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Vega Garcia, Johanna

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Examining Teacher Affect Within Interactions Between Teachers and Autistic Students Across
General and Special Education Early Childhood and Elementary Settings

By

JOHANNA VEGA GARCIA
DISSERTATION

Submitted in partial satisfaction of the requirements for the degree of

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Approved:

Nicole Sparapani, Chair

Margarita Jimenez-Silva

Lauren Lindstrom

Committee in Charge

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Abstract

Teacher affect is measured by evaluating teachers' facial expressions, vocal tones, body posturing, and body movements. While teacher affect could be an important measure of teacher-student interaction (TSI) quality, the research in this area is understudied within neurodivergent students, including those on the autism spectrum. Since positive affect has been attributed to positive student outcomes in neurotypical students within general education classrooms, this dissertation begins to explore teacher affect use towards learners on the autism spectrum within special education and general education classroom contexts. Additionally, this dissertation explores the links between teacher affect, student characteristics, and relationship quality.

This dissertation is structured across two (2) phases. The first phase, which consists of Study 1, uses an adapted measure of teacher affect, the Autism Teacher Affect Measure (ATAM), to explore teacher affect that follows autistic students' communication initiations in special education contexts. This study sets the foundation for Phase 2, which consists of Studies 2 and 3.

Building off from Phase 1, Phase 2 utilizes the ATAM to explore teacher affect within a neurodiverse sample, including learners on the autism spectrum, in general education classrooms. Specifically, Study 2 explores teacher affect that follows autistic students' communication initiations and explores links among teacher affect, student characteristics, and relationship quality. Last, Study 3 explores the differences in teacher affect among neurodiverse students, including autistic students, in general education classrooms. Altogether, the results yielded from Studies 1, 2, and 3 provide future directions and implications for teachers and researchers within the field of education.

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Currently, 1 in 36 children are diagnosed with autism spectrum disorder (autism; Maenner et al., 2023). Autistic individuals show differences in social communication and social interactions across contexts and restricted, repetitive patterns of behaviors and/or intense areas of interests (APA, 2013). In schools, 13% of students under the Individuals with Disabilities Education Act (IDEA, 2004; National Center for Education Statistics [NCES], 2023) are categorized under autism, making it the fourth largest category under IDEA. In California, autistic students account for the third largest category served under IDEA (California Department of Education, 2024). Furthermore, about ninety-three percent (93%) of students on the autism spectrum are educated within the public school system across general and special education classrooms (U.S. Department of Education, 2023). Therefore, teachers play a vital role in supporting the learning of autistic students.

Classrooms are meant to foster social communication and relationship development in addition to academic development (Vacca, 2007). One important component of the classroom environment is the quality of the interactions between teachers and their students (Pianta, 2016). Teacher-student interactions (TSIs) are dyadic exchanges between students and their teachers and are viewed as the building blocks of student-teacher relationships (Granic & Patterson, 2006; Pennings et al., 2018; Wubbels, 2017). When TSIs are of high quality, they can result in positive student developmental and academic outcomes and fewer externalizing behaviors (Sutherland et al., 2018), especially for vulnerable students including autistic learners (e.g., Allen et al., 2013; Curby et al., 2009). Some studies have examined the quality of TSIs by examining teacher language and the feedback that teachers provide to their autistic and nonautistic students. There are various components of TSIs that have been outlined in the literature as important, such as teacher talk (i.e., responsiveness) or how teachers deliver feedback to individual students (Hattie,

2008; Sparapani et al., 2021). Open-ended questions and genuine feedback have also been outlined as two features of higher quality TSIs (Burchinal et al., 2008; Hamre & Pianta, 2005). Yet one component of TSIs that is perhaps of equal importance but not studied as extensively, is teacher affect. Specifically, little is known about the role of teacher affect within classroom interactions, and whether or how interactions influence autistic learners within general education classrooms.

Teacher affect has been previously defined as both a mental representation, a subjective experience or as an expressed emotion (Frenzel et al., 2021; Koenen et al., 2019; McLean & Jones, 2025). Teacher affect within the classroom has been defined as teachers' range of nonverbal expressions in response to their students' communicative contributions. These expressions, which range from negative, neutral, to positive, have been captured through teachers' facial expressions, vocal tones, body posturing, and body movements (McLean & Connor, 2017; McLean & Jones, 2025). A tense body and narrowing of the eyes may represent anger, whereas a relaxed facial expression and a slight smile might represent a content expression.

An emerging body of literature has highlighted the important role that teacher affect plays in the classroom. Studies have documented associations between teacher affect and student academic achievement (McLean & Connor, 2017; Prosen et al., 2011) and found teacher affect contributes to the quality of student-teacher relationships (STR), with positive emotions fostering more positive STRs and negative emotions impacting relationship quality overall (Frenzel et al., 2021; Yoon, 2002). Positive affect has been linked with fewer adjustment problems when transitioning into primary school (Kiuru et al., 2016) as well as improved math outcomes in students who had limited math skills (McLean & Connor, 2017). Frenzel and colleagues found

that students either liked or disliked a particular topic based on the affect of their teachers (2021). They termed this as direct-transmission effect, in which positive affect was linked with a more joyful experience for students. Similarly, studies have found that students are more persistent and engaged in activities when teachers provide them with positive feedback, characterized as affirming, praising, and at times unexpected (Deci et al., 1999; Hattie & Timperley, 2007). Alternatively, studies suggest that the intensity of negative affect and low levels of positive affect may hinder the emotion regulation skills and emotional competence of children (Baker et al., 2007; Denham & Grout, 1992; Green & Baker, 2011; Halberstadt et al., 1999).

Dissertation Structure and Purpose

In my dissertation, we have explored teacher affect across general and special education and examined the association among teacher affect, student-teacher relationship quality and a range of student characteristics (i.e., social skills, adaptive behavior). Research questions are divided into two primary “Phases” covering three distinct goals or studies separated into chapters. The purpose of these phases was to outline the studies in an organized manner, as Phase 2 expands upon Phase 1. All three studies were grounded in Attachment Theory and a Neurodiversity Perspective.

In Phase 1, Study 1, we adapted McClean & Connor’s (2017) observational measure of affect to be used with autistic learners during literacy activities within special education classrooms. Findings from this study suggest that examining teachers’ affect during their feedback to students may be important in understanding students’ classroom experiences. Whether these findings generalize to autistic students is unknown and is the primary focus of Chapter 1. Given the known benefits of using positive feedback with positive affect as documented within general education classrooms (Hattie, 2008; McLean & Connor, 2017),

examining how and whether teachers use positive affect in response to autistic students' communication initiations may highlight an important feature of talk across educational contexts, including special education classrooms. **In Phase 2, Study 2**, we used the adapted observational measure of affect, *Autism Teacher Affect Measure* (ATAM), to explore teacher affect with autistic students in general education classrooms and examined links between the ATAM with standardized and teacher-report measures of student developmental skills. Findings from chapter 2 provide insight into the similarities and differences in teacher affect with autistic students across educational settings as well as preliminary validation for the ATAM. Finally, in **Phase 2, Study 3**, we examined whether differences exist between teachers affect with autistic students compared to general classroom talk.

Theoretical Framework

Students' success in the classroom is influenced by their classroom environment, which includes the interactions and relationships they have with their teachers (e.g., Engels et al., 2021). Since teachers are an integral part of students' classroom experience, and consequently, their social and academic development, the proposed studies are grounded in attachment theory. Attachment theory has primarily been conceptualized and studied within a child-parent dyad (Ainsworth et al., 1978; Bowlby, 1969) as a way of explaining relationships and one's self-perception (Kennedy & Kennedy, 2004). Based on Bowlby's ethological theory of attachment (1969/1982), an attachment bond is based on behaviors that are exchanged between the child and the attachment figure (caregiver). From infancy, children also develop an internal working model (IWM) of their attachment relationship. This model is largely influenced by their primary caregiver, and it informs the child of their self-worth and the extent to which they can depend on other people (Kennedy & Kennedy, 2004). This IWM ultimately sets the groundwork for the

child's future attachment relationships within and outside their family unit (Riley, 2013) and, depending on the caregivers' behaviors, consistency, and availability (e.g., physical availability, responsiveness and awareness of the child's needs; Bergin & Bergin, 2009), the child will develop a secure or insecure attachment, resulting in adaptive or maladaptive behaviors and strategies when trying to cope or seek support from others (Ainsworth et al., 1978; Bowlby, 1969; Cicchetti et al., 1995; Kennedy & Kennedy, 2004).

Studies have shown that children who grow up in a safe environment and have parents who are consistent and predictable (i.e., a secure attachment) develop an internal working model (IWM) of their parents and others as supportive, helpful, and accessible (Kennedy & Kennedy, 2004; Riley, 2013). This leads to the child becoming more independent and more likely to take risks (Ainsworth et al., 1978; Bowlby, 1969). On the other hand, children who grow up in an unpredictable and at-risk environment, such as living with a caregiver who is inconsistent and/or aggressive (insecure attachment), develop an IWM of their caregivers and others as unreliable or rejecting, and are more prone to exhibiting externalizing and internalizing behaviors (e.g., becoming distant or too clingy, showing anger towards others; Kennedy & Kennedy, 2004) later in life.

Understanding the early relationships and attachment styles children have with their caregivers may provide a lens for understanding the experiences of learners in the classroom. Relevant to the current project are the studies that have examined attachment theory within student-teacher dyads (e.g., Hamre & Pianta, 2001; Lynch & Cicchetti, 1992; Pianta & Steinberg, 1992). Studies have found that the attachment relationships students have with their teachers produce outcomes similar to those associated with their caregiver relationships (e.g., Kennedy & Kennedy, 2004; Pianta et al., 1997; Pianta et al., 2008). Moreover, some studies have

suggested that an IWM of “teacher” can form and thus influence students’ behaviors and outcomes (e.g., Bergin & Bergin, 2009; Kennedy & Kennedy, 2004; Pianta et al., 1997, 2008). For example, elementary students who had teachers who were sensitive (e.g., reassuring), warm, and consistent in their behavior were more engaged and attentive, showed greater literacy and math outcomes, and exhibited fewer problem behaviors (Brock & Curby, 2014; Buyse et al., 2008; Hugues et al., 2008; NICHD Early Child Care Research Network, 2002; Pianta et al., 2008). Meanwhile, students who had lower quality relationships with their teachers or had more teacher-student conflict showed more problem behaviors, had poorer working habits, reduced attention, lower math and literacy achievement, and reduced compliance (Bergin & Bergin, 2009; Hamre & Pianta, 2001; Sroufe et al., 1983).

Teacher’s behavior can also influence the quality of the attachment behavior and consequently change the trajectory of the predicted relationship (e.g., Pianta et al., 2003). For example, Hepper and colleagues (2021) found that autistic students who had an insecure attachment style with their caregivers were able to form secure attachments with their teachers and have positive developmental and academic outcomes when their teachers were warm and encouraging. The literature has also suggested that the IWM of both the student and the teacher could interact within the classroom setting and influence their behaviors and relationship (Kennedy & Kennedy, 2004). If teachers have an insecure attachment, they may be less responsive and less attuned to their student’s needs, especially if the student also has an insecure attachment style (i.e., overly dependent). This could result in their students perceiving them as unsupportive and inaccessible, and teachers misinterpreting their students and behaviors as overly dependent, withdrawn, or reactive (Kennedy & Kennedy, 2004).

Among studies that have used neurodivergent samples, those that have used parent-child dyads suggest that autistic children are more likely to develop insecure attachments compared to neurotypical children and, while there are mixed results, some attribute these discrepancies to their cognitive skills and autism features (Naber et al., 2006; Rutgers et al., 2007; Teague et al., 2017). Since the parent-child and teacher-student attachment relationships tend to have similar IWMs and attachment style outcomes (e.g., Bergin & Bergin, 2009; Kennedy & Kennedy, 2004), it is important to further explore the interaction quality and STRs among neurodivergent students.

Through this framework, we can explore teacher affect with their neurodiverse students as a means for understanding the quality of their interactions and relationships. Further, observing teacher affect through an attachment theory lens can help us view affect as a potential intervention target in the future, as studies have shown that students' attachment relationships and behaviors, including those in schools, can be influenced by those outside their family unit (i.e., teachers; Hepper et al., 2021). Affect has the potential to influence the student-teacher relationship quality and produce certain behaviors and outcomes, regardless of the relationship quality they have with their parents. Therefore, future interventions could aid teachers in using certain affect types that would result in higher quality relationships with teachers as well as more desirable student behaviors and outcomes. Ultimately, using attachment theory to provide a lens for understanding teachers' affect use with their neurodiverse students, especially in the earlier years of schooling, could provide insight into how certain features of interactions may lead to positive educational outcomes and better interpersonal relationships for children.

The Neurodiversity Perspective

Neurodiversity refers to the variations, or diversity, within the brain (Brown et al., 2021; Pellicano & den Houting, 2022). While there are individuals whose neurodevelopment falls within “normal” societal standards, there are also individuals whose development falls outside these standards (Ecker et al., 2015; Jumah et al., 2016); Neurodiversity includes the range of development, from within normal standards to outside of this range (typical to divergent). Through a neurodiversity lens, diversity in neurodevelopment is seen as a natural part of the human condition (Pellicano & den Houting, 2022; Walker 2012, 2014). This diversity is viewed as a strength rather than a deficit, fosters societal acceptance towards neurodivergent individuals (e.g., autistic individuals), and highlights the importance of creating classroom environments that meet the needs of neurodiverse individuals (Pellicano & de Houting, 2022), including those on the autism spectrum. Furthermore, when cognitive differences are viewed as a natural and commonplace occurrence, it creates a societal understanding that all individuals bring valuable contributions into classrooms, and further, that neurodivergent people will bring new perspectives, ideas, and ways of experiencing the world (Lambert et al., 2020).

Although autistic individuals have many strengths (Pellicano & de Houting, 2022), some literature describes autism features through a deficit-based lens (Baron-Cohen, 1990; Craig et al., 2016). Autistic features, for example, have been viewed as barriers that inhibit a learner’s ability to properly participate in classroom activities (Iovannone et al., 2003). This deficit view can lead to a false narrative that autism is caused by brain dysfunction that leads to impairment (Sonuga-Barke & Thapar, 2021). While there are vast differences observed among autistic individuals, viewing characteristics of the phenotype from a deficit-perspective may lead to societal views of

autism as a disorder that needs to be “fixed, cured, controlled, or avoided” (Beutel et al., 2020, p.8, as cited in Brown et al., 2021).

Grounded in the Neurodiversity Perspective, my dissertation centers autism through an asset-based lens by viewing the range of communication differences observed in autism as natural and beneficial to classrooms (Pellicano & Houting, 2022). This strength-based lens fosters societal acceptance toward autistic individuals and could potentially contribute to more positive relationships between autistic students and their teachers. Furthermore, focusing on the interpersonal relationships and interactions helps to change the narrative of “fixing” autistic students so they can better thrive in the classroom. This focus places an emphasis on the environment and how it can be adjusted to better support autistic students (Brown et al., 2021; Sonuga-Barke & Thapar, 2021). In this study, we focus on interactions between teachers and students as an important component of the environment.

Phase 1: Study 1 Literature Review

Teacher Affect

Previous studies have observed teacher affect within classrooms by categorizing teachers’ feedback and responses to their students into varying emotions, such as enthusiastic, angry or frustrated, and sad and depressed (McLean & Connor, 2017). Most notable, McLean and Connor’s (2017) observational measure, *Teacher Feedback Coding System—Academic* (TFCS—A), examined teachers’ affect among a large group of third graders, categorizing affect into five different emotions: content, enthusiastic/exuberant, angry/frustrated, neutral, sad/depressed. The authors then grouped affect as either positive (content, enthusiastic/exuberant), neutral, or negative (angry/frustrated, neutral, sad/depressed). Through

this approach, the authors were able to identify the type of feedback and the type of affect teachers directed toward individual students. The authors documented a link between teachers' affect and students' mathematics achievement, such that, feedback with positive affect (e.g., teacher is relaxed, exaggerated vocal tones, engaged with students), was associated with more growth in students who initially had lower mathematics skills. McLean & Connor's (2017) study illustrates the importance of examining teachers' affect within classrooms, especially with students who show more need. The findings from this emerging body of literature suggests that examining teachers' affect during their feedback to students may be important in understanding students' classroom experiences. Whether these findings generalize to autistic students is unknown and is an area that this study begins to explore.

Teacher affect has been found to set the stage for student learning by influencing students' interests, socioemotional development, and motivation through experienced personal value and enjoyment (Burić, 2019; Frazier et al., 2021; Frenzel et al., 2009; Keller et al., 2014; Poulou & Denham, 2023). For instance, Burić (2019) found that enthusiastic expression, which included teachers widening their eyes, smiling and increasing their speaking speed, was linked to students' motivation to learn the topic or activity. This was due to students internalizing their teacher's expressed emotions of enthusiasm. Teacher affect has also been linked to smoothness of transition from grade 1 to grade 2, regardless of home experiences prior to kindergarten (Kiuru et al., 2016). That is, teachers' use of positive affect has been associated with decreased externalizing behavior and stronger prosocial behavior in children from homes with limited parental support.

Emotional Expression. A separate, but similar construct related to affect that has been researched is emotional expression (Keltner et al., 2016). Previously, emotional expressions have

been defined as behaviors with multiple presentations that include vocal tones, gestures, facial expressions, or body movements (Keltner et al., 2019). Similar to affect, emotional expressions convey a behavioral response from the individual who is perceiving these expressions (Bugental, 1986; Keltner et al., 2019) and may affect the overall relationship or interaction of the individuals (Meyer & Turner, 2007). In a few classroom studies, researchers found that teachers express both positive and negative emotions towards their students (Garner et al., 2013), with anger being the most commonly used negative expression and joy being the most commonly used positive expression (Prosen et al., 2011). The emotional expression of joy was often observed when students, for example, followed instructions or calculated a problem correctly. Teachers' angry emotional expressions were observed when students did not follow directions or appeared unmotivated (Hosotani and Imai-Matsumura, 2011; Prosen et al., 2011). Regardless of the term used, these studies show that affect or emotional expression can potentially impact students' social and academic outcomes. However, studies have suggested that autistic students have more difficulty in matching and perceiving people's emotional expressions than their nonautistic peers (Berggren et al., 2016; Celani et al., 1999; Dawson et al., 2004), such as happy and neutral facial expressions (Berggren et al., 2016). This is important to consider given the range of affect types that teachers use with their autistic students and is worth exploring further.

