 months.		Rarely or never	Sometimes	Often	Very often
1.	Fails to give close attention to details (i.e. rushes through activities, makes careless mistakes)	0	1	2	3
2.	Fidgets with hands or feet or squirms in seat (taps hands or feet)	0	1	2	3
3.	Has difficulty sustaining attention in tasks or play activities	0	1	2	3
4.	Leaves seat in classroom, during meals, or in other situations in which remaining seated is expected	0	1	2	3
5.	Does not seem to listen when spoken to directly (tunes you out)	0	1	2	3
6.	Runs about or climbs excessively in situations in which it is inappropriate	0	1	2	3
7.	Does not follow through on instructions or fails to finish tasks (i.e. "go upstairs, get your shoes and socks"); has difficulty with transitions)	0	1	2	3
8.	Has difficulty playing quietly (alone or in groups)	0	1	2	3
9.	Has difficulty organizing tasks and activities (i.e. choosing an activity, getting materials, doing steps in order)	0	1	2	3
10.	Is "on the go" or acts as if "driven by a motor"	0	1	2	3
11.	Avoids tasks that require sustained mental effort (i.e. puzzles, learning ABC's, writing name)	0	1	2	3
12.	Talks excessively	0	1	2	3
13.	Loses things necessary for tasks or activities (i.e. mittens, shoes, backpack)	0	1	2	3
14.	Blurts out answers before questions have been completed	0	1	2	3
15.	Is easily distracted	0	1	2	3
16.	Has difficulty awaiting turn	0	1	2	3
17.	Is forgetful in daily activities (i.e. forgets papers, forgets directions)	0	1	2	3
18.	Interrupts or intrudes on others	0	1	2	3

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Appendix B

Family Involvement Questionnaire (FIQ)

Parents asked to respond to items a 4-point Likert format (1 = rarely, 2 = sometimes, 3 = often, 4 = always).

School-Based Involvement

I volunteer in my child's classroom
I participate in parent and family social activities with (he teacher
I participate in planning classroom activities with the teacher
I go on class trips with my child
I talk with other parents about school meetings and events
I participate in planning school trips for my child
I meet with other parents from my child's class outside of school
I hear teachers tell my child how much they love learning
I participate in fundraising activities in my child's school
I feel that parents in my child's classroom support each other

Home-Based Involvement

I spend time working with my child on number skills
I spend time working with my child on reading/writing skills
I talk to my child about how much I love learning new things
I bring home learning materials for my child (videos, etc.)
I spend time with my child working on creative activities
I share stories with my child about when I was in school
I see that my child has a place for books and school materials
I take my child places in the community to learn special things (i.e., zoo, museum)
I maintain clear rules at my home that my child should obey
I talk about my child's learning efforts in front of relatives
I review my child's school work
I keep a regular morning and bedtime schedule for my child
I praise my child for school work in front of the teacher

Home-School Communication

I talk to the teacher about how my child gets along with his/her classmates at school
I talk with my child's teacher about classroom rules
I talk to my child's teacher about his/her difficulties at school
I talk with my child's teacher about school work to practice at home
I talk to my child's teacher about my child's accomplishments
I talk to my child's teacher about his/her daily routine
I attend conferences with the teacher to talk about my child's learning or behavior
The teacher and I write notes about my child or school activities
I schedule meetings with administration to talk about problems or to gain information
I talk with my child's teacher on the telephone
I talk with my child's teacher about personal or family matters

Appendix C

Student-Teacher Relationship Scale- Short Form (STRS- SF)

Child: _____ Teacher: _____
 Grade: _____

Please reflect on the degree to which each of the following statements currently applies to your relationship with this child. Using the scale below, circle the appropriate number for each item.

