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### Publication Date

2022

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UNIVERSITY OF CALIFORNIA  
RIVERSIDE

Students With Attention-Deficit Hyperactivity Disorder:  
Examining the Association Between Teacher Factors and Student-Teacher Relationships

A Thesis submitted in partial satisfaction  
of the requirements for the degree of

Master of Arts

in

Education

by

Melissa R. Klaib

June 2022

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June 2022

The Thesis of Melissa R. Klaib is approved:

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## ABSTRACT OF THE THESIS

Students With Attention-Deficit Hyperactivity Disorder:  
Examining the Association Between Teacher Factors and Student-Teacher Relationships

by

Melissa R. Klaib

Master of Arts, Graduate Program in Education  
University of California, Riverside, June 2022  
Dr. Wesley Sims, Chairperson

Positive student-teacher relationships (STRs) are vital for student learning and success (Ewe, 2019). Students with ADHD, however, are at risk for poorer STR quality and more negative outcomes compared to their typically developing peers (Steinberg & Drabick, 2015; Zendarski et al., 2020). While empirical research has focused primarily on the STRs for typically developing students, comparatively little is known about the factors that may play a role in STR quality for students with ADHD (Rogers et al., 2015). For example, teachers consistently report feeling inadequately prepared to manage the challenging behaviors exhibited by students with ADHD (Greene et al., 2002), which likely impacts their attitude toward and relationship with the student. Unfortunately, this topic has yet to receive the scholarly attention that appears warranted. The present study aims to (1) examine which teacher-level factors influence relationship quality between teachers and their students with ADHD, (2) investigate whether students with ADHD and

their teachers perceive their relationship differently, and (3) determine how relationship quality impacts the students' academic engagement. Salient teacher-level factors considered in this study will include certification level, years of teaching experience, stress levels, knowledge of ADHD, and teacher's perception of the severity of their student's ADHD symptoms. The data is projected to be collected approximately halfway through the school year from dyads of teachers and their students with ADHD. It is expected that the number of years teaching and knowledge of ADHD will be positively associated with STR quality; stress levels and perception of ADHD symptom severity are expected to be negatively associated with STR quality, and special education teachers are expected to rate STR quality as more positive than general education teachers. It is also hypothesized that teachers and students with ADHD will differ in their STR ratings, and that both teachers' and student's perception of relationship quality will positively impact levels of academic motivation and engagement, whereas symptom severity will have a negative impact. Understanding the factors that may be associated with more positive STR quality for students with ADHD can facilitate identification of potentially malleable factors and thus inform preservice training, in-service professional development, prevent, and intervention efforts to improve these relationships that are so critical for student success.

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## **Introduction**

A diagnosis of Attention-Deficit Hyperactivity Disorder (ADHD) is often attached to a host of challenges for the person diagnosed as well as their caregivers. Research documents a marked increase in the likelihood of negative outcomes, ranging from academic difficulties and underachievement to difficulties with peer relationships, family conflict, higher rates of substance abuse and antisocial behaviors, more physical injuries, and more car accidents for individuals with ADHD (Steinberg & Drabick, 2015). Without mitigation efforts, the symptoms associated with ADHD can have a life-long impact on the individual with ADHD. Given the time individuals spend in educational settings (i.e., early and across the developmental chronology), the foci of educational services (e.g., acquisition of academic, social, adaptive knowledge and skill), and proximity to prevention and intervention services, schools appear well-situated to support individuals experiencing noteworthy difficulties, including those diagnosed with ADHD (Daley & Birchwood, 2010; Singh, 2008). As primary points of contact, classroom educators play a vital role in the identification and response to student difficulty, especially for ADHD (Jerome et al., 1994; Sax & Kautz, 2003).

Unfortunately, teacher efforts to support prevention and intervention for students experiencing life or school difficulties may be susceptible to subjective interpretation or personal bias (de Boer et al., 2018). Classroom educator's perceptions of student may be influenced by a variety of ecological factors (Singh, 2008), including their own or the student's socio-cultural or racial background (Hughes & Kwok, 2007; Warikoo et al., 2016), prior experiences with the student, and actual or perceived disability status (Zee et



al., 2020). Ultimately, these factors are highly influential in the formation of the student-teacher relationship (STR), which has been shown to be a predictor of positive academic and life outcomes (Rogers et al., 2015). Literature, however, documents the tendency for decreased quality of relationship between teacher and students with disabilities (Zee et al., 2020). Students with academic or behavioral challenges are at risk for negative relationships with their teachers, which has been linked to a plethora of negative outcomes for the students (McGrath & Van Bergen, 2015). At the same time, students who experience more positive relationships with their teachers have more favorable outcomes (Ewe, 2019; McGrath & Van Bergen, 2015; Murray & Greenberg, 2001).

### **Attention Deficit Hyperactivity Disorder**

ADHD is a neurodevelopmental disorder characterized by hyperactivity, impulsivity, and/or inattention that impairs functioning across home, school, and social settings (Barry et al., 2002) due to its impact on cognitive functioning, particularly processing speed, working memory, tasks requiring attention (Areces et al., 2018), inhibition (Castellanos et al., 2006), and social cognition (Uekermann et al., 2010). It is considered one of the most common developmental disorders in school-age children (Arnett et al., 2013) affecting an estimated 3% to 5% of children (Mohammadi et al., 2021; Song et al., 2019) and persisting into adulthood for 2.5% of them (Mohammadi et al., 2021). National prevalence rates suggest that ADHD is more common in boys (APA, 2013), who are two to three times more likely than girls to be diagnosed with ADHD (Kern et al., 2015). Approximately two million school-age children in the United States are affected by ADHD (Jensen & Cooper, 2002), placing about one to two children with

ADHD in every classroom (Batzle et al., 2010).

This disorder is believed to arise from a combination of genetic, neurological, and environmental factors (Mohammadi et al., 2021). Of the three recognized ADHD subtypes (i.e., predominantly hyperactive, predominantly inattentive, or combined), the combined presentation is the most commonly diagnosed subtype (Nijmeijer et al., 2008), with children being affected by both the inattentive and hyperactive symptomatology. Children with ADHD also frequently present with comorbid conditions (Arnett et al., 2013), with up to 44% being diagnosed with at least one additional disorder (Steinberg & Drabick, 2015). ADHD and Autism Spectrum Disorder (ASD) are considered highly comorbid, with an estimated 30-80% of children with ASD also being diagnosed with ADHD and 20-50% of children with ADHD also meeting criteria for ASD (Rommelse et al., 2010). Approximately 46% of children with ADHD were reported to have a learning disability (Larson et al., 2011), with a predisposition to reading disability (Tistarelli et al., 2020). Children with ADHD also have high rates of comorbid conduct disorder (27%), anxiety (18%), and depression (14%) (Larson et al., 2011). Other comorbid disorders frequently reported in children with ADHD include oppositional defiant disorder, substance use disorder, eating disorders, and asthma, which is more common among children with ADHD as compared to children without ADHD (Tistarelli et al., 2020). In line with the predominant diagnosis of ADHD in boys, even the associated comorbidities seem to affect boys and girls differentially—boys with ADHD were found to display more externalizing disorders (such as conduct disorder) whereas girls with ADHD exhibited more internalizing disorders (such as anxiety) (Mohammadi et al., 2021). Age

also seems to impact the pattern of comorbidities: younger children with ADHD had more externalizing disorders as opposed to their older counterparts who had a higher prevalence of internalizing disorders (Mohammadi et al., 2021; Tung et al., 2016).