Initiating Communication in the Classroom

Studies have found that initiating communication, which is defined as communicative vocalizations, verbalizations, and/or gestures that serve a function (Birkeneder & Sparapani, 2023; Wetherby et al., 2007) is important because it promotes positive relationships between autistic students and their peers and teachers (Bauminger-Zviely et al., 2014; Murdock et al., 2007; Sutton et al., 2022). This is because interlocutors may share a mental state and attentional

focus to an object or event (joint attention) when students initiate communication (Mundy, 2016; Mundy et al., 2009; Winder et al., 2013). Although initiating communication is critical to children's social and communicative development, autistic students show variation in the frequency, function, and direction of their communicative initiations within the classroom (Bauminger et al., 2003; Birkeneder & Sparapani, 2023). For example, in a study by Sparapani and colleagues (2016), autistic students initiated communication seven times on average within a 15-minute sample when participating in various classroom activities. Although not specified, the communicative functions of these initiations were not to share attention with another person, but they did vary in their function. For instance, Birkeneder and Sparapani (2023) found autistic children more often initiated communication with their teachers (85%) than their peers (8%) for the purposes of commenting and regulating others' behaviors.

Communicative subtleties, such as unclear direction or function, might be misunderstood or missed overall by teachers (Ravet, 2013). This may interfere with the success of the interaction and limit students' opportunities for social and shared experiences with others (Mohammadzaheri et al., 2021; Newman & Ten Eyck, 2005). For example, Sparapani and colleagues (2020) documented "missed opportunities" in interactions between autistic children and their interventionists within a reading program. They found interventionists often did not respond to students' initiations when their topics were outside the activity content. Rather, they directed or redirected students back to the task at hand. Understanding the range of communication expression for how, why, and to whom autistic students communicate, and viewing variability in expression as a natural part of the human condition, might provide more insight and understanding for teachers to leverage within a learning opportunity. Viewing their

communicative attempts as differences rather than as deficits can also broaden the ways in which autistic students are allowed to communicate and engage in interactions with others.

Teacher Interactions with Autistic and Non-autistic Students

Teachers' engagement in high quality TSIs have been linked to several positive outcomes in autistic and nonautistic children. This includes increased language development (Curby et al., 2013; Pianta, 2006), reading development (Burchinal et al., 2008; Connor et al., 2020), generative responding (Sparapani et al., 2020), on-topic initiations (Mercer, 1996; Walsh, 2002), and overall engagement, participation, and academic growth (Connor et al., 2020; Milburn et al., 2014; Ponitz et al., 2009). For example, a study involving 787 first graders found that those who had teachers who were warm and responsive (e.g., more sensitive to their students' needs) had stronger decoding and vocabulary skills by the end of the school year (Connor et al., 2005). In another study by Perry and colleagues (2007) first grade students who were in child-centered classrooms and had teachers who were emotionally supportive (e.g. attuned to their students' interests and promoted positive social relationships) were more likely to meet the end-of-the-year mathematics and literacy standards than the students who were not in classrooms that were child-centered and emotionally supportive.

Despite the benefits of high-quality TSIs, not all students experience these types of interactions. Some studies show teachers use more directive language, close-ended questions, or less language overall towards students who exhibit cognitive impairment, more autism features, and/or showed problematic classroom behavior (Connor, 2016; Dykstra et al., 2013, Irvin et al., 2013, 2015; Sparapani et al., 2020, 2021). For example, Sparapani and colleagues (2021) found despite special education teachers using more language overall, 69% of the language used towards their autistic students consisted of directives and close-ended questions. This type of

language was also observed between general education teachers and their autistic students, with 60% of their language being directives and close-ended questions in the same study. The use of directive language and close-ended questions at high rates relative to use of other language features have been found to not only negatively influence the overall quality of TSIs (de Kruif et al., 2000), but also negatively impact students' experiences in classrooms—causing them to engage in more externalizing behavior, less generative talk, have lower critical thinking skills, and initiate less (Milburn et al., 2014; Sparapani et al., 2020; Taylor et al., 2005). Therefore, it is important that studies focus on understanding the quality of TSIs with autistic learners. One way we might be able to do this is by examining teachers' affect in their feedback to their students, in addition to examining the categories of talk used. Doing so may shed light on the individual experiences autistic students encounter in interactions with their teachers.

Measurement of Teacher Affect

While the literature on teacher affect is limited overall, the studies to date have measured teacher affect within elementary classrooms using video observations, (e.g., McLean & Connor, 2017), semi-structured interviews (e.g., Koenen et al., 2019) or teacher-rated questionnaires (e.g., Poulou & Denham, 2023). McLean and Connor (2017) developed the Teacher Feedback Coding System—Academic (TFCS–A) to measure teachers' feedback and affect directed toward their third-grade students within general education mathematics lessons. The TFCS–A observational measure outlined five affective scales (Content, Enthusiastic/Exuberant, Neutral, Sad/Depressed, and Angry/Frustrated) that were aggregated to create three separate dimensions: Positive Affect (Content, Enthusiastic/Exuberant), Neutral Affect, and Negative Affect (Sad/Depressed, Angry/Frustrated). Similarly, McLean and Jones evaluated teacher affect across 5-minute chunks using the *Teacher Affect Coding System* (TACS; 2025), which is an adapted observational

measure based on the TFCS-A. Furthermore, the *Teacher Relationship Interview* (TRI; Pianta, 1999), a semi-structured interview that assesses teachers' experiences and mental representations of their relationships with their students. Unlike video observations, the TRI measures teachers' affect through teachers' mental representations of their students. The TRI includes an affective dimension that is comprised of helplessness (hopeless and ineffective), anger (anger and hostility), and positive affect (happiness or joy) and has been used across studies and populations (Koenen et al., 2019; Spilt & Koomen, 2009; Stulhman & Pianta, 2001).

Poulou and Dunham (2023) and Keller and colleagues (2014) also assessed teachers' affect using teacher-rated questionnaires. Poulou and Dunham (2023) used the *Self-Expressiveness in the Classroom Questionnaire* to assess teachers' range of emotional expressiveness towards students using 30 hypothetical scenarios, such as "praising a student for good work." These questions used a 9-point Likert scale to assess the frequency of teachers' emotional expressions (1 = *not frequently in my classroom* and 9 = *very frequently in my classroom*). Keller and colleagues' (2014) 8-item expressivity scale assessed teachers' emotional expression of enthusiasm towards their students by asking questions, such as "When I'm happy in class, my feelings show." Teachers rated questions using a Likert-type scale (1 = *agree not at all* and 7 = *agree totally*; Keller et al., 2014, p. 32). Similar to studies that used the TRI measure, Keller and colleagues also assessed teachers' internal affective state (e.g., enjoyment while they teach) in addition to their enthusiastic expression. That is, these studies are similar in that they included measures that observed the affect expressed towards their students as well as teachers' subjective experiences (Keller et al., 2014; Yoon, 2002).

Finally, teacher affect has also been indirectly assessed through other constructs, such as teachers' warm demeanor characterized as the teachers' ability to respond, redirect, and

communicate with their students in an effective, warm, and respectful manner (Quality of the Classroom Learning Environment rubric (Q-CLE); Connor et al., 2014). Although this demeanor includes more components than just affect, the literature suggests teachers who are warm when disciplining or communicating with their students tend to have more positive student-teacher relationships (De Jong et al., 2014). Ultimately, the literature suggests teachers' affect can impact the relationships teachers have with their students and their students' overall classroom experience.

It is important to note that teacher affect has primarily been measured within general education classrooms with the general classroom population, with the exception of one study by Koenen and colleagues (2019) who examined teacher affect with students with emotional behavioral difficulties using video observations and semi-structured interviews. Specifically, they used video observations to evaluate teacher sensitivity within teacher-student interactions, which was conceptualized as teachers' responsiveness to their students and provision of comfort, reassurance, and encouragement (Verschueren et al., 2006). Although sensitivity and affect are different constructs, they share similarities by capturing the positive features of responses teachers exhibited with their students. The authors documented correlations between teacher sensitivity and positive affect as measured by the TRI)

Phase 1: Purpose and Research Objectives

In Study 1, we explored the varying types of teachers' affect used in response to student initiations in a sample of preschool–3rd grade autistic students by adapting McLean and Connor's (2017) observational tool. This adapted measure called *Autism Teacher Affect Measure* (ATAM) expands on McLean and Connor's observational measure by adding additional teacher affect types according to what autistic students are experiencing in the classroom. Although the

ATAM can be used across different activities, we focused on literacy activities because it provides various opportunities for interactive dialoguing and social interactions, such as when a student and their teacher read a book together (Bean et al., 2020; Deshmukh et al., 2019).

Findings from this study will contribute to the autism literature by providing more insight on the type of affect autistic students are receiving from their teachers within special education settings. Given the known benefits of using positive feedback with positive affect as documented within general education classrooms (Hattie, 2008; McLean & Connor, 2017), examining how and whether teachers use positive affect in response to autistic students' communication initiations may highlight an important feature of talk across educational contexts.

This study had three research objectives:

1. Investigate whether and how teachers respond to students' communication initiations during literacy activities (Contingent, Non-Contingent, No Response).
2. Explore teachers' affect in their response to students' communication initiations across six categories: (1) Content, (2) Enthusiastic/exuberant, (3) Neutral, (4) Sad/Depressed, (5) Angry/Frustrated, (6) Dismissive).
3. Examine the relations among teachers' affect and student characteristics, including cognitive skills, autism features, and the presence of problematic behavior.

Methods

Participants

Participants were originally recruited for a larger longitudinal study evaluating the efficacy of a classroom-based intervention (R324A140005; Stahmer). The longitudinal study spanned four years, with a new cohort of teachers and students recruited each year. Some teachers and students participated in the study for multiple years. As part of this longitudinal

study, trained clinicians and research staff administered a battery of measures to assess students' cognitive skills based on their age and developmental functioning using the Differential Ability Scales-II (DAS-II; Elliot, 2007) or the Mullen Scales of Early Learning (MSEL; Mullen, 1995). The administration and scoring of these measures are outlined in Stahmer et al., 2016. Per the recommendations of the Autism Research Units on Pediatric Psychopharmacology (RUPP) network (Arnold et al., 2000), students who did not obtain a basal score on the DAS-II were administered the MSEL. As part of the longitudinal study, trained clinicians also confirmed autism diagnostic status using the Autism Diagnostic Observation Schedule–Second Edition (ADOS-2; Lord et al., 2012).

The intervention coaches provided initial training to teachers across the span of six weeks (Suhrheinrich et al., 2019). Upon completing the six weeks of training, coaching slowly faded depending upon the teachers' fidelity to intervention protocols. All training sessions were video recorded and fidelity data was calculated by trained research assistants. Teachers also completed questionnaires outlining their students' developmental and behavioral skills using the Pervasive Developmental Disorders Behavior Inventory (PDDBI; Cohen et al., 2003). Classroom video recorded observations were collected at the beginning, middle, and end of each academic year. Finally, teachers completed a demographic questionnaire to report on their background and experiences.

Current Study (Study 1)

The current study utilized data from video observations of literacy activities from the beginning of the school year across all four years, as well as student measures of autism features (ADOS-2) and cognitive skills (DAS-II, MSEL) and teacher reported measures of behavior (PDDBI). Demographic information on teachers' teaching experience related to special

education and autism were also used. The study included a subset of teachers from the larger longitudinal study and their students who were video recorded during literacy activities at the beginning of the school year. Teacher inclusion criteria included teachers who had no previous training on the intervention and had at least two (2) autistic students in their class. Participants included 34 teachers and 43 preschool–3rd grade autistic students ($M_{age} = 7.68$; $SD = 2.14$) across 14 districts. The sample was primarily male (91%) and, overall, fairly diverse in regard to racial and ethnic background. Teachers were primarily female (91%). Teachers showed variability in regard to their years of experience with teaching autism-specific ($M = 7.74$; $SD = 5.83$) and special education classrooms ($M = 6.13$; $SD = 4.29$). Seventy-seven percent (77%) taught in special education classrooms (mild/moderate and moderate/severe classrooms), 10% of these teachers taught in autism-specific classrooms (3 teachers), 22% taught in inclusive settings (7 teachers). Three teachers did not report on their classroom type. See Table 1.

Standardized and Teacher Report Measures

Cognitive Skills

The *Differential Ability Scales* (DAS-II; Elliott, 2007) and the *Mullen Scales for Early Learning* (MSEL; Mullen, 1995) were used to assess students' cognitive skills. Seventy-nine (79) percent of the sample were administered the DAS-II, only six students were administered the MSEL. The DAS-II is used to measure children and adolescents' cognitive skills. The DAS-II, administered to individuals from 30 months to 17 years and 11 months, consists of a General Conceptual Ability (GCA) composite score, which is comprised of three cluster scores (Verbal Ability, Nonverbal Reasoning Ability, and Spatial Ability). These cluster scores consist of six subtests that measure an individual's verbal, nonverbal, and spatial ability. The GCA and cluster scores yield a standard score ($M = 100$, $SD = 15$), subtests yield T-scores ($M = 50$, $SD = 10$), a

percentile score, an age-equivalent score, and a confidence interval. The Nonverbal Reasoning Ability standardized score was used as a measure to gauge students' nonverbal IQ within this study. The DAS-II shows high reliability and validity, with reliability coefficients between 0.90 and 0.94 for Preschool Level and high correlations with the *McCarthy Scales of Children Ability* (MSCA; Elliot, 2007).

The MSEL (Mullen, 1995) also measures cognitive development and school readiness of children ranging from 3–60 months. This measure is individually administered and has one Gross-Motor scale and four cognitive scales, including the Visual Reception, Fine-Motor, Receptive Language, and Expressive Language Scales. These subscales produce T-scores ($M = 50$, $SD = 10$), with lower scores indicating lower cognitive skills (Akshoomoff, 2006). A standardized Early Learning Composite Score is also given ($M = 100$, $SD = 15$) and is used as an estimate of overall cognitive skills. This study utilized students' nonverbal IQ (NVIQ) scores from the DAS-II. Since the MSEL does not yield a comparable NVIQ score, the T-scores from the 2 nonverbal scales were extrapolated, as done in previous studies (e.g., Richler et al., 2007). Reliability is consistent among all five scales, with a range of 0.75-0.83 (Shank, 2011). There is also high validity, with strong correlations with the DAS-II (Farmer et al., 2015) and high convergent validity between the NVIQ scores in the MSEL and DAS-II (Bishop et al., 2011).

Autism Features

The *Autism Diagnostic Observation Schedule–Second Edition* (ADOS-2; Lord et al., 2012) is a semi-structured tool that assesses the presence of autism features by observing and coding communication, social interactions, play, and restricted or repetitive patterns of behavior during a series of systematic probes. The ADOS-2 is available in five modules that are based on an individual's expressive language level and chronological age. The assessment yields a Social

Affect (SA) score, a Restricted and Repetitive Behavior (RRB) score, and a Calibrated Symptom Severity score (CSS). The CSS is an overall total score that represents the total amount of autism features presented by an individual and ranges from 0 – 10, such that a score of 10 indicating the presence of the most autism symptomatology (Gotham et al., 2009). For the purposes of this study, the CSS score was used to help characterize the sample. This measure showed high validity and high test-retest reliability, with a range of 0.68 and 0.92 (McCrimmon & Rostad, 2014).

Teachers were asked to fill out a teacher form from the *Pervasive Developmental Disorders Behavior Inventory* (PDDBI; Cohen et al., 2003) to measure students' maladaptive behaviors and social communication skills (Cohen & Sudhalter, 2005). The PDDBI is a rating scale used to assess children on the autism spectrum and other pervasive developmental disabilities and examine their response to interventions. This rating scale, which is organized across two dimensions (Approach/Withdrawal domain and Social Communication Skills domain), consists of domains that measure children's maladaptive behaviors, social skills, language skills, and memory skills. T-scores ($M = 50$; $SD = 10$) are produced for each domain. An Autism Composite Score (ACS), which measures how the child's communication and social skills offset the child's maladaptive behaviors, is also produced. Higher T-scores indicate more problem behaviors relative to social communication skills (Cohen & Sudhalter, 2005; Cohen et al., 2003). This measure was normed using a sample of children on the autism spectrum. Using a standardized sample of teachers from various backgrounds, the measure's test-retest stability was between .65 – .99 during a 2-week interval. Criterion related validity of the measure was also assessed by comparing the PDDBI with the *Childhood Autism Rating Scale* (CARS; Schopler et

al., 1980) and the Vineland Adaptive Behavior Scales (VABS; Sparrow et al., 1984). The ACS was used in the current study to help validate the Autism Teacher Affect Measure (ATAM).

Classroom Video Observations

Student's Communication Initiations

Observational measures have been used to measure the frequency of students' initiations within a range of classroom contexts (Sparapani et al., 2016, Birkeneder & Sparapani, 2023). As stated in Birkeneder and Sparapani (2023), the initiating communication (IC) construct is comprised of 10 communicative functions: 1) protesting, 2) requesting, 3) initiating social routines, 4) advocating, 5) seeking predictability, 6) commenting, 7) using repair strategies, 8) seeking information, 9) secures attention, and 10) giving. These communication functions were used as a basis for measuring teacher responses and teacher affect such that, the teacher dimensions were coded following each student initiation. Sparapani and colleagues' (2016) study provides some initial psychometric information on the initiation communication dimensions, with links observed between directed communication, generative communication, and social skills ($r = .19$). Birkeneder and Sparapani (2023) reported evidence of a 4-factor structure of initiating communication, providing early construct validity of the measure. Interrater agreement between raters was also high (86%).