Definitely does not apply 1	Not really 2	Neutral, not sure 3	Applies somewhat 4	Definitely applies 5
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1. I share an affectionate, warm relationship with this child.	1	2	3	4	5
2. This child and I always seem to be struggling with each other.	1	2	3	4	5
3. If upset, this child will seek comfort from me.	1	2	3	4	5
4. This child is uncomfortable with physical affection or touch from me.	1	2	3	4	5
5. This child values his/her relationship with me.	1	2	3	4	5
6. When I praise this child, he/she beams with pride.	1	2	3	4	5
7. This child spontaneously shares information about himself/herself.	1	2	3	4	5
8. This child easily becomes angry with me.	1	2	3	4	5
9. It is easy to be in tune with what this child is feeling.	1	2	3	4	5
10. This child remains angry or is resistant after being disciplined.	1	2	3	4	5
11. Dealing with this child drains my energy	1	2	3	4	5
12. When this child is in a bad mood, I know we're in for a long and difficult day.	1	2	3	4	5
13. This child's feelings toward me can be unpredictable or can change suddenly.	1	2	3	4	5
14. This child is sneaky or manipulative with me.	1	2	3	4	5
15. This child openly shares his/her feelings and experiences with me.	1	2	3	4	5

Appendix D

Parent-Teacher Relationship Scale

The following statements are about your relationship with this child's parent. For each one, please circle the number that best indicates how much you agree with the statements.

	Strongly disagree	Mildly disagree	Not sure	Mildly agree	Strongly agree
1. We trust each other.	1	2	3	4	5
2. It is difficult for us to work together.	1	2	3	4	5
3. We cooperate with each other.	1	2	3	4	5
4. Communication is difficult between us.	1	2	3	4	5
5. I respect this parent.	1	2	3	4	5
6. This parent respects me.	1	2	3	4	5
7. We are sensitive to each other's feelings.	1	2	3	4	5
8. We have different views of right and wrong.	1	2	3	4	5
9. When there is a problem with my child, the parent is all talk and no action.	1	2	3	4	5
10. This parent keeps his/her promises to me.	1	2	3	4	5
11. When there is a behavior problem, I have to solve it without help from this parent.	1	2	3	4	5
12. When things aren't going well, it takes too long to work them out.	1	2	3	4	5
13. We understand each other.	1	2	3	4	5
14. We see this child differently.	1	2	3	4	5
15. We agree about who should do what regarding this child.	1	2	3	4	5
16. I expect more from this parent than I get.	1	2	3	4	5
17. We have similar expectations of this child.	1	2	3	4	5
18. This parent tells me when s/he is pleased.	1	2	3	4	5
19. I don't like the way this parent talks to me.	1	2	3	4	5
20. I tell this parent when I am pleased.	1	2	3	4	5
	Strongly disagree	Mildly disagree	Not sure	Mildly agree	Strongly agree
21. I tell this parent when I am concerned.	1	2	3	4	5
22. I tell this parent when I am worried.	1	2	3	4	5
23. I ask this parent's opinion about this child's progress.	1	2	3	4	5
24. I ask this parent for suggestions.	1	2	3	4	5

Appendix E

Student-Teacher Relationship Scale- Long Form (STRS- LF)

Teacher's name _____ Gender: M F Ethnicity _____ Date ____/____/____

Child's name _____ Grade _____ Gender: M F Ethnicity _____ Age _____

Please reflect on the degree to which each of the following statements currently applies to your relationship with this child. Using the point scale below, CIRCLE the appropriate number for each item. If you need to change your answer, DO NOT ERASE! Make an X through the incorrect answer and circle the correct answer.

	1 Definitely does not apply	2 Does not really apply	3 Neutral, not sure	4 Applies somewhat	5 Definitely applies
1. I share an affectionate, warm relationship with this child.	1	2	3	4	5
2. This child and I always seem to be struggling with each other.	1	2	3	4	5
3. If upset, this child will seek comfort from me.	1	2	3	4	5
4. This child is uncomfortable with physical affection or touch from me.	1	2	3	4	5
5. This child values his/her relationship with me.	1	2	3	4	5
6. This child appears hurt or embarrassed when I correct him/her.	1	2	3	4	5
7. When I praise this child, he/she beams with pride.	1	2	3	4	5
8. This child reacts strongly to separation from me.	1	2	3	4	5
9. This child spontaneously shares information about himself/herself.	1	2	3	4	5
10. This child is overly dependent on me.	1	2	3	4	5
11. This child easily becomes angry with me.	1	2	3	4	5
12. This child tries to please me.	1	2	3	4	5
13. This child feels that I treat him/her unfairly.	1	2	3	4	5
14. This child asks for my help when he/she really does not need help.	1	2	3	4	5
15. It is easy to be in tune with what this child is feeling.	1	2	3	4	5
16. This child sees me as a source of punishment and criticism.	1	2	3	4	5
17. This child expresses hurt or jealousy when I spend time with other children.	1	2	3	4	5
18. This child remains angry or is resistant after being disciplined.	1	2	3	4	5
19. When this child is misbehaving, he/she responds well to my look or tone of voice.	1	2	3	4	5
20. Dealing with this child drains my energy.	1	2	3	4	5
21. I've noticed this child copying my behavior or ways of doing things.	1	2	3	4	5
22. When this child is in a bad mood, I know we're in for a long and difficult day.	1	2	3	4	5
23. This child's feelings toward me can be unpredictable or can change suddenly.	1	2	3	4	5
24. Despite my best efforts, I'm uncomfortable with how this child and I get along.	1	2	3	4	5
25. This child whines or cries when he/she wants something from me.	1	2	3	4	5
26. This child is sneaky or manipulative with me.	1	2	3	4	5
27. This child openly shares his/her feelings and experiences with me.	1	2	3	4	5
28. My interactions with this child make me feel effective and confident.	1	2	3	4	5