## **Symptomatology Experienced by Children with ADHD**

### ***Cognitive Difficulties***

Children with ADHD experience varying levels of impairment in cognitive functioning, particularly processing speed, working memory, tasks requiring attention (Areces et al., 2018), and inhibition (Castellanos et al., 2006), all of which may interfere with the learning of academic information in the classroom. ADHD is marked by deficits in sustained and selective attention, which also result in impairment in inhibition of prepotent responses and dysfunction in emotion regulation (Gupta & Kar, 2010). Children with ADHD also display a highly inconsistent and inaccurate response pattern, indicative of significant fluctuations in cognitive performance (Gupta & Kar, 2010). Deficits in control processes present challenges in disengaging from one task and transitioning to another (Gupta & Kar, 2010). Individuals with ADHD are also characterized by an abnormal reward system and a motivational style known as “delay aversion,” which refers to the tendency for avoiding delay and preferring smaller immediate rewards over larger delayed rewards (Ernst et al., 2003). ADHD impacts executive functioning on multiple levels, leading to deficits in hindsight and forethought, problem solving, and self-reflection (Barkley, 1997). Interestingly, research has indicated that individuals with ADHD who have greater cognitive deficits and more severe impairments often display a “positive illusory bias” (Owens et al., 2007), which is a

tendency to overestimate their abilities and competency (Hoza et al., 2001). This lack of awareness of their true competency level may limit their ability to use feedback to adjust their behavior and improve over time. Yet at the same time it seems to act as a protective factor against depression—children with ADHD who do not show a positive illusory bias were more likely to experience depressive symptoms than those with the positive bias despite their poor performance (McQuade et al., 2011).

### ***Socio-Emotional Difficulties***

ADHD presents emotional challenges that when paired with cognitive deficits, often result in the pattern of behavioral and social difficulties that lead to referral for diagnosis, as children with ADHD are at high risk for emotional and behavioral problems as well as functional impairment across settings (Strine et al., 2006). Approximately 45% to 54% of children with ADHD exhibit significant emotion regulation difficulties (Groves et al., 2020), leaving children with ADHD at an increased risk for internalizing and externalizing disorders and a tendency to display negative emotionality, poor reactive control, and high irritability (Steinberg & Drabick, 2015). Impairments in emotion processing have also been linked to poor academic outcomes (Jusyte et al., 2017). Children with ADHD experience impulsive, intense shifts in emotion (both positive and negative) that are difficult to control (Rosen & Factor, 2015). Dysfunction in the visual pathways that provide sensory input to the amygdala may contribute to the affect recognition deficits frequently observed in children with ADHD (Uekermann et al., 2010), which impacts the perception and interpretation of emotions in faces and from nonverbal cues (Parke et al., 2021). Studies have found that children and teens with

ADHD may have impaired recognition of negative facial expressions used to signal disapproval, such as anger, fear, or sadness (Jusyte et al., 2017), and affect recognition deficits in children with ADHD have been associated with severity of interpersonal problems (Jusyte et al., 2017). When others use nonverbal facial expressions to indicate disapproval, children with ADHD may be less likely to recognize and correctly evaluate those nonverbal cues and may persist in their disapproved behavior or words, possibly leading to rejection by others. This lower social competence due to poor affect recognition is indeed associated with lower popularity among peers (Çiray et al., 2022) and is one facet of how ADHD can impact social interactions.

Just as ADHD symptoms impact the learning of academic information, they are also believed to interfere with social cognition, or the ability to encode and interpret social cues (Uekermann et al., 2010). Children with ADHD often experience interpersonal and social difficulties (Dagdelen, 2020; M. J. Murray, 2010), and even after treating ADHD symptoms pharmacologically, the social difficulties remain (Grzadzinski et al., 2011). Although not a core symptom of ADHD required for diagnosis, impaired social cognition can be considered one of the most debilitating deficits of ADHD with its significant impact on relationships with family members, peers, and teachers (Bora & Pantelis, 2016; Nijmeijer et al., 2008). For example, research has shown that children with ADHD are more likely to be rejected socially as compared to their typically developing peers (DuPaul et al., 2011).

An estimated 85% of children with ADHD have difficulties in social interaction and communication (Bühler et al., 2011; Grzadzinski et al., 2011). The communication

challenges experienced by children with ADHD include difficulties in pragmatic language, which is the use of language in a social context. This includes skills such as initiating, maintaining, and ending a conversation (Çiray et al., 2022) as well as understanding implicit messages and figurative expressions such as irony (Caillies et al., 2014). These pragmatic language skills were found to be the best predictor of behavioral and adaptive functioning difficulties in children with ADHD (Parke et al., 2021) and were found to be correlated with affect recognition, both of which play a significant role in the social difficulties experienced by children with ADHD (Çiray et al., 2022). Difficulties in pragmatic language impair social functioning and prosocial behavior, with the relationship between ADHD and social skills being mediated by the ability to properly manage a conversation (Çiray et al., 2022). When emotion dysregulation is compounded with limited pragmatic language skills that prevent appropriate verbal expression, children with ADHD may resort to inappropriate methods of dealing with their frustration or intense emotions, such as through externalizing behaviors or internalizing behaviors (Çiray et al., 2022; Parke et al., 2021), which impact their interpersonal relationships.

### ***Behavioral Difficulties***

Depending on the severity of symptoms, individuals with ADHD can exhibit difficulty waiting their turn, a tendency to talk excessively and interrupt others (whether in games or conversations), an appearance of not listening when spoken to (Daley & Birchwood, 2010) and more aggressive reactions to interpersonal conflicts than typically developing individuals (DuPaul et al., 2011). ADHD is frequently comorbid with

externalizing disorders, with 30-40% of children with ADHD also meeting criteria for Oppositional Defiant Disorder (ODD) or Conduct Disorder (CD) (Kuja-Halkola et al., 2015). Children and adolescents with ADHD also are found to have elevated rates of delinquency compared to typically developing peers (Sibley et al., 2011) and tend to engage in more risk-taking behaviors, which has been hypothesized to be due to higher benefit perception of the risky behavior (Shoham et al., 2016), lower attribution of severe consequences to the behavior (Faraone et al., 2015), disregard of the consequences (Bruce et al., 2009), or possibly a combination of these factors. Over the life course, individuals with ADHD have been found to be at greater risk of substance abuse, criminality, and antisocial behavior (Barkley et al., 2004).