Teacher Responses and Affect

The Autism Teacher Affect Measure (ATAM) was adapted from an observational measure, TFCS—A, that aimed to examine teachers' feedback towards their 3rd grade general education students (McLean & Connor, 2017). The authors evaluated teacher affect “based on the facial expressions, vocal tones, body posturing, and body movements displayed by the teacher” (McLean & Connor, 2017, p. 7). Their coding system included 5 affect types: Content,

Enthusiastic/Exuberant, Neutral, Sad/Depressed, and Angry/Frustrated. After watching video recordings of autistic students interacting with their teachers, the ATAM was created to capture the different affective responses autistic students received from their teachers when they initiated communication. Specifically, additional language (e.g., intonation, physical touch) and the Dismissive affect type was added—these descriptors were not part of the original coding system that was being utilized within general education classrooms alone. The ATAM is composed of two dimensions: Teacher Response Type and Teacher Affect Type.

ATAM Dimension 1. Teacher Response Type is the first dimension within the ATAM. This dimension evaluates whether a teacher responds to their students' communication initiations, as well as the type of response they are using towards their students. Teacher responses are placed into four categories: (1) Contingent, where teacher's response is aligned with student's needs, (2) Not Contingent, where teacher responds but response does not align with student's needs, (3) Responds to Attentional Bid, where teacher responds when student tries to secure the teacher's attention, and (4) No Response, where teacher does not respond to student's initiation.

ATAM Dimension 2. Teacher affect is the second dimension within the ATAM. Teacher affect are categorized into six different affect ratings: (1) Content, where teacher is happy and engaged, but not exaggerated, (2) Enthusiastic/Exuberant, teacher is highly engaged and displays exaggerated characteristics, (3) Neutral, teacher is displaying neither positive or negative characteristics, (4) Sad/Depressed, teacher is displaying signs of sadness, frustration, and irritability and may be disengaged, (5) Angry/Frustrated, teacher is visibly upset with students and may be physical to the skin, and (6) Dismissive, teacher is actively ignoring student's initiations and are not taking their initiations seriously. The ratings and definitions for

both dimensions are found on Table 2. Additional examples and more thorough definitions are also found in the Appendix. The full ATAM codebook is available upon request.

Since teacher affect is the second dimension of the ATAM, teacher affect is dependent upon the teacher response type (Figure 1). To see detailed examples of how students' communication initiations and teachers' responses and affect are manifested through archival video observations, refer to Table 3.

Procedures: Teacher Responses and Affect Classification

To categorize teacher responses, the unit of analysis was at the level of the students' communication initiations. The frequency of students' communication initiations and teachers' responses were calculated to determine the overall rate of teachers' responses and non-responses. Using the unit of analysis of the individual students, we further categorized the types of teacher responses under "Contingent", "Not Contingent", and "Responds to Attentional Bid" to better understand the types of responses students are more often receiving from their teachers.

Similar to the McLean and Connor (2017) study, 18 individual codes were created to represent the possible combinations of teacher responses and teacher affect (Figure 2). These responses included 3 response types (Contingent, Not Contingent, and Responds to Attention) and six (6) affect types (Content, Enthusiastic/Exuberant, Neutral, Sad/Depressed, Angry/Frustrated, and Dismissive). For example, if a teacher's overall response was "Contingent/Content", a code was assigned to indicate that the teacher responded contingently and did so contently. These codes were thus created for each possible combination and were assigned a number ranging from 1-18. Some combinations (e.g., "Contingent/Sad/Depressed") were not observed for any of the students in our sample and were taken out of our analyses, resulting in only 13 possible combinations. These combinations are found on Table 4.

Affect types were further categorized into Positive, Neutral, and Negative groups while the Response types remained the same. The combination codes were grouped across eight (8) main subgroups according to affect group and response type. Descriptive statistics for these groupings are found in Table 5.

Similar to McLean and Connor's (2017) study, teachers' responses were also assessed separately according to their affect grouping and response type. These classifications were independent from either dimension. Descriptive statistics for these affect and response classifications are found in Tables 7 and 8.

Coding Procedures

Sampling Procedures

The present study utilized 34 archival video observations of teachers and their autistic student(s) working together within literacy contexts. To be included in this study, the video observations met the following criteria: (1) observations included a minimum of 7 minutes of literacy instruction, and (2) observations included at least three student communication initiations directed toward the teacher during the 7 minutes of instructional time.

Segmenting Rules

We sampled 15 minutes of literacy activities for longer videos, hence, the included activities ranged between 7 and 15 minutes overall. Student communication initiations were observed for each individual student during literacy instruction and were also the first step for examining the types of teacher responses and teacher affect. Teacher response types and teacher affect types were coded within 5 seconds from the offset of the student's initial communication, when possible. For a more detailed description on the segmenting rules and exceptions, refer to the ATAM codebook in the Appendix.

Training Coding Constructs

We adapted the teacher affect dimension from McLean and Connor's (2017) coding system to reflect the video observations within our study. Once fully adapted, archival video observations across mathematical contexts were used to train an undergraduate research assistant to code the ATAM. Using both virtual and in-person formats, the student coder and lead coder (lead author) met twice a week across the span of 2 months to learn the coding dimensions outlined on the ATAM. The student coder was granted access to the ATAM codebook to review the teacher response and teacher affect dimensions within the ATAM and later met with the lead coder to review the codebook more in depth. Through this process, the coder also became acquainted with the student communication initiation codes, as outlined in Birkeneder and Sparapani (2022).

Prior to achieving inter-rater reliability, the student coder and lead coder consensus coded, individually coding archival video observations of teacher-student interactions across various classroom contexts using the ATAM coding system. These videos provided a range of teacher response types and teacher affect types. Initial inter-rater agreement between the student coder and lead coder was low when the coder was given a practice video to do individually. This prompted the lead coder and student coder to consensus code 2-3 more videos across the span of 3 weeks. After 11 videos were consensus coded or individually coded for practice, the coder began the reliability process.

Inter-Rater Reliability of the Autism Teacher Affect Measure (ATAM)

Inter-rater reliability was first achieved between the lead coder and the student coder for both dimensions of the ATAM (type of teacher response and teacher affect) by reaching a minimum of 80% agreement for both dimensions across 5 consecutive archival video

observations that varied in duration. Once reliable, the student coder coded 63% of the data (27 students) and the lead coder coded 14% of the data (6 students).

To ensure that consistency and inter-rater agreement was still within acceptable range, inter-rater agreement was calculated on 21% of the data (9 students) using occurrence agreement and total percent agreement, Cohen's kappa (κ), and intraclass correlation coefficients (ICC). Occurrence agreement and total percent agreement are both types of point-by-point agreements; occurrence agreement measures the percentage of time that both raters agree on the presence of a behavior, while total percent agreement looks at the percentage of time that both raters agree on the absence and presence of a behavior (Yoder et al., 2018). Cohen's kappa also measures the agreement between raters, but accounts for the agreement that could be due to chance. Cohen's kappa (κ) ranges from -1 to 1 , with 1 meaning a total agreement between raters. Lastly, Intraclass Correlation Coefficients (ICC; Koo & Li, 2017) also measures inter-rater reliability. For this study, ICC was used to measure the consistency between the raters. The ICC values can range from 0 to 1 , with values above $.90$ indicating excellent reliability (Koo & Li, 2017). Occurrence agreement and total percent agreement were calculated using Microsoft Excel, while Cohen's Kappa and ICC were calculated using SPSS statistical package version 28 (SPSS Inc, Chicago, IL).

Analytic Methods

Descriptive Statistics

Descriptive statistics were reported for student communication initiations and teachers' response and affect types. Ratios were also used to identify the rate of responses and non-responses. Descriptive statistics include means and standard deviations on the standardized

measures that assessed autism severity, cognitive skills, and problem behaviors, which showed variability in the scores.

Correlations with Autism Teacher Affect Measure

Standardized Z-scores were created for the DAS-II and MSEL. Spearman correlations were conducted in SPSS to calculate the associations among the ATAM and student characteristics. We also ran a separate model of partial correlations controlling for NVIQ to examine the relations with the teacher rated PDD Behavior Inventory. More specifically, we used the positive, neutral, and negative affect groups and the contingent response type from the ATAM and the PDDBI teacher form Autism Composite Score (ASC).

Due to the small sample size and high number of association tests conducted in our Spearman correlation before controlling for cognitive skills, we utilized the Benjamini-Hochberg False Discovery Rate (FDR) correction to minimize the possibility for Type 1 error when interpreting the r-statistics and their corresponding p-values (Benjamini & Hochberg, 1995; Benjamini & Yekutieli, 2001).

Results

Preliminary Analyses and Data Preparation

All variables were examined for outliers, which were defined as data points that were three or more standard deviations (SD) from the mean (Knorr & Ng, 1998). Descriptive statistics showed that student characteristic measures were all normally distributed ($-3 < M < 3$), with the exception of the MSEL (Skewness = 2.44; Kurtosis = 5.98). Histograms and standard deviations also showed an outlier within the MSEL, with one student obtaining a score of 51. This value was brought down to within two to three standard deviations from the mean. The revised MSEL

yielded a new mean where student characteristic variables had a skewness and kurtosis that was deemed acceptable (Fidell & Tabachnick, 2003).

Using histograms and standard deviations, we also found outliers across the student IC codes, two of the combination codes (Not Contingent Angry/Frustrated and Not Contingent Content), and across the teacher response types (contingent, not contingent, and responds to attentional bid). These outliers were adjusted to be within three standard deviations of the mean.

Descriptive statistics of student and teacher standardized measures

Cognitive Skills. Results showed variability in students' cognitive skills. Thirty-four (34) students were administered the DAS-II and yielded an average NVIQ of 84.82 ($SD = 12.98$). Eighty-six (86) percent of students who received the DAS-II scored above 70 (clinical cutoff for intellectual disability; APA, 2013). The six students who were administered the MSEL had an average NVIQ score of 19.33 ($SD = .52$); 5 of the 6 students who received the MSEL scored a 20 or lower (Table 6).

Autism Diagnostic Status. In this study, we used the ADOS-2 scores as a measure of students' autism severity ($M = 7.71$; $SD = 1.70$). Consistent with prior studies, our sample's autistic features, on average, were classified in the moderate ($5 \leq CS \leq 7$) to severe range ($8 \leq CS \leq 10$; Duda et al., 2014). See Table 6.

Behavior Perception. Using the PDDBI, 38 students were rated by their teachers on their behaviors and social communication abilities. Students received an Autism Composite Score average of 50.82 ($SD = 10.57$), indicating teacher ratings of fewer problem behaviors. Eight students were rated a score of 60 or higher, indicating more problem behaviors offsetting their communication skills (Table 6).

Inter-Rater Agreement. Interrater agreement on the ATAM yielded an average occurrence agreement score of 89.60% for the Response Type dimension and a total agreement score of 83.91% for the Teacher Affect dimension. Cohen's kappa also showed a strong agreement between the lead coder and student coder when determining the type of teachers' responses, $\kappa = .85, p < .001$. There was also moderate agreement between the coders when determining teachers' affect type, $\kappa = .77, p < .001$ (McHugh, 2012). ICC (2, 2) estimates and the 95% confidence interval were based on a mean-rater ($k = 2$), consistency, 2-way random effects model. The 95% confidence interval of the ICC estimate for teacher's response type was between 0.85-0.93, indicating good to excellent reliability. The ICC (2, 2) estimate for teacher's affect was between 0.79 to 0.90 with 95% confidence, indicating good reliability. The ICC (2, 2) estimates and 95% confidence interval for teacher response and affect type combined was between .85-.92, indicating good to excellent reliability (Koo & Li, 2017).

Research Questions and Results

Teacher Response Types

Across the 34 videos, students initiated communication 10 times on average ($M = 10.40, SD = 6.97$), and teachers responded 8 times on average ($M = 7.84; SD = 5.27$) to those initiations. Of the 43 students, 34 students received at least one (1) non-response from their teacher when they initiated communication ($M = 2.53; SD = 2.89$). However, all students received at least one response from their teachers when they initiated communication.

Looking across response types, we found variability in teachers' contingent ($M = 4.35; SD = 3.77$) and noncontingent ($M = 3.51; SD = 4.09$) responses. Thirty-nine (39) students received at least one (1) contingent and one (1) noncontingent response from their teacher, and only eight (8) students received the code "responds to attentional bid." See Table 7.

Affect Groupings and Response Types

We observed 12 instances where affect was not judged due to the response being classified as a nonverbal response to attentional bid. The remaining responses were categorized according to affect group and response type. We found that most students (36 students) received at least one (1) positive, contingent response from their teacher when they initiated communication ($M = 3.56$; $SD = 3.25$). Twenty-nine (29) students also received at least one (1) positive, noncontingent response from their teachers ($M = 1.30$; $SD = 1.46$), and twenty-five (25) students received at least one (1) negative, noncontingent response from their teachers ($M = 1.70$; $SD = 2.57$; Table 5).

Affect Groupings. Responses were then categorized across affect groups without taking the response type into account. We found that thirty-nine (39) students received at least one (1) positive affect response from their teacher ($M = 4.95$; $SD = 4.11$). This was followed by the negative affect group, where twenty-eight (28) students received at least one (1) response that had negative affect ($M = 2.00$; $SD = 2.80$). See Table 8 for more descriptive statistics on the affect groupings.

Correlations. Pearson correlations were used to examine the relation between the teacher affect codes with student characteristics, including cognitive skills (DAS-II; MSEL), autism features (ADOS-2), and teacher-perceived problem behaviors (PDDBI). We found negative, strong relations with students' cognitive skills and teachers' negative affect ($r = -.50$, $p < .001$) and negative, moderate relations with autism features and positive affect ($r = -.38$, $p < .05$). This indicated that teachers used more negative affect with students who exhibited less developed cognitive skills and used less positive affect with students who had more autism features. We also observed negative, moderate relations between teacher-perceived problem behaviors and

neutral affect ($r = -.34, p < .05$), and with contingent responses ($r = -.42, p = .009$), indicating that students who were perceived to have more problem behaviors received fewer neutral responses and fewer contingent responses from their teachers. See Table 9.

To reduce the likelihood of Type 1 errors, we used the Benjamini-Hochberg False Discovery Rate (FDR) correction (Benjamini & Hochberg, 1995) with the correlation matrix that is not controlling for cognitive skills. We found that teacher-perceived problem behavior was no longer significant with neutral affect ($r = -.34, p = .11$). However, we still observed a significant, negative relation between teacher-perceived problem behavior and contingent responses ($r = -.42, p < .05$), between positive affect and autism features ($r = -.38, p < .05$), and between negative affect and students' cognitive skills ($r = -.50, p < .05$; see Table 11).

Discussion

Autism Teacher Affect Measure

This study used an adapted version of the TFCS—A, called the Autism Teacher Affect Measure (ATAM), to explore a feature of teacher-student interaction quality with autistic students. Studies have previously used teacher language to measure TSIs with autistic and nonautistic children (Pianta et al., 2008; Pianta, 2016; Sparapani et al., 2020). Yet, teacher affect as a measured feature of teacher-student interaction (TSI) quality among autistic students is understudied. Given that TSIs help shape students' academic and social development (Connor et al., 2005; Pianta et al., 2004, 2012), it is important to explore aspects of interactions that contribute to this interaction. We, therefore, provided a new lens with the ATAM—this measure ultimately provided information on the type of response and affect autistic students received from their teachers. Although McLean and Connor (2017) did not focus on TSI quality specifically, their study did provide information on how teacher affect can positively impact

neurotypical students academically. We expanded upon McLean and Connor's (2017) observational measure to capture the experiences of autistic learners by observing teacher affect to better understand the quality of the TSIs and get a glimpse of how the quality of these interactions may impact students academically. By using classroom video observations of teachers interacting with their autistic students in literacy lessons, this study makes three primary contributions: (1) providing preliminary evidence for the ATAM as a tool to measure affect in teachers working with autistic students; (2) showing that teacher affect varies among children and that this might be due to their individual developmental differences; and (3) providing evidence for how affect might be an important feature to gauge interaction quality between teachers and their autistic students.

Teacher Response and Affect Types

We found variability among the response and affect types directed toward autistic students. Although every student received at least one response from their teacher when they initiated communication, we also observed 34 students (79%) whose teachers did not respond to their students' initiations at least once. It is possible teachers did not respond to their students' initiations because students' communications initiations may not have been related to or relevant to the activity at hand (e.g., off-task comment; see Sparapani et al., 2022). Given that there are various functions or reasons why children communicate, it is possible that teachers are more likely to respond to certain communicative functions over others, such as communicating to comment versus communicate to protest (Birkeneder & Sparapani, 2023). The teachers' own attachment style can also play a role in how and how often they communicate with their students. However, the influence that student communication function and teachers' attachment style have on teacher affect is outside the scope of this paper and should be researched in the future. Despite

these reasons, not responding to students' communicative initiations might be detrimental for the student. This might specially be detrimental to autistic students given their differences in social communication that already pose a challenge when it comes to communicating with others (APA, 2013). Thus, when they initiate and are ignored, it can limit their access to interactions with their teachers and may also affect their future communicative attempts (Hart & Whalon, 2008; Wetherby & Prizant, 2005).

Across response types, contingent responses were the primary response type used. However, the instances of noncontingent responses, on average, were very similar to contingent responses. Contingent responses can enhance student communication and can help form high-quality TSIs (van de Pol et al., 2010). On the other hand, not contingent responses, such as redirecting students to comply following an initiation to request, can hinder student engagement and lower the TSI quality (de Kruif et al., 2000; McWilliam et al., 2002). It is possible that some teachers find it difficult to utilize contingent responses due to the nature of the lesson or if they deem their students' communication initiation to be “off-task” (Sparapani et al., 2020). This finding may point to the need for professional development, specifically training centered on learning strategies to redirect students while still taking up and contingently responding to their contributions, such as providing a reason as to why they cannot do a specific activity at a given time.

Teacher Affect Types. These results suggest that there is variability in TSI quality for autistic students, with more than half of our sample potentially experiencing lower-quality TSIs when they initiate communication. Specifically, 65% of our sample received at least one instance of negative affect—this is in line with other studies that have studied teacher talk with autistic students (Keen et al., 2005; Sparapani et al., 2021). In these studies, interactions are

characterized by high frequencies of directives. Our findings also suggest that teachers may use affect differently with autistic students overall. Whereas McLean and Connor's (2017) findings showed very few instances of negative affect directed towards the neurotypical students in their sample, this study found several instances of negative affect directed towards autistic students. This discrepancy in negative affect could be because we included a Dismissive affect type and added additional characteristics under the Angry/Frustrated affect type. Such characteristics included teachers being physical to the skin (often when redirecting) as well as dismissing an initiation for the sake of redirecting the student back to the on-topic activity. It is possible we observed more instances of negative affect overall when students initiated because those initiations were not properly understood by their teachers. Similar to the results yielded by Hosotani and Imai-Matsumura (2011) and Prosen and colleagues (2011), it is possible that their communicative attempts were misinterpreted as being disengaged or off-task, resulting in more negative responses from their teachers. This creates an opportunity to provide professional development for teachers, to highlight the types, functions, and features of autistic students' communicative attempts.