Appendix F

ADHD Knowledge Survey

Self-Check #1		Knowledge Survey		
If you wish, please take a few moments to complete this knowledge survey. Indicate whether you believe each of the statements below are "True" or "False". If you are unsure, please tick the "Don't Know" response column. The correct answers are listed in Appendix 4.				
		True	False	Don't Know
1	ADHD occurs as frequently in girls as in boys.			
2	ADHD is caused by too much sugar in the diet and/or by food additives.			
3	Children who are inattentive, but not hyperactive, can be diagnosed with ADHD.			
4	Academic weaknesses in students with ADHD are primarily the result of the behavioural symptoms of ADHD (for example, easily distracted, restless).			
5	Children with ADHD are disruptive mainly because they do not want to finish assignments or follow rules.			
6	Eliminating food additives and reducing sugar intake are not effective ways to improve the behavioural symptoms of most children with ADHD.			
7	Educational interventions are often not needed if the student is receiving pharmacological treatment (i.e., medication).			
8	ADHD can be inherited.			
9	Children with ADHD usually have good social skills and peer relations.			
10	ADHD is due primarily to poor parenting practices.			
11	Girls with ADHD are as impaired as boys with ADHD.			
12	Adolescents with ADHD usually do the same academically as adolescents without ADHD.			
13	Academic underachievement tends to be more strongly associated with symptoms of hyperactivity/impulsivity than with inattention symptoms.			
14	Most children with ADHD do not have ADHD once they become adolescents.			
15	Children with ADHD exhibit more attentive and focused behaviour in one-on-one than group situations.			
16	A child who exhibits behavioural symptoms of ADHD in at least one situation (for example, home or school) can be diagnosed with ADHD.			
17	Adolescents with ADHD are three times more likely than adolescents without ADHD to leave school early (that is, drop out).			
18	ADHD occurs in approximately 5% to 12% of school-age children.			
19	There are three main subtypes of ADHD: Primarily Inattentive, Primarily Hyperactive/Impulsive, and Combined Subtype.			
20	Children with ADHD often exhibit cognitive deficits in working memory and executive functions.			

Appendix G

Teachers' Sense of Efficacy Scale- Short Form

Teachers' Sense of Efficacy Scale¹ (short form)

Teacher Beliefs		How much can you do?								
Directions: This questionnaire is designed to help us gain a better understanding of the kinds of things that create difficulties for teachers in their school activities. Please indicate your opinion about each of the statements below. Your answers are confidential.		Nothing	Very Little	Some Influence	Quite A Bit	A Great Deal				
1.	How much can you do to control disruptive behavior in the classroom?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2.	How much can you do to motivate students who show low interest in school work?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
3.	How much can you do to get students to believe they can do well in school work?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
4.	How much can you do to help your students value learning?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
5.	To what extent can you craft good questions for your students?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
6.	How much can you do to get children to follow classroom rules?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
7.	How much can you do to calm a student who is disruptive or noisy?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
8.	How well can you establish a classroom management system with each group of students?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
9.	How much can you use a variety of assessment strategies?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
10.	To what extent can you provide an alternative explanation or example when students are confused?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
11.	How much can you assist families in helping their children do well in school?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
12.	How well can you implement alternative strategies in your classroom?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)