### **Treatment of ADHD**

Conventional treatment for ADHD consists of medication, behavior therapy, or a combination of both. Stimulants, such as methylphenidate and amphetamines (Swanson et al., 1998) are considered the first line of medications used in the treatment of ADHD, while psychosocial therapy focuses on altering behavior through modifications to the child's environment (Dias et al., 2013). Research suggests that pharmacological treatment or a multimodal treatment combining medication and psychosocial therapy provided better results than behavior therapy alone (MTA Cooperative Group, 1999), although it is unclear whether the difference in results is maintained over the long-term (Dias et al., 2013). However, the use of medication alone remains the most commonly used treatment option for individuals with ADHD (Danielson et al., 2018).

## **Impact of ADHD in the Classroom**

### ***Behavioral and Academic Challenges***

With a diagnosis of ADHD, these children are at higher risk for academic underachievement, being retained a grade (Larson et al., 2011), dropping out of school (Kent et al., 2011), or being suspended or expelled (Daley & Birchwood, 2010). The classroom setting is particularly exacerbating to ADHD symptomatology (Kos et al., 2006). Students are expected to sit quietly, listen attentively, and act with self-control, all of which are challenging tasks for students with ADHD (Bell et al., 2011), whether of the inattentive, hyperactive/impulsive, or combined subtype. Because hyperactivity and impulsivity can be especially disruptive in a classroom setting, students with ADHD are often referred for behavior support or special education to address the externalizing behaviors that are impacting their academic performance. In addition, the inattention and the frequent comorbidity of learning disorders (such as dyslexia and other specific learning disabilities) can negatively impact the academic achievement of students with ADHD, which also results in referrals to special education for academic support.

In every academic subject, students with ADHD were found to obtain significantly lower grades than students without ADHD (Barry et al., 2002; Daley & Birchwood, 2010), often struggling with remaining on task, completing their work (DuPaul et al., 2019), paying attention and following instructions (Kos et al., 2006). Students with ADHD also tend to exhibit behavior problems, such as aggression, noncompliance (Barkley, 2006), arguments, and defiance (Bekle, 2004) in addition to social impairment in their interactions with peers and adults (Hoza, 2007) and lack of



emotional control (Bekle, 2004). The difficulty in managing the myriad of behavioral challenges can severely impact the students' relationships with their teachers.

### ***School Services and Interventions***

Federal law mandates that special education services be provided to students who have an educational disability that impairs their educational functioning through an individualized education program (IEP), as determined by the eligibility criteria listed in the Individuals with Disabilities Education Improvement Act (IDEA, 2004). Students can also be offered educational accommodations in their general education classrooms under Section 504 of the Rehabilitation Act of 1973. Parent-reported data from a national survey of 2,495 children with ADHD indicated that 62.3% received educational support in schools and 32.0% received classroom behavior management support. Most students with ADHD had an IEP (42.9%) over a Section 504 plan (13.6%) (DuPaul et al., 2019). Reward contingencies including teacher praise and daily report cards are common interventions used for students with ADHD (Batzle et al., 2010), and the fidelity and quality of a teacher's implementation of these interventions is important for their success in managing ADHD-behavior. A teacher's relationship with the student, however, may impact the fidelity and quality of the intervention provided, thus undermining its effectiveness (Ljusberg, 2011; Yeager & Walton, 2011).

### **Student-Teacher Relationships**

Student-teacher relationships (STRs) are conceptualized as resulting from the combination of both student and teacher characteristics, in what is sometimes called "student-teacher compatibility" (Greene, 1995). Both student and teacher characteristics

play a role in the quality of their reciprocal relationship (McGrath & Van Bergen, 2015; Nurmi, 2012). Evidence is conflicting, however, regarding how congruent teacher and student perceptions are, whether they both match in their perception of relationship quality (Prewett et al., 2019) or differ (Hughes, 2011; Koomen & Jellesma, 2015) due to their interaction history and specific personal characteristics (Pianta et al., 2003). In one study examining STRs for students with behavioral difficulties, it was found that while teachers tended to rate these relationships negatively, students expressed wanting closer relationships with their teachers and tended to rate the STR more positively (Decker et al., 2007), indicating that students and teachers may have different perceptions regarding the quality of their relationship.

Despite the more limited investigation of incongruence in relationship perception and the less frequent study of students' perceptions as compared to teacher perceptions (Rogers et al., 2015; Zee et al., 2020), the positive impact of STRs on student outcomes widely studied and accepted (Ewe, 2019; Hughes, 2011; Pianta, 1994; Rogers et al., 2015) and has been found to predict students' social, behavioral, and academic outcomes (Furrer & Skinner, 2003; McGrath & Van Bergen, 2015). Positive STRs are important for students' academic and socioemotional development, affecting their overall well-being, academic achievement, sense of belonging, and attitude towards school (McGrath & Van Bergen, 2015; Rogers et al., 2015). A positive relationship with the teacher has also been shown to influence peer acceptance, while poor relationships with the teacher tended to increase peer avoidance and rejection (Hughes et al., 2001; McGrath & Van Bergen, 2015). Through their relationship with the student, teachers can influence their social and

behavioral outcomes as well as their academic trajectory. Even starting from the beginning of the school year, teachers make inferences about their students' capabilities and performance. They create expectations that students can often sense and are aware of, leading into a phenomenon known as a "self-fulfilling prophecy" in which the students perform as their teacher expects of them (Batzle et al., 2010). In a study examining this effect, students who were expected by their teachers to show improvements did indeed show more increases in reasoning and IQ scores compared to other students (Rosenthal & Jacobson, 1966). Teachers' expectations and attitudes towards students can influence their relationship with them, and the quality of their relationship has implications for the students' academic engagement and success in school. Students who report a positive relationship with their teacher tend to work harder and persevere in difficult tasks, pay more attention to the teacher, and experience overall higher levels of engagement in the classroom (Hughes & Kwok, 2007), leading to higher academic self-efficacy and achievement (Prewett et al., 2019). A positive relationship with their teacher allows students to feel more motivated and capable of learning (Hughes & Kwok, 2007), as well as better able to manage their behavioral challenges (Little & Kobak, 2003).

Weaker relationships, on the other hand leave students feeling disengaged, at risk for poor academic engagement and achievement (Rogers et al., 2015), and more susceptible to exhibiting antisocial behavior and experiencing peer rejections (McGrath & Van Bergen, 2015). Students with challenging behaviors and disabilities are particularly at risk for negative teacher perceptions or expectations, and students who exhibit aggressive or under-controlled behaviors have been shown to experience more

conflict and less support in their relationship with their teacher (Hughes & Kwok, 2007). Considering the bidirectional nature of relationships, this negative teacher view is reinforced by the students' tendency to exhibit more aggressive behaviors in response to the poor STR (Rogers et al., 2015), whereas a positive STR may have a remedial influence in improving the aggressive behaviors (Hamre & Pianta, 2001; McGrath & Van Bergen, 2015). For at-risk students who are most vulnerable to poor STR, a positive relationship with the teacher can act as a buffer and protective factor (McGrath & Van Bergen, 2015; Murray & Greenberg, 2001). Positive STRs have been found to promote student resiliency (Decker et al., 2007), improve adjustment for students with socio-emotional difficulties (Arbeau et al., 2010), and guard against other negative effects (Murray & Greenberg, 2001) such as maladaptive behavior that can continue to affect the child into adulthood (McGrath & Van Bergen, 2015).