Affect and Student Characteristics

The students in our study had a range of cognitive skills and autism features. We found that teachers used more negative affective responses with students who had lower cognitive skills. Teachers also used less positive affective responses towards students who exhibited more autism features. These results are alarming, considering that positive affect and emotional expressions have positive academic and developmental outcomes in NT students (Buric, 2019; Hernandez et al., 2016; Kiuru et al., 2016). Yet, these findings are in line with the literature describing the types of language autistic students or students with differing cognitive skills

generally receive. For example, directives, close-ended questions, and less language overall has been commonly used with autistic students and with students with lower cognitive skills (Connor, 2016; Irvin et al., 2013; Sparapani et al., 2021).

The discrepancies found in the use of affect types could be due to a variety of reasons, including teacher burnout (Ruble & McGrew, 2013), not having the appropriate training or knowledge to work with autistic students or students with cognitive differences (Hummerstone & Parsons, 2021), viewing autistic students and special education classrooms through the medical model of disability (Lynch & Irvine, 2009; Pellicano & den Houting, 2022), or misinterpreting autistic students' characteristics as problem behaviors (Caplan et al., 2016; Hart & Whalon, 2013). All speculation for now, but possible areas for future research. Nevertheless, the differences in the type of affect used can be detrimental to students. For instance, Connor and colleagues (2014) noted that students had the best reading outcomes when teachers spent greater amounts of time in child/teacher or small group environments and were responsive (which includes providing positive feedback to students), organized, and interactive with their students. If students are learning in an environment that is more negative, it can negatively impact their classroom experiences and their academic and developmental outcomes. Teacher trainings and interventions related to autism and teacher affect as well as overall teacher support, should be considered in order to improve the interaction quality among all students, regardless of cognitive skills or autism features. This points to the need for equitable, humanizing practices for all learners, including neurodivergent learners with more intensive needs.

The results found between student characteristics and teacher affect highlight our theoretical framework of attachment. Although the theory of attachment was originally studied between parents and children (Bowlby, 1969/1982), this theory was also applied to the

classroom, showing that students with secure attachments tend to be more emotionally regulated, more resilient, and have higher academic achievement (Bergin & Bergin, 2009; Commodari, 2013; Geddes, 2006). Yet, studies that have looked at parent-child dyads with autistic children have suggested that autistic children are more likely to develop insecure attachments compared to neurotypical children, and these discrepancies might be attributed to their autism features and cognitive skills (Naber et al., 2006; Rutgers et al., 2007; Teague et al., 2017). Although these studies were not done with teachers and the results from the current study showed that majority of students received at least one instance of positive affect, overall, students received teacher affect that ranged from positive, neutral, to negative. The inconsistency in the affect they receive might make it difficult for these students to develop secure attachment relationships with their teachers, and those who present more autistic features or cognitive impairment might be even more vulnerable to developing an insecure attachment.

Furthermore, given that some studies suggest that autistic students have a harder time perceiving people's emotional expression, such as neutral and happy expressions (Berggren et al., 2016), it is important to try to minimize the instances of negative affect, as this might also lead to a more insecure attachment style and may potentially impact their academic achievement and later attachments relationships with their future teachers. Thus, it is important that teachers form secure attachments with their autistic students in order to reduce the possibility of negative academic and developmental outcomes (Driscoll & Pianta, 2010), and increasing positive affect and decreasing negative affect may be a good step to form this attachment.

Psychometric Properties and Future Implications

The ATAM's dimensions showed good psychometric properties in regard to reliability (Koo & Li, 2017; McHugh, 2012; Yoder et al., 2018). Interrater agreement and consistency was

high for both dimensions, including when the calculations were accounting for the probability of chance. These psychometric properties, therefore, show promise that this observational measure can be used in future studies with an autistic population. More specifically, this measure will be useful as more research examines the teacher affect and response types with autistic students, especially since the current literature only documents teacher affect with typically developing students (McLean & Connor, 2017). Continuing to understand teacher affect towards autistic students will not only provide additional insight into their interaction quality, but it might also assist in understanding their relationship quality as well (Granic & Patterson, 2006). Moreover, since the ATAM is a newly adapted measure, extending the measure to other classroom contexts as well as other teacher-rated measures will not only further validate the ATAM, but it may also provide information on whether the ATAM is a tool that can be used across different classroom settings.

Utility of the ATAM

This observational measure can be used in multiple ways. First, it can help measure the teacher-student interaction quality through an affective lens. Using teacher affect as the lens can help create professional development programs that specifically focus on the tones, body movements/body language, and facial expressions that are being conveyed to autistic students. Moreover, this measure can be used as a relationship and quality marker and can thus help develop a professional development training on working with autistic students in different classroom contexts.

Second, the ATAM can be used alongside other types of communication and with other student populations. This study only examined teacher affect following autistic students' communication initiations. However, communication initiations only capture a small fraction of

student communication. Since the ATAM is an observational measure, future studies can utilize this tool with other forms of communication, such as when the student responds to a teacher's bid. Furthermore, since the ATAM was adapted from McLean and Connor's TFCS—A to capture the experiences of students on the autism spectrum, we may be able to utilize this measure with other neurodivergent populations. By doing so we can better understand if there are any similarities or differences in how teachers communicate with nonautistic neurodivergent students.

Strengths and Limitations

The study provides an important contribution to the literature by using teacher affect as an additional component to measure TSI quality. Although teacher affect has previously been examined with typically developing children, teacher affect had not been studied within a classroom context with students with autism. This exploratory study expands on the literature by providing some preliminary results on the type of affect students are receiving from their teachers. It also provides a new methodological approach to examine teacher affect. For instance, previous studies (Yoon, 2002) have used self-reports to measure teacher affect. This new approach prevents self-reported bias from impacting the results. In addition, we utilized measures, such as the DAS-II and MSEL, that are widely used in autism research literature to conduct correlational analyses. We also found our measure to have good psychometric properties, and we used the Benjamini-Hochberg FDR correction (Benjamini & Hochberg, 1995) to ensure that our findings were in fact significant.

This study also has some limitations. First, we used a 15-minute sample to judge teacher affect due to the high variability of video duration within our sample. Future studies should examine whether the frequency of response and affect types gathered in our study are

representative of samples with longer video durations. In addition, although we provided a rich examination of the type of affect teachers are using towards their autistic students, our sample size was fairly small. This was also the case in our teacher sample size. Future research should include more students and teachers in order to generalize our findings. Lastly, our study only focused on teacher affect that followed student communication initiations. Given that this is only a small portion of their overall communication with their teachers, future studies should consider all other communicative contributions in order to better understand the type of affect students are receiving overall.

Conclusion

The first exploratory study in this dissertation utilized a newly adapted measure, the Autism Teacher Affect Measure (ATAM), to explore teacher affect use towards autistic students' communication initiations in primarily special education classrooms as well as explore potential links with student characteristics. The findings showed variability in teacher affect, with primarily positive responses. However, instances of negative affect and non-responses were also reported. In addition, there were significant links between teacher affect, cognitive skills, and autism features. Ultimately, this study provided preliminary evidence for the type of affect teachers use towards their autistic students. Given that this is an understudied area of research, Study 1 ultimately laid the foundation for the work that will be discussed in the following two studies.

Table 1, Study 1*Student and Teacher Demographic Information*

Demographic Information	Student ($n = 43$)		
	N	%	Mean (SD)
Age	43		7.68 (2.14)
Sex			
Male	39	91	
Female	4	9	
	Teacher ($n = 34$)		
	n	%	$M (SD)$
Sex			
Female	31	91	
Classroom Types	31		
Special Education	21	68	
Inclusion	7	22	
Resource Specialist Program	3	10	
Years of Experience			
Autism	34		7.74 (5.83)
Special Education	34		6.13 (4.29)

Note. The majority of students were male (4 female). There was variation between teachers' years of experience working in special education and with children with autism. Special Education classrooms consisted of mild/moderate, moderate/severe, and autism-specific classrooms. Teachers taught in a variety of classroom types, with 68% teaching in special education classrooms. Teachers' data appeared to be missing at random.

Table 2, Study 1

Autism Teacher Affect Measure Dimensions and Definitions

Autism Teacher Affect Measure Dimensions
Teacher Response. Teacher Response Type is the first dimension within the Autism Teacher Affect Measure. This dimension is defined as verbal and/or nonverbal responses that follow students' communication initiations, as used in previous studies (Birkeneder & Sparapani, 2022; Sparapani et al., 2016; Wetherby et al., 2016). The 4 response types within this dimension are described below: Contingent. Teacher responds to and acknowledges the student's initiations and does not change the topic of conversation that was initiated by the student. Not Contingent. Teacher responds, but does not acknowledge or aligns their response to the students' needs. Teacher may redirect the student back to the initial task or activity. Responds to Attentional Bid. Teacher responds to the student verbally or nonverbally when the students initiates communication to secure attention. No Response. Teacher ignores and does not acknowledge the student's communication initiation.
Teacher Affect.^{a b} Teacher affect types are the second dimension within the Autism Teacher Affect Measure and is determined after the Teacher Response type is determined. As described by McLean and Connor (2017), teacher affect is “based on facial expressions, vocal tones, body posturing, and body movements displayed by the teacher” (p.7). The 6 affect types within the dimension are described below. Content.^a The teacher is “happy, relaxed, engaged with the students, but is not exaggerated” (p. 7). Teacher may have a rise in intonation. Enthusiastic/Exuberant.^a The teacher shows excitement and uses exaggerated vocal tones and movements (McLean and Connor, 2017). Neutral.^a The teacher is not showing positive or negative characteristics (McLean and Connor, 2017) and has a monotonous tone. Sad/Depressed.^a The teacher has “low energy, slow movements, and low, sad vocal tones” (McLean and Connor, 2017, p. 7). Angry/Frustrated.^a The teacher is “visibly and audibly irritated, frustrated and/or upset and uses harsh tones” (p. 7), and may physically redirect or block objects from the student. Dismissive.^b The teacher dismisses the students' initiations, has flat vocal tones and facial expressions, and blocks objects or redirects students without being physical to the skin.

Note. Both of these dimensions are within the *Autism Teacher Affect Measure* (ATAM).

^aAffect types were in McLean and Connor's (2017) TFCS—A measure, but additional language was added to the original description to reflect autistic students' experiences.

^b This affect type was created based on what autistic students experience in the classroom.

Table 3, Study 1

Examples of Teacher Affect and Teacher Response Types

Examples	Teacher Response and Teacher Affect
Student: "Do you have an eraser?" Teacher: "Hey Ms. B may I have an eraser?" Student: "Ms. B may I have an eraser?" Teacher: "Sure no problem." <i>Hands student an eraser</i>	Contingent. Content. The student initiates to request an eraser. Teacher responds to student's initiation by acknowledging and aligning their response with the student's needs and initial communication, and does not change the topic of conversation initiated by the student. The teacher's affect is content due to her rising intonation and slight smile during her response.
Teacher: "How many stickers are we gonna put on this side?" Student: <i>Points to another set of stickers that are on the opposite side of the classroom</i> "I want to get those stickers." Teacher: "How many stickers are we gonna put on this side?"	Not Contingent. Dismissive. After the teacher asks the student a question about the lesson, the student initiates by requesting a separate set of stickers. The teacher responds to the student's initiation, but they redirect the student; their response or action is different from the student's intent and is overall dismissive of the student's initiation.
Student: <i>Taps teacher's shoulder</i> Teacher: <i>Looks at the student</i> "What is it, buddy?"	Responds to Attentional Bid (verbal). Content. The student initiates by trying to secure attention from the teacher. The teacher responds by directing language towards the student and by utilizing body movements to indicate a response. The teacher's affect was content since the response had positive tones and teacher was engaged and relaxed.
Teacher: <i>Uses gestures so student pays attention.</i> Student: <i>Inaudibly replies to teacher in form of protest.</i> Teacher: <i>Walks away and speaks to another student.</i>	No Response. The teacher gestures so the student pays attention, but the student initiates by protesting. The teacher ignores the student's protest by not acknowledging the student and talking to a different student.

Student: *Student initiates communication, but cannot hear what they said.*
Teacher: "We have 2 more minutes!" *Provides a slight smile.*

Student: "Can you take off your hand Ms. E?"
Teacher: *Talks to the research assistant who is off-camera.* "He's not usually like this."
Grabs student's arm to redirect their behavior.

Teacher: "Can you set this one up?"
Student: "It's subtraction."
Teacher: *Nods* "Mhm."

Cannot Determine. Content. Student initiates communication, but is incomprehensible and thus coded as "Underdetermined". The teacher responds to the student, but is coded as "Cannot Determine" since we are unable to determine if it's a contingent or not contingent response. Teacher affect is content since the response has rising intonation and teacher's facial expressions are relaxed and are smiling.

Not Contingent. Angry/Frustrated. The student initiates communication by requesting their teacher's hand to be moved. The teacher responds to the student by redirecting their behavior using a physical prompt. The affect is angry/frustrated due to the teacher being physical to the skin (grabbing student's arm) and for having a tense mouth and eyes.

Contingent. Neutral. The teacher asks the student to set up the problem they are working on together. The student initiates by making a comment it is a subtraction problem. The response is contingent because the teacher is acknowledging the student's initiation and confirms that it is a subtraction problem. The affect is neutral because the teacher displays neither positive or negative characteristics during the response.

Note. Examples are from video observations that include teachers and autistic students performing a variety of tasks within mathematics and literacy instruction. Teacher response and affect types are labeled for each example and an explanation describing the response and affect type is provided.

Table 4, Study 1*Teacher Response & Teacher Affect Combination Codes*

Combination Code	Combination Label	Mean (SD)	Range
1	Not Contingent/ Content	1.26 (1.40)	0 – 5
2	Not Contingent/ Enthusiastic/Exuberant	0.05 (.21)	0 – 1
3	Not Contingent/ Neutral	.28 (.45)	0 – 1
4	Not Contingent/ Angry/Frustrated	.19 (.50)	0 – 2
5	Not Contingent/ Dismissive	1.51 (2.34)	0 – 10
6	Contingent/ Content	3.49 (3.22)	0 – 13
7	Contingent/ Enthusiastic/Exuberant	.07 (.26)	0 – 1
8	Contingent/ Neutral	.70 (1.37)	0 – 6
9	Contingent/ Angry/Frustrated	.12 (.39)	0 – 2
10	Contingent/ Dismissive	.14 (.41)	0 – 2
11	Responds to Attention/ Content	.07 (.34)	0 – 2
12	Responds to Attention/ Enthusiastic/Exuberant	.02 (.15)	0 – 1
13	Responds to Attention/ Angry/Frustrated	.05 (.31)	0 – 2

Note. Frequency of teacher response and teacher affect types. Mean and standard deviations for the 13 possible combinations are shown. Contingent/Content responses are observed the most, followed by Not Contingent/Dismissive.

Table 5, Study 1*Classification of Responses According to Affect Groups and Response Types*

Affect and Response Groupings ($n = 43$)	Mean (SD)	Range	Skewness	Kurtosis	No. of students who received affect/ response type
Positive/ Contingent	3.56 (3.25)	0 – 13	1.26	1.65	36
Neutral/ Contingent	.70 (1.37)	0 – 6	2.96	9.34	16
Negative/ Contingent	.26 (.54)	0 – 2	2.07	3.56	9
Positive/ Not Contingent	1.30 (1.46)	0 – 6	1.53	2.17	29
Neutral/ Not Contingent	.28 (.45)	0 – 1	1.02	-1.01	12
Negative/ Not Contingent	1.70 (2.57)	0 – 12	2.34	6.12	25
Positive/ Responds to Attentional Bid	.09 (.37)	0 – 4	4.27	19.08	3
Negative/ Responds to Attentional Bid	.05 (.31)	0 – 2	6.56	43.00	1

Note. Teacher responses were classified according to affect groupings and response types.

Responses were reported at the level of the teacher by using the number of teachers who used a certain combination of affect and response type at least once. Only verbal Respond to Attentional Bids were judged for affect. 36 teachers used positive and contingent responses, followed by 33 teachers who used neutral and/or negative and not contingent responses.

Table 6, Study 1*Student Standardized Measures and Teacher Measures*

Student Measures	<i>n</i>	Mean (SD)	Range
ADOS-2	42	7.71 (1.70)	3 – 10
DAS-II (NVIQ)	34	84.82 (12.98)	50 – 109
MSEL (NVIQ)	6	19.33 (.52)	19 – 20
Teacher Measures			
PDDBI	38	50.82 (10.57)	31 – 78
CPRT			
CPRT FI Score	34	2.70 (.64)	1.89– 4.36
Contingent Consequences	34	4.18 (.78)	2.00 –5.00
Reinforces Attempts	18	1.67 (1.53)	1.00 – 5.00

Note: Descriptive summary of the student measures is shown based on the data that was available. Three students did not have cognitive skills data (DAS-II or MSEL). 79% of the sample of students were administered the DAS-II. Six students were administered the MSEL. Standard Scores are reported for the DAS-II; scale scores are reported for the MSEL. Of those who were administered the DAS-II, 31 students had an NVIQ of above 70. 29 teachers gave reports on students' behaviors using the PDDBI (PDD Behavior Index). 8 students were rated a score above 60 on the PDDBI. CPRT (Classroom Pivotal Response Training) were given a fidelity score based on a 1 – 5 Likert scale. Standard scores are reported.

Table 7, Study 1*Teacher's Response Type Usage*

Teacher Responses (<i>n</i> = 43)	Mean (SD)	Range	Skewness	Kurtosis	No. of students who received response type
Total Responses	7.84 (5.27)	1 – 20	1.08	.18	43
Response Type					
Contingent	4.35 (3.77)	0 – 14	1.25	1.09	39
Not Contingent	3.51 (4.09)	0 – 17	2.31	5.03	39
Responds to Attentional Bid	.26 (.59)	0 – 2	2.21	3.87	8
No Response	2.53 (2.89)	0 – 13	2.07	4.61	34

Note. Frequency of responses and non-responses are reported at the level of the student. 34 students received at least one non-response from their teacher. When teachers did respond to students, 39 students received at least one contingent and one not contingent response from their teachers. Eight students received a response to attentional bid.