### **Student with ADHD-Teacher Relationship**

While both student-teacher relationships and ADHD are two well-researched areas, they have generally been examined as separate fields, leaving research on student-teacher relationships *for* students with ADHD quite limited (Ewe, 2019; Rogers et al., 2015). Some research suggests that students' behavior challenges may lead to increased teacher perception of relationship conflict (Hughes, 2011). Teachers have a more negative view on teaching students with disruptive behavior disorders (Jerome et al., 1994), especially in light of their tendency to report hyperactivity and inattention as the most challenging student behaviors to manage (Nurmi, 2012). This negative view may in turn affect their perceptions and attitudes towards students with ADHD who are prone to

exhibiting these challenging behaviors. One study found that even by just reading vignettes of students with ADHD and students without ADHD, negative perceptions of students with ADHD are pervasive, with teachers rating the diagnosed students significantly lower than students without ADHD on scales of behavior, intelligence, and personality (Batzle et al., 2010). This is a grave concern for students with ADHD as positive student-teacher relationships are widely regarded as essential for learning and academic success in school (Ewe, 2019). Teachers may be more pessimistic about teaching students with ADHD and view them as needing extra instruction and effort (Atkinson et al., 1997, as cited in Bell et al., 2011). If a teacher already has a pre-formed negative view of the student with ADHD and low expectations of their academic capabilities, this may impact the effectiveness of any intervention plan and create a continuous cycle of negativity marked by a “self-fulfilling prophecy” of expecting poor behavior thus not effectively implementing the intervention that had the potential to create positive change when implemented with fidelity.

As such, the ADHD-related social impairments in addition to the inattention and hyperactivity/impulsivity may play an important role in the affected students’ relationship with their teacher in the classroom, especially when considering the reciprocal nature of relationships—student and teacher characteristics interact and influence each other in a back-and-forth manner, and these interactions influence the students’ and teachers’ perceptions of their relationship quality (Nurmi, 2012). Students are sensitive to and aware of teachers’ potentially negative views towards them (Zee et al., 2020), which may in turn impact their relationship with their teacher as well as affect their school outcomes,

such as classroom behavior and academic achievement (Montague & Rinaldi, 2001; Rogers et al., 2015).

### ***Factors Influencing Student with ADHD-Teacher Relationships***

Although research examining the relationship between students with ADHD and their teachers is sparse, general STR literature provides some insight into the potential factors that may influence this relationship that is so critical to promoting better student outcomes and academic engagement. While STRs have been examined in typically developing children (Ewe, 2019; Nurmi, 2012), children with intellectual disability or learning disabilities (Eisenhower et al., 2007; Murray & Greenberg, 2001), and children of ethnic minority (Cornelius-White, 2007; Hamre & Pianta, 2001), findings from these studies can be used to inform research on student-teacher relationships for students with ADHD. Factors that may influence teachers' attitudes towards students with ADHD and play a role in this relationship include certification level, years of teaching experience, stress levels, knowledge of ADHD, and the teacher's perception of the severity of the student's ADHD symptomatology.

**Teacher Certification.** Levels of pre- and in-service teacher training can vary dramatically across quality and focus. Typically, state departments of education, the primary credentialing body for educators, establish minimum thresholds for training as a quality control mechanism for the field. As such, certification or professional credentials serve as a metric to evaluate the depth, breadth, and specialization for educators. To this point, different credentials or certifications require documentation of a greater amount and scope of training. For example, a reading specialist or special education certification

requires more specialized training in these respective topics and students than a general education certification would require. One study comparing the attitude and knowledge of teachers towards students with ADHD and learning disabilities found that teachers who received special education training were more tolerant and understanding (Brook & Boaz, 2005), and research has shown that specialized training can significantly increase the teachers' knowledge of ADHD and the challenges experienced by the affected students, which may influence teachers' expectations (Bell et al., 2011). There is some debate, however, as to whether holding a special education certification improves the relationship of special education teachers with students who have ADHD as compared to general education teachers. On one hand, special education teachers have more constant daily exposure to highly disruptive classrooms and severe, challenging behaviors (Bell et al., 2011), which may cause higher levels of stress and can potentially negatively affect their relationship with students with ADHD. However, the additional specialized training that special education teachers undergo increases their knowledge of ADHD and improves their attitude towards students with ADHD (Vereb & DiPerna, 2004), which can positively affect their relationship with them. The increased exposure to students with ADHD through the specialized training programs has been found to be a predictor of improved teacher perceptions of ADHD (Bell et al., 2011), which has positive implications for their relationship with students affected by the disorder.

**Teacher Years of Experience.** Teachers with more exposure to students with ADHD tend to have more knowledge of ADHD and improved attitudes towards students with ADHD (Kos et al., 2004; Sciutto et al., 2000), which could positively influence their

relationship with the student. While some studies argue that more years of experience does not necessarily mean that teachers will have more exposure to ADHD (Bell et al., 2011) and the number of students with ADHD taught was not found to be significantly related to years of experience (Kos et al., 2004), the general consensus that teacher training programs seem to under-prepare preservice teachers on ADHD (Poznanski et al., 2018) may still put teachers with more years of teaching experience at an advantage in regards to exposure to ADHD. With more years of experience, teachers have been found to perceive themselves as more competent, which favorably affected their attitude toward teaching students with disabilities (Rizzo & Vispoel, 1991) and may have implications for their relationship with them, including students with ADHD.

**Teacher Stress Levels.** The teaching profession can be highly stressful, and teachers across countries commonly report high levels of stress (Harmsen et al., 2018), which may lead to burnout and poor teacher wellbeing if unaddressed (Gagnon et al., 2019). In fact, between 30% to 50% of new teachers in the United States leave the teaching profession within the first 5 years (Prilleltensky et al., 2016; Wilhelm et al., 2000), citing various causes such as poor school climate (Grayson & Alvarez, 2008) and child behavior problems (Greene et al., 1997), among others. Considering stress related specifically to students, researchers have made a distinction between *teaching stress* as opposed to *teacher stress*, with teaching stress referring to the student-specific stress as related to interactions or relationship with a particular student, whereas teacher stress refers to more general, distal sources of stress such as the demands of the job itself (Gagnon et al., 2019; Abidin et al., 2004). One study examining teaching stress in a



sample of preschool teachers found that the quality of STRs predicted teaching stress, with conflictual relationships being a significant predictor (Gagnon et al., 2019). As Gagnon and colleagues (2019) explain, the negative interactions seem to have a more powerful and enduring impact than positive interactions, making poor STRs a more salient experience. High levels of stress may prevent teachers from building positive, warm, and responsive relationships with their students—relationships which have been shown to promote higher academic achievement and social competence in students (Gagnon et al., 2019). The relationship between a teacher’s stress levels and STR quality has important implications for both the student and the teacher, though it remains unclear across the literature whether higher stress levels predict poor STR unidirectionally or whether poor STR leads to higher stress levels; the relationship between stress and STR may be bidirectional or more complex than is currently understood. Students with ADHD may be particularly prone to poor student-teacher interactions because of their often-challenging behaviors as related to their inattentive or hyperactive symptomatology. Indeed, research has shown that the student’s behavior can impact the quality of the STR as perceived by the teacher (Greene et al., 1997; Pianta, 1994) with teachers reporting higher levels of stress in teaching students with ADHD (Greene et al., 2002). The lack of a close relationship or positive STR may lead teachers to feeling ineffectual and make them less willing to try new strategies for supporting those students (Gagnon et al., 2019), which can compromise the level of support that students with ADHD receive or, if they do receive it, may compromise their effectiveness if delivered without fidelity or teacher “buy-in.”

**Teacher Knowledge of ADHD.** Having an awareness of what ADHD is and how it impacts the affected student is critical for fostering an understanding relationship. Students prefer teachers who understand their needs and their disabilities, and in one study, students with ADHD expressed the importance of their teachers understanding that they are not intentionally or deliberately acting with a purpose to disrupt the classroom (Wiener & Daniels, 2016). Another study found that 52% of adolescents with ADHD felt that their teachers don't understand them or the struggles they face, often accusing them of lacking motivation (Brook & Boaz, 2005). Misattributing the causes or intentionality of disruptive or challenging behaviors may instill negative feelings or perceptions in the teacher towards the student with ADHD while also making the student feel attacked or misunderstood by the teacher, both of which can affect the quality of their STR. Teacher training programs, however, generally do not emphasize training related to ADHD, which is unfortunate given the high prevalence of ADHD in schools. According to one study, 77% of teachers reported a lack of opportunities to learn about ADHD in their teacher training programs (Bekle, 2004), and this lack of sufficient knowledge of ADHD can be considered one of the most pressing obstacles in addressing the needs of students with ADHD (Batzle et al., 2010). Gaps have been identified in teachers' knowledge of ADHD symptomatology (Guerra et al., 2017; Sciutto et al., 2016), which tended to cover just the general stereotypical symptoms (Batzle et al., 2010; Sciutto et al., 2000) which may limit the teachers' ability to accurately identify ADHD to refer a student for evaluation. There are also concerning gaps in teachers' knowledge of evidence-based interventions for students with ADHD (Lawrence et al., 2017; Vereb & DiPerna, 2004), which can impact

how well these students are supported in the classroom. In a study by Ohan and colleagues (2008) which asked teachers to read vignettes and react to them, the researchers found that teachers with average to higher knowledge of ADHD had more helpful perceptions of students with ADHD and more helpful behaviors towards them, but also less confidence in their ability to manage the students' disruptive behaviors. This finding suggests that higher knowledge of ADHD may be linked to improved perceptions of the affection individual but also points at the gap in knowledge of ADHD's treatment and interventions in order to increase teacher efficacy (Ohan et al., 2008). Teacher knowledge of both ADHD's symptomatology as well as effective treatments/interventions may play a role in fostering positive interactions with and attitudes towards the student with ADHD as well as improving the teacher's self-efficacy in teaching students with ADHD, all of which can improve STR quality.

**Teacher Perception of Symptom Severity.** It has been found that teachers tend to prefer more cooperative, prosocial students (Montague & Rinaldi, 2001), which leaves students with ADHD at a disadvantage in forming positive relationships with their teachers considering the significant academic, behavioral, and social deficits they face. Teachers face increasing challenges in managing ADHD-related symptomatology as severity of the disorder increases. They may feel less prepared in managing these challenges (Arcia et al., 2000) and may suffer higher stress levels related to teaching students with more severe presentations of ADHD (Greene et al., 2002). While students may have similar symptom severity objectively, teachers differ in their tolerances of the symptoms and their expectations for the students (Ritter, 1989; Safran & Safran, 1987),

and so they may perceive the symptoms to be more or less problematic depending on their own perceptions and attitudes. Thus, while not an objective measure of actual severity, teachers' perceptions and ratings of how severe the ADHD symptoms may affect their attitude towards instructing these students and impact their relationship with them.

It is crucial to investigate the teacher factors that may be impacting teachers' relationships with their students, especially considering that teachers spend a significant amount of time with their students and are often the first not only to recognize symptoms and refer students, but also to implement the behavioral and academic interventions (Jerome et al., 1994; Sax & Kautz, 2003). Daily interaction with students who have ADHD and continuous management of the more challenging symptomatology may have serious implications for how teachers may approach or perceive these students. It is important to foster positive student-teacher relationships for children with ADHD which can serve as a protective factor (Toste et al., 2014) to maximize intervention benefits and buffer against the poor long-term outcomes associated with poor STRs and with the diagnosis of ADHD.

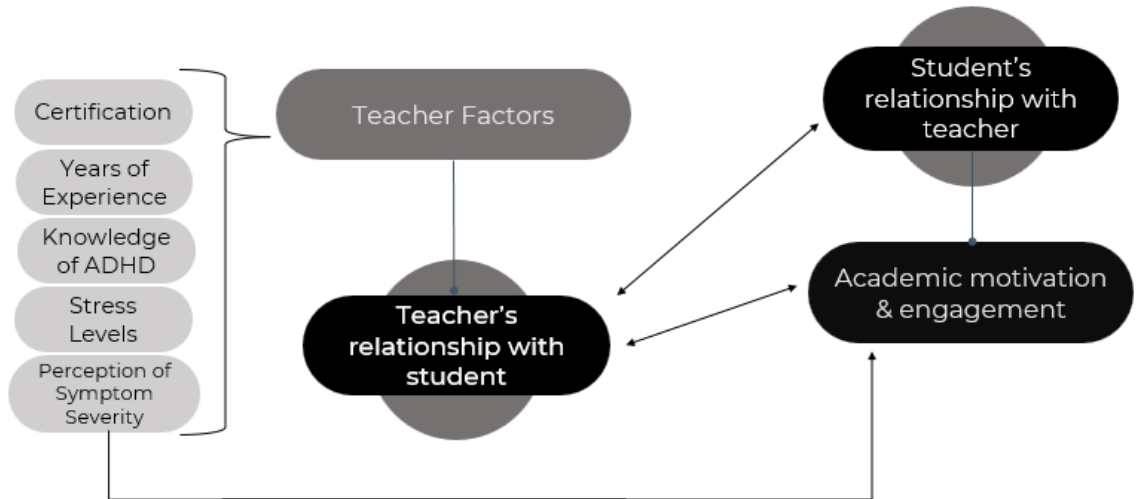
### **Current Study Proposal**

Students with ADHD are at greater risk for lower grades, higher rates of absences, and increased likelihood of retention or dropping out (DuPaul et al., 2011) as well as higher rates of substance abuse and delinquency (Sibley et al., 2010). A positive relationship with their teacher may mitigate or buffer against some of these negative outcomes, but students with ADHD may be more vulnerable to poorer STRs due to the

influence of ADHD symptomatology on their behavior and academic performance (Zee et al., 2020; Zendarski et al., 2020). Teacher characteristics and other teacher-level factors may play a role in the teacher's perception of and attitude toward students with ADHD, which could influence their relationship with those students.