Table 8, Study 1*Teacher's Affect Type Usage*

Affect Category (<i>n</i> = 43)	Mean (SD)	Range	Skewness	Kurtosis	No. of students who received affect type
Positive	4.95 (4.11)	0 – 20	1.50	.36	39
Neutral	.98 (1.49)	0 – 7	2.59	7.96	22
Negative	2.00 (2.80)	0 – 14	2.46	7.57	28

Note. Frequency of teacher affect groupings are shown. Nonverbal Responds to Attentional Bid Responses were not judged for affect. Affect types were grouped by affect categories (positive, neutral, negative). Affect type frequencies were reported at the level of the teacher. 39 teachers were reported of using positive affect at least once. Twenty-eight (28) teachers were reported of using negative affect at least once.

Table 9, Study 1*Correlational Matrix Involving Teacher Affect and Student Characteristics*

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. PDDBI ACS	38	50.82	10.57	—	-.27	-.34*	.19	-.42**	-.07	.05
2. Positive Affect	43	4.95	4.11	-.27	—	.59**	.05	.84**	-.26	-.38*
3. Neutral Affect	43	0.98	1.49	-.34*	.59**	—	-.05	.72**	-.13	-.08
4. Negative Affect	43	2.00	2.80	.19	.05	-.05	—	-.11	-.50**	-.12
5. Contingent	43	4.35	3.77	-.42**	.84**	.72**	-.11	—	-.10	-.19
6. NVIQ	40	84.82	12.98	-.07	-.26	-.13	-.50**	-.10	—	.19
7. ADOS-2	42	7.71	1.70	.05	-.38*	-.08	-.12	-.19	.19	—

* $p < .05$. ** $p < .01$.

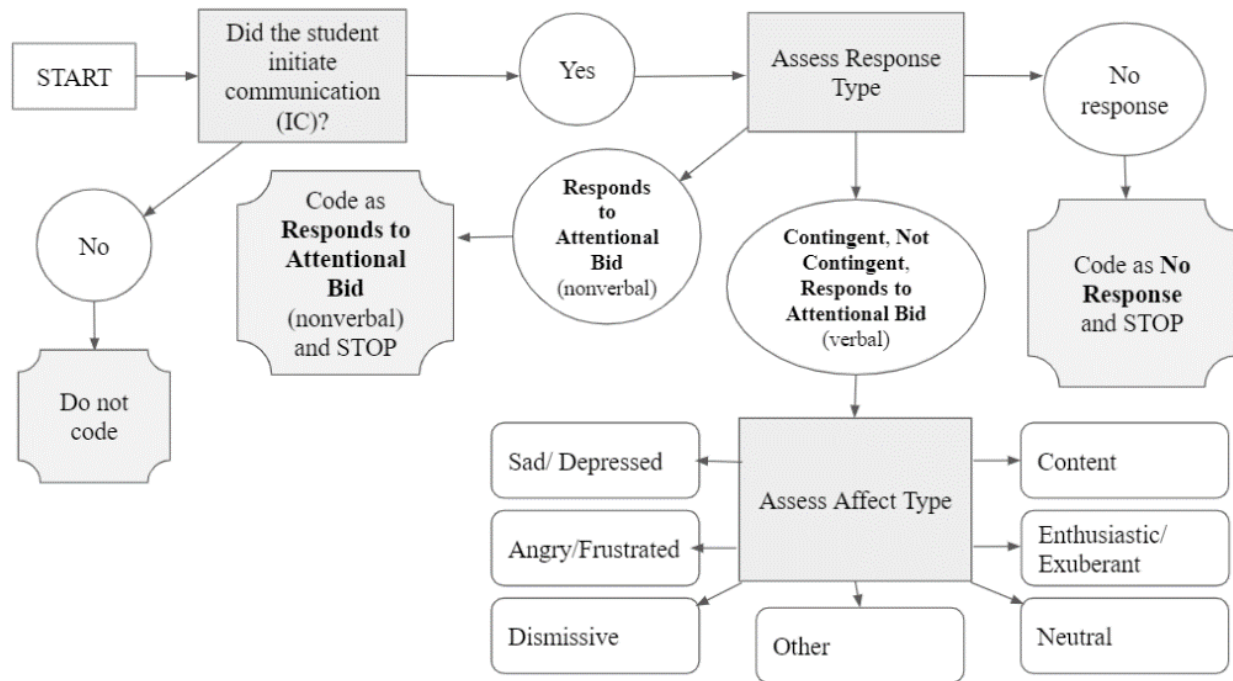
Table 10, Study 1*Benjamini-Hochberg False Discovery Rate (FDR) Correlational Matrix*

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. PDDBI ACS	38	50.82	10.57	—	-.27	-.34	.19	-.42*	-.07	.05
2. Positive Affect	43	4.95	4.11	-.27	—	.59**	.05	.84**	-.26	-.38*
3. Neutral Affect	43	0.98	1.49	-.34*	.59**	—	-.05	.72**	-.13	-.08
4. Negative Affect	43	2.00	2.80	.19	.05	-.05	—	-.11	-.50**	-.12
5. Contingent	43	4.35	3.77	-.42*	.84**	.72**	-.11	—	-.10	-.19
6. NVIQ	40	84.82	12.98	-.07	-.26	-.13	-.50**	-.10	—	.19
7. ADOS-2	42	7.71	1.70	.05	-.38*	-.08	-.12	-.19	.19	—

* $p < .05$. ** $p < .01$.

Figure 1, Study 1

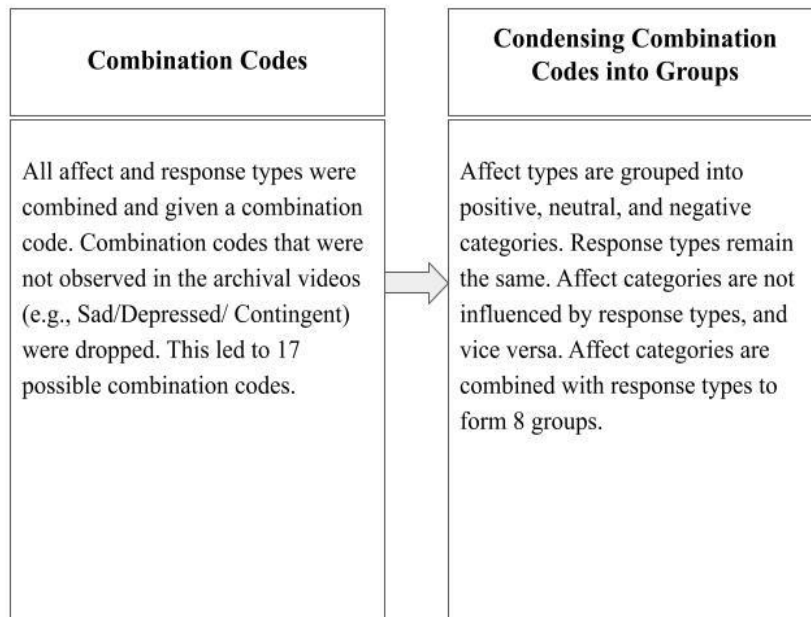
Flowchart for Coding Response and Affect Types



Note. Flowchart that shows how to code both dimensions of the ATAM from start to finish.

Figure 2, Study 1

Teacher Response and Affect Classification Procedure



Note. This figure shows the procedure for combining and grouping teachers' response and affect types after they have been coded using archival video observations.

Phase 2: Studies 2 and 3

Examining Teachers' Affect and Student-Teacher Relationship Quality Among Autistic Students and General Classroom Talk in TK – 5th Grade General Education Classrooms

Most studies have examined teacher affect through feedback and responses to students. Studies have also used the mental representations of teacher affect (e.g., Koenen et al., 2019), teachers' observed expressions (Yoon, 2002) or specific attributes related to teacher affect (i.e., harsh discipline when misbehaving, teacher enthusiasm; De Jong et al., 2014). Two relevant

studies to date have examined teacher affect within neurodivergent populations, including students with emotional behavior difficulties and students on the autism spectrum within special educations. In Phase 1, Study 1, we found variability in teachers' affective responses directed towards their autistic students, including positive and negative affect. Similarly, Koenen and colleagues (2019), documented links between teacher affect and teacher-student relationship quality in a sample of students with emotional behavioral difficulties. Little is known about teacher affect, and whether and how it varies between special and general education classrooms-- goals of this study. **Phase 2** of my dissertation outlines two studies which together provide information about the influence teacher affect and relationship quality have on autistic students within general education classrooms. We examined teacher affect in interactions with autistic students and in response to the general class within TK-5th grade classroom using observational methods. In addition, the studies aim to understand whether group differences in affect exist between autistic students with talk directed at the general classroom. This foundational research will answer important questions that will help explain the experiences neurodiverse students, including those on the autism spectrum, have within their classrooms as well as provide insight into the role of teacher affect as an important target for change.

Literature Review (Studies 2 and 3)

Neurodiversity in Mainstream Classrooms

Neurodivergent learners have steadily been included more often in mainstream schools and classrooms (Snyder & Dillow, 2013). Specifically, 67% of students served under the Individuals with Disabilities Education Act (IDEA) spend at least 80% of their time in general education classrooms – a 7% increase from the 2009-10 school year (National Center for Education Statistics [NCES], 2023). With this inclusion push, autistic students have also been

increasingly included in mainstream classrooms. Currently, autistic children make up the fourth highest disability classification of children receiving special education within public schools and, as of the 2020-21 school year, 39.7% were educated in general education classrooms at least 80% of the time (U.S. Department of Education, 2019, 2022). This dissertation will focus on examining autistic students who are included within general education classrooms to gain further understanding of the affect teachers use with autistic students and their nonautistic peers.

While educators generally have positive attitudes about including autistic students in mainstream classrooms (Humphrey & Symes, 2013; Segall & Campbell, 2012; Whitaker, 2007), studies have shown that general education teachers do not have a grasp on effective teaching strategies for autistic students (Humphrey & Symes, 2013; Segall & Campbell, 2012). Studies have also suggested that general education teachers have felt like they had limited knowledge on autistic characteristics (Lindsay et al., 2013; Soto-Chodiman et al., 2012). A qualitative study conducted by Lindsey and colleagues (2013), for example, found that teachers found it hard to fully include autistic students in the classrooms because of their unfamiliarity with autistic traits. Not feeling well-equipped to work with autistic students could result in teacher burnout, low self-efficacy, and negative attitudes toward learners on the autism spectrum (Boujut et al., 2016; Kelly & Barnes-Holmes, 2013). In addition, some studies have shown that teachers have more negative attitudes of inclusion when autistic students exhibit problem behaviors (i.e., Jury et al., 2021). It is possible that certain autistic characteristics are misunderstood as problem behaviors. Misunderstanding the expression of autism could potentially create challenges that influence the quality of interactions and relationships students have with their general education teachers. This may be observed through teachers' affect, as the varying knowledge of autism features and mixed attitudes may result in a range of affect types toward autistic students.

In addition, although inclusive general education classrooms have the potential to promote social belonging (Boutot & Bryant, 2005) and improved academic outcomes for autistic and other neurodivergent students (Kim et al., 2018), they are often not designed with neurodiversity in mind. For instance, classrooms that are noisy, large, and chaotic may cause autistic students, who often have sensory processing differences, to be in distress (Pellicano & de Houting, 2022). One core feature of autism is difficulty with joint attention, the ability to secure a common referent or share attention with others on a specific topic (Mundy, 2016). Thus, multiple visual stimuli in the classroom could also be a barrier for autistic students' learning (Martin & Wilkins, 2022), especially when a lesson requires a high capacity for joint attention. Furthermore, classrooms that have language-heavy instructional opportunities might become barriers for autistic learners who have communication or socialization differences (Sparapani et al., 2021) and need other modalities to access the curriculum (e.g., visuals; Goodall, 2018). These features of the general classroom could ultimately impact autistic students' communication or behavior and may alter the quality of interactions and relationships they have with their teachers.

Examining Affect towards Autistic Populations

While the literature on teacher affect continues to expand, this area of research is still severely understudied among neurodivergent learners, including those on the autism spectrum. In Phase 1, we used an adapted observational measure, the *Autism Teacher Affect Measure* (ATAM), to explore teachers' affect within a sample of autistic students and their special education teachers. Results showed that teachers used a range of affective responses from positive to negative with their autistic students, and this was influenced, in part, by individual student differences. We documented correlations among students' cognitive skills, autism

features, behavior, and teacher affect. In addition, we found that students who exhibited lower cognitive skills experienced more negative affective responses from their teachers, and students with more autism features received fewer positive responses. Finally, students who exhibited more problematic behavior, as perceived by their teachers, received fewer contingent responses. These results are interesting and concerning, as they suggest a negative link between student characteristics and developmental skills with teachers' affect. It is possible that students may not be properly understood by teachers (i.e., autistic students' communicative needs being misinterpreted as problem behaviors) and may influence the type of affect students receive. However, more research is needed to further unpack these findings.

Koenen and colleagues (2019) studied teacher affect in a sample of 85 Belgian elementary school students in special education with emotional and behavioral difficulties who have had an autism diagnosis to examine the relations between teachers' mental representations of teacher affect with relationship quality and teacher sensitivity. The authors used the *Teacher Relationship Interview* (TRI), a 12-question semi-structured interview, to examine the relation between teacher affect and relationship quality. Specifically, they used the affective scales (helplessness, anger, and positive affect) to examine the relation between teacher affect and relationship quality. They used video observations to examine the links between teacher affect and teacher sensitivity. They found a positive relation between positive affect and positive STRs; anger and negative STRs; and helplessness and negative STRs. There were also negative relations between positive affect and negative STRs as well as helplessness and positive STRs. Last, the authors found positive links between positive affect and student participation and prosocial behavior as well as links with teacher anger, helplessness, and student behavior problems.

Although these studies measure affect in different forms (expressed emotions versus subjective feelings of affect), they both provide information pertaining to how teacher affect manifests within neurodivergent populations. Specifically, both studies show how certain student factors (e.g., communication, student behavior, developmental differences) are related to teachers' affect. Even though it is outside the scope of both studies, it is possible that certain factors, like student behavior or communication, were due to the structure of their environment (i.e., classroom was not supporting students' needs) or were misunderstood by teachers—a potential opportunity for professional development. Given that both of these studies took place in special education classrooms, more research is needed to determine if these findings are applicable to general education classrooms. Since general education classrooms have less individualized instruction compared to special education classrooms, it is possible that the ways in which autistic students communicate in general education classrooms differs from special education, resulting in potentially different affective teacher responses.

Teacher Affect and Student-Teacher Relationships

Studies have demonstrated links between teacher affect and student-teacher relationship (STR) quality (Koenen et al., 2019; Spilt & Koomen, 2009). Spilt and Koomen (2009), for example, found that teachers' use of positive affect was significantly and positively correlated with student-teacher relationship closeness, whereas anger expression was related to relationship conflict. Koenen and colleagues' (2019) study yielded similar results and in addition, found a significant, negative relation between positive affect and student-teacher conflict. That is, special education teachers expressed more positive feelings with their students when they had less teacher-student conflict. Using a sample of elementary school teachers, Yoon (2002) also found that negative affect was a predictor for negative student-teacher relationships, while also noting

that there are other potential teacher factors that could influence the student-teacher relationships. Nevertheless, these studies suggest that certain affect types may be associated with either positive or negative student-teacher relationship quality.

The quality of relationships between students and teachers has been found to influence students' classroom experiences as well as their academic, social-emotional, and behavioral development (Pianta, 2006; McGrath & Van Bergen, 2015). Studies have previously studied STRs using various measures, such as observational tools that assess student-teacher interactions (e.g., Classroom Assessment Scoring System [CLASS]; La Paro et al., 2004), teacher and student surveys and questionnaires (e.g., Longobardi et al., 2016; Yoon, 2002), and the *Student Teacher Relationship Scale* (STRS; Pianta, 2001). Positive STRs have been associated with children's and adolescents' academic outcomes and social development, including school adjustment, language skills, motivation, and prosocial behavior (Pianta et al., 2003, 2012; Roorda et al., 2011; Wentzel, 2010). For example, Longobardi and colleagues (2016) found that positive STRs were associated with students' transition from middle school to high school (as observed through students' problem and prosocial behaviors). Specifically, student-teacher closeness was associated with improved academic achievement.

Examining Student-Teacher Relationships with Neurodivergent Populations

Studies suggest that autistic learners have lower quality relationships with their teachers compared to their neurotypical peers (Blacher et al., 2014; Prino et al., 2016). Student-teacher relationships have previously been studied with neurodiverse and racially diverse populations in general and special education classrooms (e.g., Caplan et al., 2016; Crosnoe et al., 2004; Hugues & Kwok, 2007). There is very limited research that examines teacher affect and student-teacher relationship quality concurrently. However, the existent studies do shed some light on the

relationship quality with neurodivergent learners, including those on the autism spectrum. Prino and colleagues (2016) examined student-teacher relationship quality with neurodivergent learners in Italy, who had a diagnosis of either autism, Down Syndrome, specific learning disorder, or attention-deficit/hyperactivity disorder (ADHD). They found that teachers had lower quality relationships (lower scores in the Closeness scale on the STRS) with their autistic students and students who exhibited more ADHD features. However, when compared with students who were not neurodivergent, autistic students had even lower quality relationships compared to students with ADHD. In a study conducted by Kelly and Barnes-Holmes (2013), 16 primary school teachers had more negative implicit attitudes towards students who showed severe autism characteristics compared to students who did not have autism. A longitudinal study also found that externalizing behaviors and more prominent autism characteristics decreased the student-teacher relationship quality, while high levels of language, cognitive and social skills increased the level of closeness with their teachers (Caplan et al., 2016). These findings are similar to our findings from Phase 1, such that students with more autism features, for example, received fewer positive affective responses from their teachers. These findings might suggest that teachers have difficulty with accurately interpreting the neurodiversity associated with autism students' differences; Sensory processing sensitivities and communication differences might be misinterpreted as misbehavior (Buyse et al., 2008). This could potentially jeopardize the TSI quality with autistic learners and thus impact the relationship with their teachers (Ashburner et al., 2010; Eisenhower et al., 2015). The studies in Phase 2 will provide insight in whether or not these pattern of findings are consistent with autistic students in mainstream classrooms.