In addition, students with disabilities are often aware of any potentially negative teacher views or attitudes towards them (Montague & Rinaldi, 2001; Zee et al., 2020), which may impact their relationship with the teacher. It is important to include student perceptions of STR to investigate whether students specifically with ADHD also exhibit this awareness and rate their relationship quality commensurately similar to their teachers or whether the positive illusory bias and tendency to underreport challenges (Owens et al., 2007) will inflate their ratings of their relationship with their teachers. By measuring both teacher and student ratings of STR, their differential impact on student academic engagement can also be examined to understand the functional influence of these relationships on the student's academic engagement and thus success in school. With positive STRs shown to be beneficial and linked to positive outcomes across elementary (Eisenhower et al., 2007; Jerome et al., 2009; Murray & Greenberg, 2001; Hamre & Pianta, 2001), middle (Wentzel et al., 2010), and high school (Agyekum, 2019), a better conceptualization of STR between teachers and students with ADHD across grade levels is critical for informing future interventions aimed at improving this vital relationship for an already at-risk population.

## Guiding Logic Model



## Purpose and Research Questions

The goals of this study are threefold. First, this study seeks to examine the degree to which various teacher-level factors (e.g., years of teaching experience, certification level, stress levels, knowledge of ADHD, and teacher's perception of the ADHD symptom severity) impact teacher perceptions of the quality of the relationship between third to twelfth grade students with ADHD and their teachers. This examination may facilitate identification of malleable factors that may be used to improve STR and in turn student outcomes. A second goal of this study is to determine if teachers and students with ADHD differ in their reported perceptions of their relationship quality. Knowledge regarding the congruence or incongruence of STR perception between teachers and students can inform targeted interventions efforts for fostering positive STRs. If teachers tend to view STRs more negatively than students do, this can inform prevention and intervention by focusing on the teacher level. Lastly, the proposed study will evaluate the

degree to which STR and closely related factors influence student academic engagement and motivation, which are important precursors to academic achievement and school success. This understanding can also inform prevention and intervention efforts aimed at improving student success through fostering strong, positive student-teacher relationships. Specific research questions include:

1. To what degree do teacher-level factors (e.g., years of experience, certification, stress levels, knowledge of ADHD, or ratings of symptom severity) influence teacher-reported perceptions of the quality of their relationship with students who have ADHD? It is hypothesized that experience and knowledge of ADHD will be positively associated with teacher ratings of STR whereas stress levels and symptom severity will be negatively associated with the teachers' ratings of STR. Special education teachers are expected to have more positive STRs compared to general education teachers.
2. Do teachers and their students with ADHD agree in their reported perceptions of their STR quality? Given the tendency for incongruence in ratings and the tendency of students with ADHD to underreport challenges (Owens et al., 2007), teachers and students with ADHD are expected to differ in their STR ratings.
3. To what degree do socio-contextual factors (e.g., student ratings of relationship quality, student's symptom severity [as rated by the teacher], teacher ratings of relationship quality) predict reported academic motivation and engagement levels for students with ADHD? It is hypothesized that both student and teacher ratings of STR will be significant predictors of academic motivation and engagement levels whereas

symptom severity will be negatively associated with academic motivation/engagement.

## **Methods**

### **Participants**

#### ***Teachers***

The target sample size for this study will be 95 teacher-student dyads from local elementary, middle, and high schools. Teachers will be recruited from schools in the greater Inland Empire region and beyond as needed. The target sample will include general educators and special educators of varying years of teaching experience. To be included in the study, teachers must currently be responsible for delivery of instructional content (e.g., reading, mathematics, English language arts) or special education support for a student with ADHD, and the teacher must have known the student for at least two months.

#### ***Students***

Student participants will be identified by the included teachers for study recruitment. The target sample will include students from grade levels from 3 to 12. To be included in the study, students must have a medical diagnosis of ADHD and must be currently eligible for special education services via an Individualized Education Plan (IEP) under the primary eligibility category of Other Health Impairment (OHI). Since comorbid disorders are largely prevalent in individuals with ADHD and since medication is a common ADHD treatment, students with an additional diagnosis or those that take medication will be eligible for participation. Comorbidity and medication use will not be



considered exclusionary factors, with the intent of recruiting a sample that is more representative of the general ADHD population as expected to be found in any classroom.

## **Measures**

### ***Teacher Demographic Information***

Teachers will be asked to complete a researcher-created demographics form to gather information on the teachers' age, race/ethnicity, gender, and highest level of education. The form will also inquire about the number of years teaching, their certification level (general education, special education) and any additional specialization or certifications they may hold. Additional information will also be gathered regarding the estimated number of students with ADHD served, the current number of students with ADHD in their classroom, and any ADHD-related training or professional development attended in the past.

### ***Teacher Stress Levels***

To measure *teaching stress* (the stress related to teaching a particular student), the Index of Teaching Stress (ITS; Abidin et al., 2004) will be used. The ITS is a 90-item self-report form with a 5-point Likert scale ranging from 1 (*never stressful*) to 5 (*very often stressful*) that teachers use to rate the degree of their stress as related to a specific student (for the purposes of this study, the student with ADHD). The measure can be used for teachers of all grade levels (preschool to grade 12) and provides scores along three domains: Attention-Deficit/Hyperactivity Disorder, Student Characteristics, and Teacher Characteristics. Subscales of the measure assess stressors related to both student characteristics (e.g., learning limitations, aggressiveness, ADHD-type behavior) and

teaching-related stressors (e.g., loss of job satisfaction, lack of support, frustration working with the student's parents). The ITS is estimated to take between 20 to 25 minutes to complete and is available in paper format through Par, Inc. Validity studies found an internal consistency ranging from 0.75 to 0.97 (Greene et al., 1997) and indicated significant relationships between the ITS and similar measures of teacher health, student behavior, and teacher behavior (Gagnon et al., 2019; Abidin et al., 2004).

### ***Teacher Knowledge of ADHD***

Teachers' level of ADHD knowledge will be measured using the Knowledge of Attention Deficit Disorders Scale (KADDS; Sciotto et al., 2005). The KADDS contains 36 ADHD-related statements which require the respondents to select whether they think the statement is *true (T)*, *false (F)*, or if they *don't know (DK)*. The items on the survey include both what ADHD is as well as what it is not in order to avoid a negative response bias (Sciotto et al., 2005). Three domains of ADHD knowledge are measured by the KADDS: (1) symptoms and diagnosis of ADHD, (2) treatment of ADHD, and (3) associated features (the nature, causes, and outcomes of ADHD). The KADDS has a high internal consistency ranging between 0.80 and 0.90 and includes items that have a strong empirical research base. While the manual does not include an established time to complete the KADDS, completion time should take between 20 to 30 minutes.

### ***Teacher Perception of Symptom Severity***

Teachers will be asked to complete the teacher's form of the Behavior Assessment System for Children, 3<sup>rd</sup> edition, abbreviated as BASC-3 Teacher Rating Scales (BASC-3 TRS; Reynolds & Kamphaus, 2015) for their participating student with

ADHD. The BASC-3 (TRS) is validated for use in rating students ages 2 to 21 and has been shown to have an alpha coefficient exceeding 0.80 (Altmann et al., 2018). The teacher scale includes 105-165 items that are rated using a 4-point frequency scale, with responses ranging from *never* to *almost always*. The BASC-3 TRS provides scores along multiple scales that include hyperactivity, aggression, conduct problems, anxiety, depression, attention problems, learning problems, withdrawal, atypicality, and somatization. A *T* score is generated for each scale along with a classification of clinical significance. In addition, an *F* Index score is calculated, which provides an indication as to whether the teacher tends to view the child's behavior as excessively negative. The estimated time of completion is between 30 to 45 minutes; however, if the teacher has already completed the BASC-3 for the student within one month of data collection as part of a special education assessment, the existing results will be used.

### ***Student-Teacher Relationship Quality***

Ratings of student-teacher relationship quality will be obtained using the Classroom Working Alliance Inventory (CWAI; Heath et al., 2017), which offers parallel student and teacher forms. Previous research in student-teacher relationships tends to view STRs as attachment bonds measured by degree of connectedness, trust, or lack of conflict (Pianta, 1994), and more emphasis was placed on the teachers' ratings, as reflected in the limited availability of corresponding student versions of measures. The CWAI, however, expands beyond the emotional connection and conceptualizes the student-teacher relationship as a collaborative "alliance" that encompasses more of the breadth of student and teacher relationships in the classroom (Toste et al., 2015). It was

modified based on the Working Alliance Inventory-Short Form (WAI-SF; Tracey & Kokotovic, 1989). The WAI-SF had been adapted from the original Working Alliance Inventory (WAI; Horvath & Greenberg, 1989), with the CWAI then modified from the WAI-SF for use in the classroom setting. The CWAI has been shown to have a moderate internal consistency of 0.76 to 0.91 on the teacher form and 0.59 to 0.71 on the student form (Toste et al., 2010).

The CWAI includes 12 items with participants' responses indicated on a 5-point scale. Scores are provided on three subscales: *bond* (respect, liking, trust), *goal* (mutual agreement and understanding of objectives), and *task* (mutual agreement and understanding of relevance) (Toste et al., 2015). The student and teacher versions include the same items, worded appropriately for each perspective; by using corresponding forms, teacher and student perceptions of their relationship can be compared on the same constructs. While the manual does not include an established time to complete the CWAI (students or teachers), completion time is estimated to take 10 to 15 minutes.

### ***Student Demographic Information***

Student information will be collected from their teachers and parents. A study-specific survey form will be used to gather information on participating students' age, grade level, race/ethnicity, gender, and current academic standing (grade point average/GPA or grades, as available). The survey will also inquire as to whether the student is on ADHD medication, whether the student is currently receiving therapy or counseling services, whether the student has an IEP (along with date of initial eligibility), and whether the student has a medical diagnosis of ADHD (along with the date of

diagnosis or age).

### ***Student Academic Motivation and Engagement Level***

The academic motivation and engagement levels of students with ADHD will be measured using the Motivation and Engagement Scale (MES; Martin, 2009). The MES measures the cognitive, behavior, and emotional components of engagement (Fredricks & McColskey, 2012). Students respond using a Likert scale to indicate their level of agreement with 44-item statements. The measure yields scores on eleven subscales falling into the four domains of positive engagement, negative engagement, positive motivation, and negative motivation (Martin, 2009). Positive motivation includes subscales measuring self-efficacy, valuing and mastery orientation while negative motivation includes subscales of anxiety, failure avoidance, and uncertain control (Liem & Martin, 2012). Positive engagement includes subscales of planning, task management, and persistence, whereas negative engagement includes self-handicapping and disengagement (Liem & Martin, 2012). The junior form (MEH-JS) will be administered to students in elementary and middle school, and the high school form (MES-HS) of the measure will be completed by the older students. Internal consistency values for the MES-HS ranged between 0.77 and 0.79. Additionally, the first-order and higher-order factor models underlying the MES-HS were confirmed through additional factor analytic analyses. The MES also displays measurement invariance, or consistent loadings, correlations, variances, and uniqueness across primary/elementary school, high school and university/college samples (see Liem & Martin, 2012). The estimated administration time of both forms is 10 to 15 minutes.

## **Procedures**

### ***Recruitment***

Participants will be recruited from districts within the greater Inland Empire metropolitan area (and beyond as needed) at the beginning of the school year to allow data collection to occur in the fall to winter of that same school year. This timeline will also allow time for relationships to develop between the students and teachers. With IRB and district approval, emails will be sent district-wide to the individual school sites to invite teachers who provide instruction for a student with ADHD to participate in the study. After a teacher provides written consent for participation in the study and nominates one of their students with ADHD, a consent form will be sent to the student's educational decision makers (e.g., parents, legal guardians), along with a letter providing information regarding the study. Once written consent is obtained from both parties (teachers and educational decision makers) and the student provides written assent, the teacher-student dyad will be eligible to participate in the study. Both teachers and students will receive a gift card as compensation for their time spent participating in study activities at the end of the data collection.

### ***Data Collection***

After receiving active consent from the teachers, they will be provided with the measures in electronic and paper format to complete at their convenience within a two-week period. The demographics form, CWAI-Teacher, KADDS, and BASC-3 will be provided electronically to the teachers' email (BASC-3 through its online version and the remaining three measures through Qualtrics). Due to copyright regulations, the ITS will

be provided in paper form with a prepaid envelope to be mailed back. Parents will be provided with the demographics form for their student electronically through Qualtrics, and students will be administered the MES electronically and CWAI-Student with the researcher present to read the items. Once the measures are completed, the CWAI (Teacher and Student), MES, KADDS, and ITS will be scored using their respective manuals and the BASC-3 will be scored automatically through its online scoring system. The demographic information and information regarding years of experience and certification level will be coded for analysis. The responses and scores will be de-identified while maintaining the pairing of each teacher with their respective student, and the data will be examined for missing information prior to analysis.