Phase 2, Study 2: Purpose and Research Questions

Studies 2 and 3 build off of Phase 1 by addressing the gap in the literature relating to teacher affect in interactions with autism spectrum in general education classrooms. The purpose of Study 2 is to describe teacher affect following autistic students' initiations in general education classrooms and explore links among teacher affect, relationship quality and student developmental and behavior skills (adaptive behavior, cognitive skills presence of teacher-rated problematic behavior. Study 2 addresses the following objectives:

1. Explore the range of teacher affect that follows autistic learners' initiations within TK-5th grade general education classrooms during mathematics instruction.
2. Explore links among teacher affect dimensions, relationship quality, and student adaptive skills, problem behaviors, and cognitive skills.

Methods

Participants

Participants were recruited as part of a federally funded exploration study that aimed to examine inclusion and inclusive practices for autistic students and their nonautistic peers within general education classrooms. (R324A210288; Sparapani). As part of the exploration study, which spanned across five (5) years, the research team recruited 30 general education teachers from six elementary schools in three districts across Northern California. Once enrolled, all students within the 30 classrooms were invited to participate in the study. Across the five years of the study, there were 30 participating teachers, including 16 returning, and 467 students (117 autistic).

Trained research assistants administered academic measures to all students participating in the study. In addition, research assistants video recorded classroom lessons of mathematics

and literacy in the fall, winter and spring. Last, teachers completed questionnaires on students' development.

Autism Identification

School records were used to identify students receiving special education services under the autism classification category, obtaining supplemental supports, or undergoing the process of receiving eligibility for special education services. Families also reported if their child had a medical diagnosis of autism. Trained clinicians administered the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2; Lord, 2012) to students who were identified or were in the process of being eligible for special education services under the autism category. Families also completed the Social Responsiveness Scale, Second Edition (SRS-2; Constantino & Gruber 2012), which identifies social behaviors associated with autism. Teachers also completed the SRS-2 as well as the Child Behavior Checklist Teacher's Report Form (CBCL-TRF; Achenbach, 2001), which has been used to identify autistic profiles (Deckers et al., 2020). Students who were identified with the SRS-2, CBCL-TRF measures, met autism criteria on the ADOS-2, or had an educational or a medical diagnosis of autism were included under the autism group of the larger study.

Studies 2 & 3

The current studies included participating teachers and students from Years 1 and 2 of the exploration study. Students were included if they met the following criteria: 1) students had a video observation from the Fall term during a mathematics lesson, 2) students were identified under the autism group of the larger study, and 3) students initiated communication towards their teachers at least three (3) times during mathematics instruction.

Participants in the current study included 15 teachers and their 31 TK-5th grade students ($M_{age} = 6.65$; $SD = 1.32$) on the autism spectrum across 3 districts in Northern California. Eighteen (58%) students were male, and, overall, students were racially/ethnically diverse. Majority of teachers were female (87%) and majority were White/Caucasian (79%). Teachers ranged in their years of teaching experience ($M = 7.78$; $SD = 6.05$) as well as in years of teaching students in their current grade level ($M = 4.14$; $SD = 2.35$). See Table 1.

A battery of measures was used across the studies. Studies 2 and 3 used parent demographic surveys and teacher questionnaires to characterize the teacher and student sample. These studies also used observational measures (ATAM, Class-MAP) to examine teacher affect that followed students' communication initiations. Study 2 also used cognitive and diagnostic measures as well as teacher-reported measures (developmental, relationship quality) to characterize the student sample and examine potential links with teacher affect (See Table 7). These measures are described in detail next.

Standardized Measures

Characterizing Measures and Diagnostic Classification

DAS-II (Elliott, 2007). The DAS-II is a tool that evaluates the cognitive skills and achievement of children and adolescents who are 2–17 years old. This measure includes 20 subtests that are organized into the Early Years (ages 3 to 6 years) and School-Age (ages 6 years and older) batteries. Both the Early Years and School-Age batteries have 6 core subtests that yield verbal, nonverbal reasoning, and spatial ability scores, and a General Conceptual Ability (GCA) composite score. These ability scores yield T-scores ($M = 50$, $SD = 10$), a percentile score, an age-equivalent score, and composite and cluster scores ($M = 100$, $SD = 15$). This measure shows high reliability and validity, with reliability coefficients between 0.90 and 0.94

for Preschool Level and high correlations with the McCarthy Scales of Children Ability (MSCA; Elliot, 2007). The GCA composite score was used to characterize the student sample. Data was missing at random.

Social Responsiveness Scale—Second Edition (SRS-2; Constantino & Gruber, 2012).

The SRS-2 is a 65-item questionnaire that is used to assess social abilities that are associated with autism. This measure can be filled out by caregivers or teachers and it takes 15-20 minutes to complete. T-scores ($M = 50$; $SD = 10$) are yielded for the five treatments subscales (Social Awareness, Social Cognition, Social Communication, Social Motivation, and Restricted Interests and Repetitive Behaviors), as well as the overall total score. The study used the overall total score ($T > 60$) to determine whether a student met autism criteria.

ADOS-2 (ADOS-2; Lord et al., 2012). The ADOS-2, also known as the “gold standard” for diagnosing autism, is a semi-structured tool that helps assess and diagnose autism in children ages 12 months through adulthood. This is done by observing and coding their communication, play, social interactions, and restricted or repetitive patterns of behaviors through a Social Affect (SA) and Restricted and Repetitive Behavior (RRB) domain. There are 5 modules that can be administered, which are dependent on the individual’s age and language level. The ADOS-2 yields a Social Affect (SA) score, a Restricted and Repetitive Behavior (RRB) score, and a Calibrated Symptom Severity score (CSS). The CSS ranges from 0 to 10, with a score of 10 indicating the presence of the most autism features in an individual (Gotham et al., 2009). This measure has strong psychometric properties, with its validity and test-retest reliability ranging between 0.68 and 0.92 (McCrimmon & Rostad, 2013). The autism-checklist derived from the ADOS-2 were used to characterize the sample.

Demographic Surveys. Two surveys (Parent Demographic Survey and Informational Survey for Teachers) were developed to be used within the study. The Parent Demographic Survey had questions pertaining to the parents' background (e.g., caregivers' race and ethnicity, highest level of education completed) as well as their child's background (e.g., child's age, race and ethnicity, special education status). In order to ensure accessibility, these surveys were written in English and Spanish. The Parent Demographic Survey, particularly the child's age and race and ethnicity, were used to help characterize the student sample.

The Informational Survey for Teachers collected demographic data on the teachers. This included their race and ethnicity, highest level of education, type of credential obtained, and any certifications they possessed. In addition, they were asked about the grades they taught prior to the study, overall years of teaching, and their current grade level. Finally, questions about their practices and knowledge in different areas, such as teaching literacy, mathematics, teaching autistic students, and their understanding Universal Design for Learning and Multi-Tiered Systems of Support frameworks, were also asked. The informational Survey for Teachers, in particular their race and ethnicity, degree, and years of experience were used to help characterize the teacher sample.

Teacher-Reported Measures

Vineland Adaptive Behavior Scales–Third Edition (Vineland-3; Sparrow et al., 2016). Vineland-3 is used to measure adaptive behaviors and help diagnose intellectual and developmental disabilities, including autism. This measure is individually administered by conducting a comprehensive or a domain-level parent interview and by completing teacher report form that consists of items regarding an individual's adaptive behaviors. The forms consist of three domains that relate to adaptive functioning: Communication, Daily Living Skills, and

Socialization. The teacher form describes the individual's adaptive behavior in school and is given in a questionnaire. Normative scores are given for the interview and parent form for the individual across their lifespan, while the teacher form only provides a normative score for ages 3-21. An Adaptive Behavior Composite (ABC) is also yielded, which reflects the scores from the Communication, Daily Living Skills, and Socialization domains. This study utilized the teacher form's Communication domain and Socialization domain normative score obtained from Time 1 (Fall) to explore associations with the ATAM and to characterize the sample. Interrater reliability coefficients ranged from 0.70 to 0.81 for the comprehensive interview form and 0.69 to 0.84 for the domain-level interview form, indicating strong psychometric properties (Hill et al., 2017).

Student-Teacher Relationship Scale–Short Form (STRS-SF; Pianta, 2001b). This teacher-rated scale examines the relationship between a teacher and an individual student. This scale consists of 15 items and are rated on a 5-point Likert type scale (1= *Definitely does not apply*; 5 = *Definitely applies*). The items are distributed across two subscales (Conflict and Closeness), which yield a Conflict and Closeness score by averaging the items in each subscale. The STRS-SF shows high psychometric properties as well as high internal consistency ($\alpha > 0.80$; Hamre & Pianta, 2001; Pianta, 1992; Pianta et al., 1995; Settanni et al., 2015). The Conflict and Closeness scores obtained at Time 1 were used to explore possible associations with the ATAM and to characterize the sample.

Child Behavior Checklist-Teacher Report Form (CBCL-TRF; Achenbach & Rescorla, 2001). The CBCL-TRF form is used to assess students' internalizing and externalizing behaviors. This tool has also been used previously to evaluate autistic students' emotion regulation. T-scores ($M = 50$; $SD = 10$) are yielded for two categories: Internalizing Behaviors (i.e., depressed, anxious, overly controlling) and Externalizing Behaviors (i.e., aggressive,

noncompliant, hyperactive). The Externalizing Behaviors T-scores at Time 1 were used for Study 2 since they focus on the observed behaviors. The CBCL-TRF is a widely used tool that has been found to have strong psychometric properties, with reliability coefficients reported at above the 0.90 range (Achenbach & Rescorla, 2001).

Classroom Video Observation Measures

ATAM. Teacher responses and teacher affect were assessed using the ATAM. This measure, which is adapted from the Teacher Feedback Coding System - Academic (TFCS -A; McLean & Connor, 2017), consists of two dimensions: the 1) Teacher Response Type and 2) Teacher Affect type. The lead coder (author) and an undergraduate student researcher previously used and coded this measure in Study 1, which explored teacher affect within an autistic student sample in special education. Inter-rater agreement was calculated on 20% of the data using the same procedures as in Study 1. The dimensions are described in more detail below.

Teacher Response. The first dimension within the ATAM assesses whether and how a teacher responds to their students' communicational bids. Teacher responses are placed into four categories: (1) Contingent, where teacher's response is aligned with student's needs, (2) Not Contingent, where teacher responds but response does not align with student's needs, (3) Responds to Attentional Bid, where teacher responds when student tries to secure the teacher's attention, and (4) No Response, where teacher does not respond to student's initiation.

Teacher Affect. This is the second dimension of the ATAM. There are seven different affect types within this dimension: 1) Content, 2) Enthusiastic/Exuberant, 3) Neutral, 4) Sad/Depressed, 5) Angry/Frustrated, 6) Dismissive, and 7) Stern. With the exception of the Dismissive and Stern affect types, these categories were part of and adapted from the TFCS-A (McLean and Connor, 2017). Similar to McLean & Connor (2017) and the study in Phase 1 this

the teacher affect types were combined into three composite affective categories (positive, neutral, negative). Refer to Table 2 and Table 3 from Study 1 Phase 1 for definitions and examples of the ATAM's dimensions.

Class-MAP. The Classroom Measure of Active Participation (Class-MAP) is an observational tool that captures the features of interactions between autistic and nonautistic students and their teachers during literacy and mathematics instruction (Sparapani et al., 2016). This observational measure has two coding systems (student coding system and teacher coding system), with five (5) dimensions in each system. For the purpose of this study, we will focus on one (1) dimension within the student coding system: Initiating Communication.

Initiating Communication. Initiating communication (IC) is defined as unprompted communicative vocalizations, verbalizations, and/or gestures that are directed towards another person and serve a specific function (Birkeneder & Sparapani, 2022; Sparapani et al., 2016; Wetherby et al., 2006). The IC measure is composed of 10 communicative functions within four dimensions: 1) Regulating Others' Behavior, which consists of protesting and requesting; 2) Showing Attention to Oneself, which consists of initiating social routines, commenting, and secure attention; 3) Using Language to Advocate, Repair, or Inquire, which consists of advocating, seeking predictability, using repair strategies, and seeking information; and 4) Giving and Other Social Initiations, which consists of giving. Inter-rater reliability was above 80 percent.

Procedures

Training and Inter-rater Reliability of the ATAM

An undergraduate researcher was trained for about 3 months to learn the ATAM. The undergraduate researcher was given access to the ATAM codebook and met with the lead coder

once a week to watch videos of autistic students initiating communication with their general education teachers. Initiating communication was previously coded by other graduate and undergraduate researchers, who had achieved high interrater agreement ($> 80\%$). Once the student researcher watched and consensus coded 5 videos with the lead coder, they began the reliability process for teacher affect.

The student researcher met reliability once interrater agreement was above 80% across both dimensions twice on 5 consecutive videos. Once reliable, the student coder coded about 84% (26 students) of the real data and the lead coder coded about 16% (5 students) of the data. Interrater agreement was calculated on 20% of the data (7 students) to ensure that coding remained consistent throughout the coding process.

Teacher Responses and Affect Classification Procedures

Teacher response and teacher affect types were assessed for every communication initiation that was “clearly directed” or “not clearly directed.” Given that students initiated communication that was “clearly directed” towards their teacher, towards another educator (e.g., student-teacher, paraprofessional), or both, teachers’ affective responses were observed across two (2) different classification groups: 1) “Not clearly directed” and “clearly directed” towards teachers and 2) “Clearly directed” towards other educators.

Video Coding Procedures

A lead coder (myself) and one undergraduate student researcher coded the teacher affect measure that followed students’ communication initiations. These types of communication initiations included choral or individual responses, as well as hand-raises.

Sampling Procedures. The studies included 18 videos of general education teachers and their neurodiverse students (including those on the autism spectrum) in whole class and small

group mathematics instruction. In order to be included in this study, the video observations met the following criteria: 1) observations included a minimum of 16 minutes of mathematics instruction and 2) observations included at least three (3) instances of students communicating with their teachers during the 16 minutes of instructional time.

Segmenting Rules. We sampled about 33 minutes of instructional time for the longer videos thus, our included videos ranged from 16 to 33 minutes in length ($M = 29$ minutes). Instances of students on the autism spectrum initiating communication with their teachers were observed for each individual student during mathematics instruction and were also the first step in examining the teacher affect dimension. Teacher affect types were coded within 5 seconds from the offset of the students' communication attempts, when possible.

Study 2 Analytical Methods

Descriptive Statistics

Descriptive statistics were reported for student communication initiations, teacher response types, and teacher affect types. Descriptives were also reported for response and affect types across the four (4) IC dimensions. Ratios were used to identify the rate of educators' responses and non-responses as well as the use of positive, neutral, and negative affect. These descriptives were reported across the two classification groups (teachers and other educators). Descriptives and ratios were also reported to indicate the rate of teachers addressing the whole class, individual students, or calling on other students' raised hands when they did not respond to the target students' initiations. This was only reported for the teacher. Last, descriptive statistics included means, standard deviations, and ranges for students' characterization measures and teacher-reported measures that assessed STRs, adaptive functioning, problem behaviors, and cognitive skills.

Correlations with the ATAM

Spearman correlations were run in SPSS to examine the relations among teacher affect, student communication, and student characteristics. Due to the collinearity between Contingent responses and Positive responses ($r = 0.97$), a “Contingent Positive” composite score was created. Thus, separate correlations were run using students’ communication initiations, not contingent responses, contingent-positive responses, students’ students’ cognitive skills (DAS-II GCA), STRS-SF subscales (closeness and conflict subscales), student adaptive skills (Vineland-3 Communication domain and Social Skills domain scores), and teacher-rated problem behaviors (Externalizing Problems score per the CBCL-TRF). Partial correlations controlling for cognitive skills were not run since there were no significant relations influenced by cognition.

Due to the small sample size and high number of association tests conducted in the Spearman correlations, the Benjamini-Hochberg False Discovery Rate (FDR) correction was used to minimize the possibility for Type 1 error when interpreting the r -statistics and their corresponding p -values (Benjamini & Hochberg, 1995; Benjamini & Yekutieli, 2001).

Results

Preliminary Analyses and Data Preparation

All variables were examined for potential outliers, which were defined as measures that were 3 or more standard deviations (SD) from the mean (M ; Knorr & Ng, 1998). Student characterizing measures and teacher-reported measures were normally distributed ($-3 < M < 3$), with the exception of the STRS-SF Closeness subscale, which was negatively skewed and leptokurtic (Skewness = -1.41; Kurtosis = 3.21), and the Vineland-3 Communication domain, which was slightly positively skewed and leptokurtic (Skewness = 1.02; Kurtosis = 3.22). Additionally, histograms and SDs showed an outlier within the Closeness subscale, with one

student obtaining a closeness rating of 1.87. However, this value remained unchanged since it was only 0.20 away from being within 3 SDs. Descriptives also showed an outlier within the Vineland-3 Communication domain, with a student yielding a score of 135. This value was brought down to 2 to 3 SDs from the mean, resulting in a new skewness and kurtosis that was deemed acceptable (Fidell & Tabachnick, 2003).

Using histograms and descriptives, outliers were also found within students' communication (communication "not clearly" and "clearly" directed towards teacher) and teachers' responses (Teacher Total Response and Teacher No Response). These outliers were adjusted to be within 3 SDs from the mean. Students' communication initiations towards other educators and their responses (Other Educators' Total Responses and Non-Responses) were positively skewed and leptokurtic, which could be due to the small sample size ($n = 13$). These initiations and responses did not yield any outliers, thus their values remained unchanged.

Descriptives of student measures and teacher-reported measures

Cognitive Skills. There was variability among students' cognitive skills. Twenty-eight (28) students were administered the DAS-II and yielded an average General Conceptual Score (GCA) score of 95.79 ($SD = 17.46$). Ninety-three percent (93%) of students received a score above 70 (clinical cutoff for intellectual disability (APA, 2013). See Table 2.