### **Analysis Plan**

#### **Teacher-level Factors Influencing STR**

The first research question asks to what degree teacher-level factors influence teacher perceptions of the quality of their relationship with students with ADHD. Multiple regression will be employed to facilitate this examination. Based on power analyses conducted using G\*Power statistical program (Faul et al., 2009), the recommended sample size was calculated to be 89 in order to maintain an acceptable power level above 0.8 (0.95) with an 0.05 alpha error rate and a moderate effect size of 0.15 (Cohen, 1988). Ideally the recommended sample size will be exceeded by the planned recruitment of 95 teachers.

Multiple linear regression analysis makes several key assumptions about the sample and data, including the assumption of linearity, multivariate normality, lack of

multicollinearity, and homogeneity of variance. Through linearity, multiple regression analysis assumes that the relationship between the outcome variable (in this case, teachers' STR rating) has a linear relationship with the independent variables (the teacher-level factors). This assumption can be evaluated by visually analyzing scatterplots of the data for a linear relationship, (which would meet the assumption) or a curvilinear relationship (which would violate the assumption of linearity). The assumption of multivariate normality assumes that the residuals (the error between observed and predicted values) are normally distributed. A visual analysis of a Q-Q-Plot or a histogram can be used to confirm normal distribution. A third key assumption of multiple regression is the assumption that there is no multicollinearity between the independent variables (meaning that the teacher-level factors are not highly correlated with each other). If this assumption is violated, the standard errors of the regression coefficients would be unnecessarily inflated, which could adversely affect their significance (Akinwande et al., 2015). To test this assumption, the Variance Inflation Factor (VIF) values are examined; ideally, the VIF value would be equal to 1 to indicate no multicollinearity. If, however, the values are between 5 and 10, this would indicate a high correlation between the independent variables and a violation of this assumption, necessitating the removal of an independent variable from the model. The assumption of homogeneity of variance assumes that the error terms have similar variances across the independent variables. This assumption is confirmed through a visual analysis of the standardized residuals vs. predicted values scatterplot to determine if the points are equally distributed. The data from the demographics form, ITS, KADDS, and BASC-3



will be entered into R statistical computing software and run as a multiple regression model to determine which and to what degree the varied independent variables explain variability in teacher ratings of their relationships with their student with ADHD (i.e., teacher-reported STR quality). The results will be used to determine which factors significantly explain the variance in the teachers' ratings of STR quality.

### **Differences in Student and Teacher Ratings of STR Quality**

The second research question investigates whether students with ADHD and their respective teachers differed in their ratings of STR. Based on G\*Power analyses (Faul et al., 2009), the recommended sample size was calculated to be 88 students with ADHD and 88 teachers in order to maintain an acceptable power level above 0.8 (0.95) with an 0.05 alpha error rate and a moderate effect size of 0.15 (Cohen, 1988); this sample size will ideally be exceeded by the planned recruitment of 95 teacher-student dyads. A two-group independent sample t-test will be conducted using R to calculate and compare the mean ratings of the two groups. This analysis assumes that the samples are independent of each other, normally distributed, and randomly sampled from the population. The normality assumption can be examined statistically through the Shapiro-Wilks test to determine if the two samples are both normally distributed along the bell curve.

### **Factors Influencing Student Motivation and Engagement**

The third research question examines whether the student ratings of relationship quality, student's symptom severity as rated by the teacher, or teacher ratings of relationship quality predict student academic motivation and engagement levels. Multiple regression analysis will be used to examine this research question. Based on G\*Power

analyses (Faul et al., 2009), the recommended sample size was calculated to be 74 in order to maintain an acceptable power level above 0.8 (0.95) with an 0.05 alpha error rate and a moderate effect size of 0.15 (Cohen, 1988); this sample size will ideally be exceeded by the planned recruitment of 95 teacher-student dyads. Four main assumptions are associated with multiple regression (linearity, multivariate normality, lack of multicollinearity, and homogeneity of variance), and as noted previously, these assumptions will be examined for violations through the VIF values (lack of multicollinearity) and visual analysis of the data's scatterplot (linearity), Q-Q-Plots (multivariate normality), and standardized residuals vs. predicted values scatterplot (homogeneity of variance). Data from the CWAI-Student Form, CWAI-Teacher Form, and BASC-3 will be used to run a multiple regression in R statistical software to determine whether these factors significantly explain the variance in students' academic motivation and engagement.

### **Anticipated Findings**

#### **Teacher-level Factors Influencing STR**

The goal of the first research question is to examine the influence of teacher factors (e.g., years of experience, certification, stress levels, knowledge of ADHD, symptom severity) on teacher perceptions of the quality of their relationships with their students with ADHD. After running the regression model, it is expected that all five teacher-level factors will explain a portion of the variance in teacher ratings of STR to varying degrees of significance. Increased years of experience, higher ADHD knowledge, and special education certification are expected to explain increases in teacher ratings of

STR while higher stress levels and higher symptom severity ratings are expected to explain lower teacher ratings of STR.

### **Differences in Student and Teacher Ratings of STR Quality**

The second research question addresses the congruence or incongruence of STR perception between teachers and students with ADHD. After comparing the means of the two groups using the t-test, it is expected that teachers and students with ADHD will have significant differences in their ratings of STR quality, with teachers viewing the relationship more negatively than the students.

### **Factors Influencing Student Motivation and Engagement**

The third research question investigates the influence of student ratings of STR, teacher ratings of STR, and teacher rating of symptom severity on the student's academic engagement and motivation. After running the regression model, it is expected that all three socio-contextual factors will explain a portion of the variance in students' motivation and engagement. Higher teacher STR ratings, higher student STR ratings, and lower BASC-3 ratings of symptom severity are expected to explain increases in the students' self-reported academic engagement and motivation levels.

### **Potential Implications**

Findings should facilitate identification of potentially malleable factors of particular importance to these critical relationships. By identifying these factors, interventions can be designed and implemented to improve student-teacher relationships for students with ADHD, for example by increasing ADHD knowledge or reducing stress levels, etc., depending on the results of the study. Understanding whether the students

and teachers differed in the ratings also provides researchers, administrators, and educators with valuable information as to how the relationship is formed and perceived by both involved parties to determine whether any conflict or negativity is bidirectional. If teachers tended to be more negative in their perceptions of the STR quality whereas students with ADHD were more positive, this could indicate a need for further research into the causes of this negative perception and possible interventions to improve the teachers' attitudes towards students with ADHD. If students with ADHD tended to be more negative in their perceptions of STR than the teachers, this may suggest a need for teachers to re-evaluate their perception of the relationship and take more steps to improve the students' experience of that relationship. Finally, understanding whether student ratings of STR, teacher ratings of STR, or symptom severity impact student engagement can inform future interventions for improving their academic engagement. For example, if it was determined that student ratings of the relationship predicted their engagement more than the teacher ratings of STR, then interventions will be narrowed to focus on improving the students' perceptions of the relationship quality. The research questions to be examined in this study will help narrow down the areas of most significance to STRs and student academic engagement to inform more focused interventions and to buffer against some of the negative risks associated with a diagnosis of ADHD.

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