Student-Teacher Relationships. Twenty-eight (28) teachers rated their perceived relationship quality with their autistic students using a 5-point Likert scale. On average, teachers had a Closeness score of 4.10 ($SD = 0.68$), indicating more positive teacher-student interactions. Seven percent (2 students) had 5-point ratings across all Closeness items. Teachers, on average, had a Conflict score of 2.21 ($SD = 1.08$), indicating generally fewer negative interactions (Stensen et al., 2023). No students were given 5-point ratings across all Conflict items (Table 2).

Adaptive Functioning. Twenty-eight (28) students were rated by their teachers on their communication and socialization skills. There was variability across students' communication and socialization skills. Students' communication skills scored an average of 86.75 ($SD = 11.28$), which is considered adequate in relation to the average population of their age group (Sparrow et al., 2016). Students' socialization functioning yielded an average of 82.89 ($SD = 9.84$), which is considered moderately lower compared to the average population of their age group (Table 2; Sparrow et al., 2016).

Teacher-Perceived Student Problem Behavior. Teachers rated twenty-nine (29) students' externalizing problems, per the CBCL-TRF. There was variability across students' externalizing behaviors, with students yielding a score of 58.97 ($SD = 10.93$) on average. About 31 percent (9 students) had a clinically significant elevated externalizing score ($T > 64$), suggesting more externalizing problem behaviors (Achenbach & Rescorla, 2001). Descriptives are found on Table 2.

Interrater Agreement. Interrater agreement on the ATAM yielded an average occurrence agreement score of 91.79% for the Response Type dimension and a total agreement score of 89.33% for the Teacher Affect dimension. Cohen's kappa also showed a strong agreement between the lead coder and student coder when determining teacher responses ($\kappa = .83$, $p < .001$) as well as teacher affect ($\kappa = .82$, $p < .001$; McHugh, 2012). ICC (2, 2) estimates and the 95% confidence interval were based on a mean-rater ($k = 2$), consistency, 2-way random effects model. The 95% confidence interval of the ICC estimate for teacher's response type was between 0.74 to 0.86, indicating good reliability. The ICC (2, 2) estimate for teacher's affect was between 0.88 to 0.94 with 95% confidence, indicating good to excellent reliability (Koo & Li, 2017).

Research Questions and Results

Teacher Response Types

Students participated in whole-class and small group instruction, with 48 percent participating in both. Across all videos, students had a total of 388 communication initiations that were ‘not clearly’ or ‘clearly directed’ towards their teachers. With the exception of one student who did not initiate communication with their teacher, on average, students initiated communication 13 times ($M = 12.93$; $SD = 10.10$). Teachers responded to students’ initiations 109 times, or 28 percent of the time (Table 3).

When examining initiations by function, whether teachers responded differed by students’ communicative function. For example, students initiated 40 times for the purpose of “using language to advocate, repair, and inquire;” teachers responded 70% of the time. Furthermore, teachers responded to students’ communication for the purpose of “showing” 20% of the time, while they responded to students’ communication to “regulate behavior” 42% of the time. This difference in response percentage was significantly different ($p < 0.05$). While we observed fewer initiations for the purpose of “regulating other’s behavior” (33 initiations) compared to “showing” (318 initiations), the significant difference in response percentage provides evidence regarding teachers’ response frequency to students’ communicative functions.

Looking at more detail, there were patterns of contingent and not contingent responses to those initiations. Sometimes teachers had contingent responses, where the initiations were taken up and their responses reflected the students’ communicative intent (e.g., student asking for a book and the teacher responded by handing the student a book). Other times teachers had non-contingent responses, where the initiations were not taken up and their responses were not aligned with the students’ communicative intent (e.g., student asking for a book and the teacher

told them to stop talking). Contingent and not contingent responding might be related to the initiations' function. When thinking about contingent responding for "showing attention to oneself," we observed contingent responses 74 percent of the time, whereas "regulating behavior" showed contingent responses 50 percent of the time. Students who initiated for the purpose of "using language to advocate, repair, and inquire," which is considered more sophisticated language, 93 percent of teachers' responses were contingent (Figure 1).

Teacher Affect Types

There was one (1) nonverbal response to attentional bid that was not judged for affect. Apart from that, 108 responses were judged across positive, neutral, and negative affect categories. Similar to response type, affect might be related to the function of the initiation. Overall, there was a high percentage of positive responses—84 were positive (78%), followed by 13 instances of negative responses (12%) and 11 neutral responses (10%; Table 3). Positive responses included smiling at the student, having a rise in intonation, and using warm tones. Negative responses were comprised of the dismissive affect type, which consisted of teachers not taking students' initiations seriously, cutting students off, or blocking objects and activities without an explanation. On the other hand, neutral responses consisted of teachers not having any discernable emotion or having a monotonous tone.

When examining affect across communication function, majority of the responses were positive. Yet, interestingly, there was a pattern in whether and how teachers responded to students' different functions of communication. The amount of positive, neutral, and negative responses depending on the sophistication of each communication function. For instance, when initiating for the purpose of "regulating behavior," teachers showed positive responses 64 percent of the time, leaving the remaining 36% as negative (22%) or neutral (14%). Students

initiated relatively more for the purpose of “showing attention to oneself” at 64 times (59%) and teachers’ responses were significantly more positive (78%, $p < 0.05$). When initiating for the purpose of “using language to advocate, repair, or inquire,” which uses more sophisticated language, teachers responded positively 23 times (82%). Students only initiated twice for the purpose of “giving” and both responses were positive.

A similar pattern was observed for neutral and negative responses, but at lower rates. For example, when initiating for the purpose of “showing attention to oneself,” teachers responded negatively 8 times (12%) and neutrally 6 times (12%). These responses were observed even less when initiating for the purpose of “using language to advocate, repair, and inquire,” where teachers responded negatively twice (7%) and neutrally thrice (11%). On the other hand, when students initiated for the purpose of “regulating behavior,” 21% of responses were negative, and 14% were neutral. See Figure 2.

Other Educator Response Types. While not the original purpose of this study, 13 students (42%) in the sample had another educator (e.g., paraprofessional, student-teacher) present in their classrooms. These students were physically next to an educator (23%), had an educator present in their small group (31%), or had an educator roaming the classroom for at least a portion of the lesson (46%). Overall, students initiated communication towards these educators 136 times, demonstrating high variability in communication initiations ($M = 10.54$; $SD = 10.37$). These educators responded to 102 of those initiations, or 75 percent of the time. Looking at the initiations by function, like teachers, it appeared that these educators responded to students’ communication at different percentages. For instance, students initiated for the purpose of “showing attention to themselves” the most at 87 times (64%) and these educators responded to those initiations 57 times (66%). Students initiated less for the purpose of “regulating

behavior” and “using language to advocate, repair, and inquire” at 23 times each. Interestingly, educators showed relatively more responses for communication that “used language to advocate, repair, or inquire” (96%) compared to communication that was for the purpose of “regulating behavior” (87%). See Table 4.

Looking at response types more closely, there were patterns of contingent and not contingent responses to students’ initiations. Similar to teachers, these educators had contingent responses that were in line with the students’ communicative intent (e.g., student made a comment about the problem and the educator responded by agreeing with the student’s comment). There were also times when the educator’s responses were not contingent, or not in line with the student’s communicative intent (e.g., student made a comment and the educator redirected and pointed the student back to the lesson). These responses could also be related to the communication function. For example, when communicating for the purpose of “regulating behavior,” 20% were contingent, whereas 81% of responses for the purpose of “showing attention to oneself” were contingent. Contingent responses appeared to be even higher when initiating for the purpose of “using language to advocate, repair, and inquire” at 95% of the time (Figure 3).

Other Educator Affect Types. There was one (1) nonverbal response to attentional bid that was not judged for affect. Apart from that, 101 responses were judged across positive, neutral, and negative affect categories. Overall, there was a high percentage of positive responses towards students’ initiations—63 were positive (62%), followed by 23 neutral responses (23%) and 15 instances of negative responses (15%; Table 4). Positive and neutral responses were similar to the teachers’ responses. Yet, compared to teachers’ negative responses, these

educators' negative responses also consisted of angry/frustrated responses (i.e., redirecting while being physical to the skin).

Looking across communication function, the affective responses appeared to have a variable pattern. For example, when students initiated for the purpose of “showing attention to oneself,” 47 of the educator’s responses were positive (82%). Meanwhile, when initiating for the purpose of using “language to advocate, repair, and inquire”, these educators only responded positively 10 times (45%)—a difference from teachers’ positive response patterns. Positive responses appeared to be the lowest when initiating for the purpose of “regulating behavior”, with only 4 positive responses observed (20%). When looking at neutral and negative responses, there was a similar pattern to the teachers’ when initiating for the purpose of “showing attention to oneself.” Educators responded negatively 3 times (5%) and neutrally 6 times (11%). The pattern changed with the other functions of communication. When initiating for the purpose of “using language to advocate, repair, and inquire” educators only responded negatively once (5%), however, half of the responses (50%) were neutral. On the other hand, when students initiated for the purpose of “regulating behavior”, 30% of responses were neutral and 50% were negative. See Figure 4.

Correlations

Spearman correlations were run to examine the relations between the teacher affect codes with students’ communication (students’ communication initiations and the IC dimensions) and students’ characteristics, including adaptive functioning (Vineland-3 Socialization and Communication domains), STR quality (STRS-SF conflict and closeness), and problem behavior (CBCL-TRF Externalizing domain). Results showed that the function of students’ communication was fairly strong and moderately linked to teachers’ responding ($r = 0.77, p <$

.001), Showing Attention to Oneself dimension ($r = 0.57, p < .001$), and contingent responses ($r = 0.63, p < .001$). In addition, there were moderate, positive correlations among teachers' contingent, positive responses and the frequency of student communicative initiations ($r = .64, p < .01$), indicating that more communication bids received more contingent, positive responses from teachers. In addition, teachers' non-contingent responses were negatively correlated with the Vineland-3 Socialization domain ($r = -.64, p < .05$), indicating that teachers used more non-contingent responses with students who showed more social skill need. Correlational matrices demonstrating the other significant relations are found on Table 5.

To reduce the likelihood of Type 1 errors, correlations were also ran using the Benjamini-Hochberg False Discovery Rate (FDR) correction (Benjamini & Hochberg, 1995). There were still fairly strong and moderate positive relations between students' communication and teachers' responding ($r = 0.77, p < .01$), the Showing Attention to Oneself dimension ($r = 0.57, p < .01$), and teachers' contingent responses ($r = 0.63, p < .01$). In addition, student communication initiations still showed a moderate, positive relation with contingent, positive responses ($r = .64, p < .05$). However, the relation between teachers' not contingent responses and students' social skills was no longer significant ($r = -.64, p = 0.27$; see Table 6).

Discussion

This study aimed to expand the previous literature on teacher affect within autistic learners in special education by exploring teacher affect—a potential feature of interaction quality—within an autistic population in general education classrooms. Given that teacher affect may be an important feature of interaction quality and divergent students, including those on the autism spectrum, are increasingly included in general education classrooms (Snyder & Dillow, 2013), this study makes two important contributions to the literature. First, the study provides

information on whether and how teachers respond to their autistic learners' initiations. Second, this study contributes to the literature by showing the links between teacher affect, relationship quality and student characteristics. Together, these findings provide initial evidence on the quality of interactions autistic students have with their general education teachers, as well as areas of need for professional development for general education teachers.

Teacher Response and Affect Types

There was variability in teachers' response and affect types overall. When looking at teacher response types, however, majority of initiations did not receive a response. This was different from the first study in this dissertation that looked at teacher affect in special education, where only a quarter of students' initiations were not responded to. One potential reason for this difference could be due to teachers misinterpreting students' initiations as off-task or as problem behaviors (e.g., Sparapani et al., 2022). There are various functions for initiating communication, including protesting, commenting, advocating for oneself, among others (Birkeneder et al., 2022). Teachers may be more inclined to respond to certain communicative attempts over others, and the function of that communication might play a role. For instance, communication that was categorized under the Regulating Others' Behavior (e.g., protest, request, tell others to stop) or Showing Attention to Oneself (e.g., comment, hand-raise) dimensions received the most non-responses from teachers. Teachers may be perceiving certain communication functions, such as protesting, as off-topic, resulting in more non-responses. However, causal inference cannot be determined with this data and should continue to be studied.

The classroom context could also play a role in teachers' responses to students' initiations. Twenty-eight students (90%) had either a portion or the entirety of their lesson instructed within a whole classroom context, and almost half of the students (48%) had at least a

portion of their math lesson in a small group classroom context. When looking at teachers' responses, most of their non-responses were observed when they spoke to other students individually or in a small group within the whole class. Given that whole class contexts tend to promote discussions that involve multiple students rather than just a single student (Duran & Jacknick, 2020), teachers might have difficulty responding to all students' communication bids, resulting in missed opportunities to reinforce those high quality interactions. Too many non-responses could be detrimental to students. Autistic students' social communication differences (APA, 2013) make it harder for students to initiate with others and, when these bids are not responded to, it could impact their perception of their attachment relationship with their teacher (i.e., teacher availability; Kennedy & Kennedy, 2004). This can result in students limiting their attempts to communicate in the future (Hart & Whalon, 2008; Wetherby & Prizant, 2005) and being less engaged during the lesson (Havik & Westergård, 2020).

When teachers did respond to students' initiations, most of the responses (77%) were contingent. Contingent responses are defined as responses that followed the child's lead and were in line with the initiation (Appendix A). Contingent responses are important as they can contribute to high quality TSIs and can promote communication in students (e.g., Boyd & Rubin, 2006; van de Pol et al., 2010). Furthermore, contingent responses can make students feel valued within the classroom. For example, a study by Boyd (2015) found that teachers' consistent and contingent patterns of talk fostered student learning by creating safe and positive learning communities. Despite the high rate of contingent responses, however, there were still instances when autistic students received not contingent responses (i.e. not following the child's lead). These not contingent responses may also be attributed to teachers' misinterpreting the function of the communication or interpreting the communication as off-task. For example, the frequency

of not contingent responses decreased as the function of the communication became more "advanced." For instance, communicating for the purpose of regulating behavior is considered more basic (e.g., requesting an item, protesting) than communicating for the purpose of using language to advocate, repair, or inquire, which is deemed more advanced (e.g., "wait but we didn't get to that part yet," advocating to use the bathroom). It is possible that teachers are viewing some of the more basic functions of communication as off-task, or off-topic, resulting in more not contingent responses. However, some of these more basic forms of communication could have different underlying meanings for the student than what is interpreted by the teacher (i.e., protesting due to a mismatch in the environment versus protesting to be off-task). This highlights a potential need for professional development programs to focus on not only understanding the different functions of communication but also understanding the autistic learner as a whole. Through this understanding, teachers could take up students' communication, regardless of its function, and relate it back to the instructional lesson (Boyd, 2015) while still having autistic students feel heard and valued within the classroom.

Teacher Affect Types

When looking at affect types, most responses to student communication were positive, while fewer responses were neutral or negative. Additionally, 50 percent of students only received positive responses and none of the students received solely negative responses. This is an important finding given that positive affect (i.e., praise, enthusiasm, warmth) has been linked to students' socioemotional development and academic outcomes (Hamre & Pianta, 2005) including increased behavior management, staying on task, and having more correct responses (e.g., Cook et al., 2017; Sutherland, Wehby, & Copeland, 2000). Thus, despite the high

frequency of non-responses, autistic students are still experiencing high-quality TSIs and forming positive attachment relationships with their teachers.

The rates of positive affective responses are in line with previous studies that found primarily positive affect and few negative affective responses in general education classrooms with neurotypical populations (e.g., McLean & Connor, 2017; McLean & Jones, 2025). In contrast, the first study of this dissertation (Vega Garcia et al., in preparation), which took place in a special education context, found a quarter of teachers' responses to be negative. The differences in the amount of negative affective responses could be due to the affect types that comprised that affect category. For example, the first study observed both angry/frustrated (i.e., physical to the skin, harsh and short wording, furrowed brows) and dismissive (e.g., redirecting back to the task without being physical to the skin) affect types. Meanwhile, the current study only observed the dismissive affect type. This difference could be due to the components of the angry/frustrated and dismissive affect types. In addition to the teachers' facial expression or vocal tones, the angry/frustrated affect type also included instances when a teacher was physical to the skin—a common practice used in special education to redirect behavior (Case & Stinson, 2021). Thus, the differences in negative affect between special and general education settings could partially be due to the instances observed when the teacher had angry/frustrated expressions and was also physical to the skin—a practice that was not observed in general education. While more research is needed, these findings suggest that special education and general education teachers might display negative affective responses to autistic students differently.

Moreover, when looking at teacher affect based on communicative function, we observed a similar pattern as response types—the frequency of positive responses increased and the

frequency of negative responses decreased as the communicative function became more advanced (i.e., students communicating for the purpose of advocating for themselves). This again could be due to the more basic communication functions being misinterpreted as off-task or off-topic. More professional development should focus on understanding how autistic students communicate as well as the benefits of responding positively to students.

Role of Other Educators

While the purpose of this study was to explore teacher affect among general education teachers, it was apparent that the other educators in the classroom also served an important role in shaping TSI quality and impacting autistic students' classroom experiences. More recently, the role of these educators, especially paraprofessionals, has expanded to directly provide instruction, manage behavior, and facilitate social supports (e.g., Carter et al., 2009; Fisher & Pleasants, 2012)—all opportunities for fostering teacher-student interactions. In the current study, about 42 percent of students (13 students) initiated communication towards another educator at least once, and one student only initiated communication towards the other educator. While students received a range of responses from these educators, on average, they responded to students' communication bids more than teachers. This could be due to the close proximity between the students and the educators. Particularly during the whole-class instruction, these school personnel were in more direct contact with autistic students than teachers. While these educators primarily used positive affect with their students, one notable difference between teachers and these educators was the use of not contingent responses within the Regulating Others' Attention dimension. Students who initiated under this dimension (i.e., protesting, asking others to stop) received more not contingent responses from other educators compared to the general education teachers. The literature has documented behavior management as one of the

primary roles of paraprofessionals (Carter et al., 2009). It is possible that some of these communicative bids, especially in this dimension, were misinterpreted as off-task by these other educators, resulting in not contingent responses. This is important especially since not contingent responses (i.e., not following the child's lead, using directives) could result in lower quality TSIs if used excessively (de Kruif et al., 2000; Sparapani et al., 2022).

In addition, understanding the affective responses of these other educators is important because, while not extensively studied, the proximity and availability of these educators to the students could result in an attachment relationship being formed (Kennedy & Kennedy, 2004). There could be instances when some students have easier "access" to these educators than their teachers (i.e., when teachers are instructing a whole-class lesson), thus making students more dependent on these educators. Future research should continue to explore the interactions, particularly the affective responses, between autistic students and the other educators present in the classroom, as their role in a student's learning experience can be of equal importance as the primary teacher in the classroom.

Affect and Teacher-Reported Student Measures

The students in our sample had a wide range of communication initiations and found that teachers' contingent, positive responses were linked to the rate of student initiations. Yet, not contingent responses were linked to social skills development. Students' communicative attempts serve different functions, including to regulate others' behavior or showing attention to oneself (e.g., Birkeneder & Sparapani, 2022). As students communicate with their teachers more, it creates more opportunities for teachers to respond to those initiations and thus fostering more opportunities for TSIs. As mentioned previously, it is possible that teachers are misinterpreting social skill needs, resulting in more not contingent responses (i.e., redirecting without following

the child's lead). This misinterpretation could potentially stem from the differences in social communication (APA, 2013). In other words, the difference in communication could cause a mismatch in how the student's communicative attempt is displayed and how it is received by the teacher, which could ultimately affect TSI quality. This is speculation for now, though future research should investigate the bidirectional nature of these relationships.

Last, these findings showed links between teacher and student contributions within interactions. However, in contrast to previous works, this study did not observe significant correlations between teacher affect with STR quality. One possible reason for this difference could be due to teacher's internal versus external affect. Studies like Spilt and Koomen (2009) and Koenen and colleagues (2019), for example, utilized a semi-structured interview to measure teacher affect, which included teachers' internalized affect. On the other hand, this study utilized the ATAM, an observational measure used to capture teachers' affect that was displayed outwardly. It is possible that there were no associations between teacher affect as measured by the ATAM and STR quality because teachers' observed affect differed from their internal emotional state (e.g., Taxer & Frenzel, 2018)—an area for future research. Moreover, studying teacher affect may require consideration of other aspects within interactions—studying affect in isolation might not be representative of the entire interaction. Future studies should explore these possibilities further, particularly with an autistic student sample. Despite not finding significant links between teacher affect and STR quality, teachers' affective responses may still contribute to students' attachment relationships with their teachers. STRs are dynamic, interactive, and are constantly evolving (Pianta, 1999); the way a teacher responds to students may still shape the internal working model (IWM) of the student and ultimately impact the students' perception of their future relationships with other teachers.

Limitations and Future Directions

The study had some limitations. First, our study looked at teachers' affect that only followed students' communication initiations. Communication initiations might not be representative of all the language that autistic students are using in the classroom, and some opportunities to examine teacher affect may be missed. Future studies should use other communicative attempts (i.e., student responses) in addition to initiations in order to get a more wholistic representation of teachers' affect. Additionally, our sample criteria included students initiating towards their teacher a minimum of 3 times. This resulted in some students in our sample initiating a minimal amount and others initiating more. This broad range might not fully represent autistic students' experiences in regard to the affect they received, particularly with those who initiated less. In addition, while our study provided rich data related to teacher affect, our student and teacher sample size was fairly small. While we used the FDR correction within the correlational analyses to minimize the possibility for Type I error and to account for the small sample size, future studies should strive to obtain a larger sample to generalize our findings.

The third, and final study of my dissertation attempts to address a few of these limitations. Specifically, Study 3 expands on the second study by exploring teacher affect that follows all communicative attempts and actions from students in the classroom. Additionally, since the second study only looked at the autistic learners within general educational classrooms, the third study aims to explore teacher affect use towards all learners within the classroom, including those on the autism spectrum, to get a more wholistic understanding of the quality of interactions within the classroom. This final study is described in more detail below.

Table 1, Study 2*Student and Teacher Demographic Information*

Demographic Information	Student ($n = 31$)		
	<i>N</i>	%	Mean (<i>SD</i>)
Age	31		6.65 (1.32)
Sex			
Male	18	58.06	
Female	13	41.94	
Race/Ethnicity			
Caucasian/ White	6	19.35	
Asian American/ Pacific Islander	6	19.35	
Asian Indian	2	6.45	
Bi-Racial	10	32.26	
Prefer Not to Say	1	3.24	
Not Reported	6	19.35	
	Teacher ($n = 15$)		
	<i>N</i>	%	Mean (<i>SD</i>)
Sex			
Female	13	87	
Race/Ethnicity ($n = 14$)			
Caucasian/White	11	79	
Bi-Racial	2	14	
Hispanic/Latinx	1	7	
Education Level ($n = 14$)			
4-Year College	3	21	
Graduate Degree	11	79	
Years of Experience ($n = 14$)			
Teaching Experience	14		7.78 (6.05)
Current Grade Level Experience	14		4.14 (2.35)

Note. Demographic information pertained to the student and teacher sample from Study 2. While Study 3 used the same sample, due to sampling procedures, only 27 students were included in Study 3. Data was missing at random.

Table 2, Study 2*Student and Teacher Standardized Measures*

Measures	Mean (SD)	Range
DAS-II GCA ($n = 28$)	95.79 (17.46)	57-132
Vineland-3 ABC ($n = 28$)	83.25 (9.07)	64-98
Social Skills ($n = 28$)	82.89 (9.84)	65-99
Communication Skills ($n = 28$)	86.75 (11.28)	
CBCL-TRF Total Problems ($n = 29$)	61.59 (7.25)	46-73
Externalizing	58.97 (10.93)	41-79
STRS-SF ($n = 28$)		
Closeness	4.10 (0.68)	1.88-5.00
Conflict	2.21 (1.08)	1.00-4.86

Note. Student and teacher standardized measures for Phase 2, Studies 2 and 3. Study 3 only used the DAS-II GCA score. Ninety-three (93%) percent of students who were administered the DAS-II received a score above 70 (clinical cutoff for intellectual disability; APA, 2013). Data was missing at random.

Table 3, Study 2*Teacher Response Types and Affect Categories*

	Mean (<i>SD</i>)	%	Range	# of initiations and responses	# of students receiving response type
Student Initiations (<i>n</i> = 30)	12.93 (10.10)	100	3-41	388	
Total Teacher Responses (<i>n</i> = 30)	3.60 (4.70)	28	0-19	109	30
Teacher Response Types (<i>n</i> = 30)					
Contingent	3.61 (4.28)	77	1-16	83	23
Not Contingent	2.27 (1.10)	22	1-4	25	11
No Response (<i>n</i> = 30)					
Whole Class	4.92 (2.97)	47	1-11	133	27
Small Group	3.17 (4.02)	7	1-11	19	6
Individual Student	3.72 (3.87)	36	1-14	93	25
Student Raised Hand	1.79 (1.19)	9	1-5	25	14
Teacher Affect Categories (<i>n</i> = 30)					
Positive	4.00 (4.64)	77	1-16	84	21
Neutral	1.57 (0.79)	10	1-3	11	7
Negative	2.17 (1.17)	12	1-4	13	6

Note. Teachers had contingent, not contingent responses, and responses for attentional bid when students initiated to secure the teachers' attention. Majority of non-responses were due to the teacher attending an activity or other students. 1% of non-responses were marked as teachers simply not responding to the initiation (i.e., were writing in their lesson plan). Affect categories

were created based on teachers' combined response and affect type (i.e., contingent, content response = positive affect). One response was not judged for affect due to the response being marked as a nonverbal response to attention.

Table 4, Study 2*Other Educator Response and Affect Categories*

	Mean (SD)	%	Range	# of students receiving response type
Student Initiations (<i>n</i> = 13)	10.54 (10.37)	100	1-41	
Other Educator Total Responses (<i>n</i> = 12)	9.18 (7.08)	70	2-27	11
Other Educator No Response (<i>n</i> = 12)	4.5 (4.11)	30	1-14	8
Other Educator Affect Categories (<i>n</i> = 12)				
Positive	7.00 (5.15)	62	2-17	9
Neutral	4.60 (3.50)	23	1-10	5
Negative	7.5 (2.12)	15	6-9	2

Note: Thirteen (13) students initiated communication towards another educator. Response and affect types were not judged for one educator due to being off-screen. Majority of students (11 students) who initiated communication with these educators were responded to at least once. Eight (8) students who initiated communication did not receive a response at least once. Majority of educators' responses were positive, followed by negative and neutral. While only 2 students received negative responses, the range (6-9) was relatively higher than neutral responses.

Table 5, Study 2*Correlational Matrix Involving Teacher Affect and Teacher-Rated Measures*

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1. Communication Initiations	30	12.93	10.10	—	-.18	.64**	-.08	-.03	-.02	.06	.12
2. Not Contingent	11	2.27	1.10	-.18	—	.23	-.64*	-.41	.18	.13	.14
3. Contingent Positive	20	3.85	4.32	.64**	.23	—	.00	-.08	.15	.10	.16
4. Vineland SOC	19	82.89	9.84	-.08	-.64*	.00	—	.47*	.28	-.22	-.45*
5. Vineland COM	19	87.89	14.22	-.03	-.41	-.08	.47*	—	.16	.30	-.01
6. Closeness	20	4.10	0.68	-.02	.18	.15	.28	.16	—	-.04	-.13
7. Conflict	20	2.21	1.00	.06	.13	.10	-.22	.30	-.04	—	.82**
8. CBCL Externalizing	28	58.93	10.93	.12	.14	.16	-.45*	-.01	-.13	.82**	—

* $p < 0.05$. ** $p < 0.01$.

Table 6, Study 2*Benjamini-Hochberg False Discovery Rate (FDR) Correlational Matrix*

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1. Communication Initiations	30	12.93	10.10	—	-.18	.64*	-.08	-.03	-.02	.06	.12
2. Not Contingent	11	2.27	1.10	-.18	—	.23	-.64	-.41	.18	.13	.14
3. Contingent Positive	20	3.85	4.32	.64*	.23	—	.00	-.08	.15	.10	.16
4. Vineland SOC	19	82.89	9.84	-.08	-.64	.00	—	.47	.28	-.22	-.45
5. Vineland COM	19	87.89	14.22	-.03	-.41	-.08	.47	—	.16	.30	-.01
6. Closeness	20	4.10	0.68	-.02	.18	.15	.28	.16	—	-.04	-.13
7. Conflict	20	2.21	1.00	.06	.13	.10	-.22	.30	-.04	—	.82*
8. CBCL Externalizing	28	58.93	10.93	.12	.14	.16	-.45	-.01	-.13	.82*	—

* $p < 0.05$. ** $p < 0.01$.

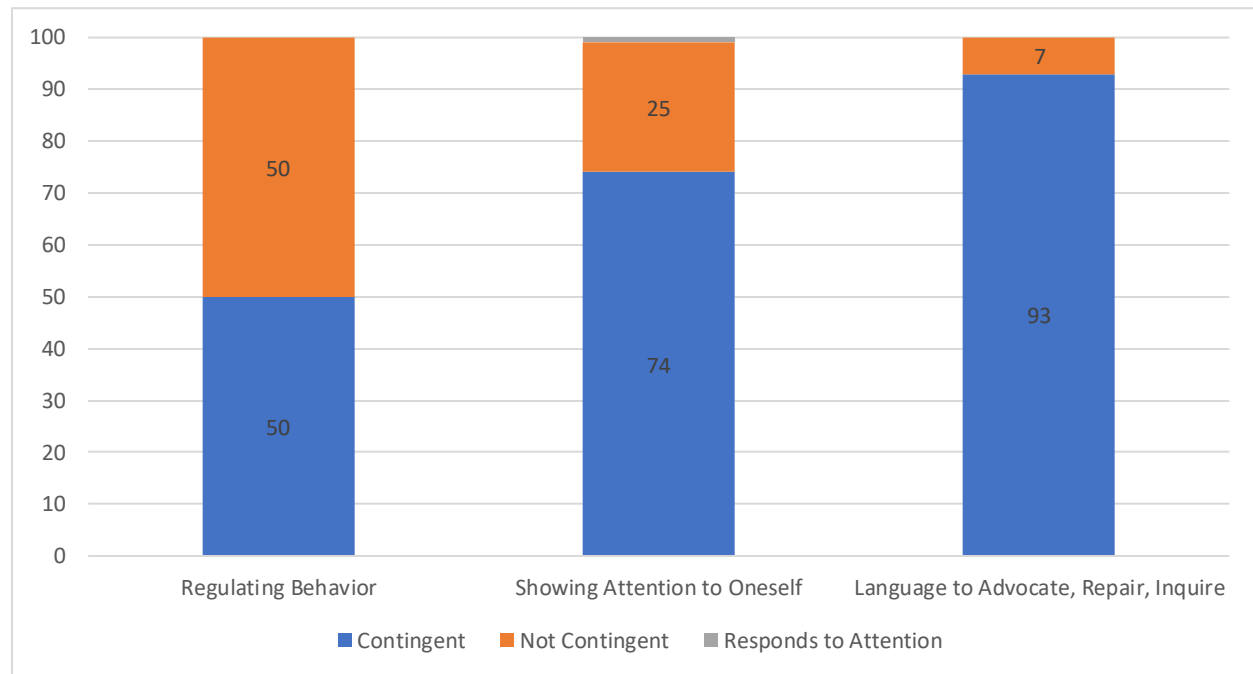
Table 7, Study 2*Characterizing Measures and Teacher-Reported Measures by Study*

Characterizing Measures	Study 2	Study 3
DAS-II (Elliot, 2007) evaluates cognitive skills of children and adolescents who are 2-17 years of age.	Yes	Yes
SRS-2 (Constantino & Gruber, 2012) assesses social abilities that are associated with autism	Yes	Yes
ADOS-2 (Lord et al., 2012) is known as the “gold standard” for diagnosing and assessing autism in children ages 12 months through adulthood	Yes	Yes
Demographic Surveys (Parent Demographic Survey) collected information pertaining to the parent and child’s background.	Yes	Yes
Informational Survey for Teachers collected teachers’ demographic information.	Yes	Yes
Teacher-Reported Measures		
Vineland-3 (Sparrow et al., 2016) was used to evaluate adaptive functioning.	Yes	No
CBCL-TRF (Achenbach & Rescorla, 2001) assessed students’ internalizing and externalizing behaviors.	Yes	No
STRS-SF (Pianta, 2001) examined the student-teacher relationship	Yes	No
Video Observation Measures		
ATAM (Vega Garcia et al., in preparation) examined teachers’ affective responses	Yes	Yes
CLASS-MAP Initiating Communication (Sparapani et al., 2016) dimension was used to capture the instances of students’ communication initiations towards teachers	Yes	Yes

Note. All three studies used both observational measures to explore teacher affect across special education and general education contexts. Study 1 used data from a larger study that aimed to explore a teaching intervention in special education and thus did not use the same data from the characterizing measures and teacher-reported measures as Studies 2 and 3.

Figure 1, Study 2

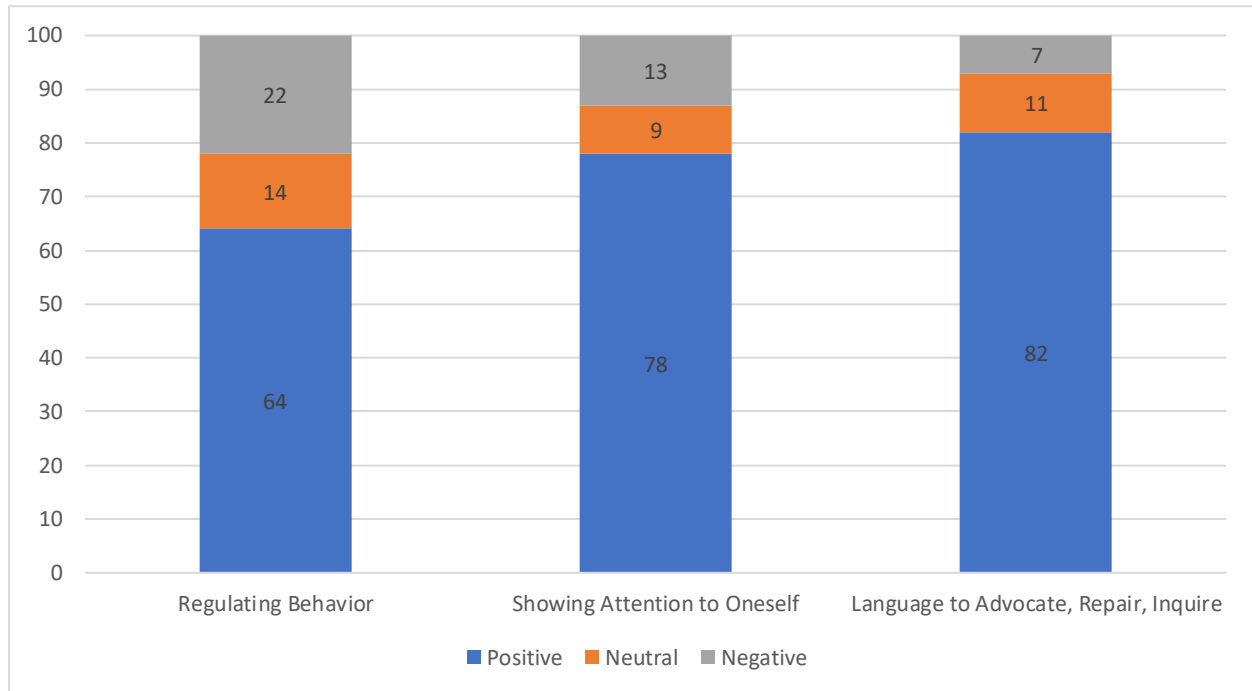
Teacher Response Types Across IC Dimensions



Note. Teachers had contingent and not contingent responses at different percentages across the various communication functions. There was one (1) instance where teachers responded to an attentional bid when students initiated for the purpose of showing attention to oneself (e.g., trying to get the teacher’s attention). There were only three (3) initiations for the purpose of “giving”, in which teachers responded contingently twice.

Figure 2, Study 2

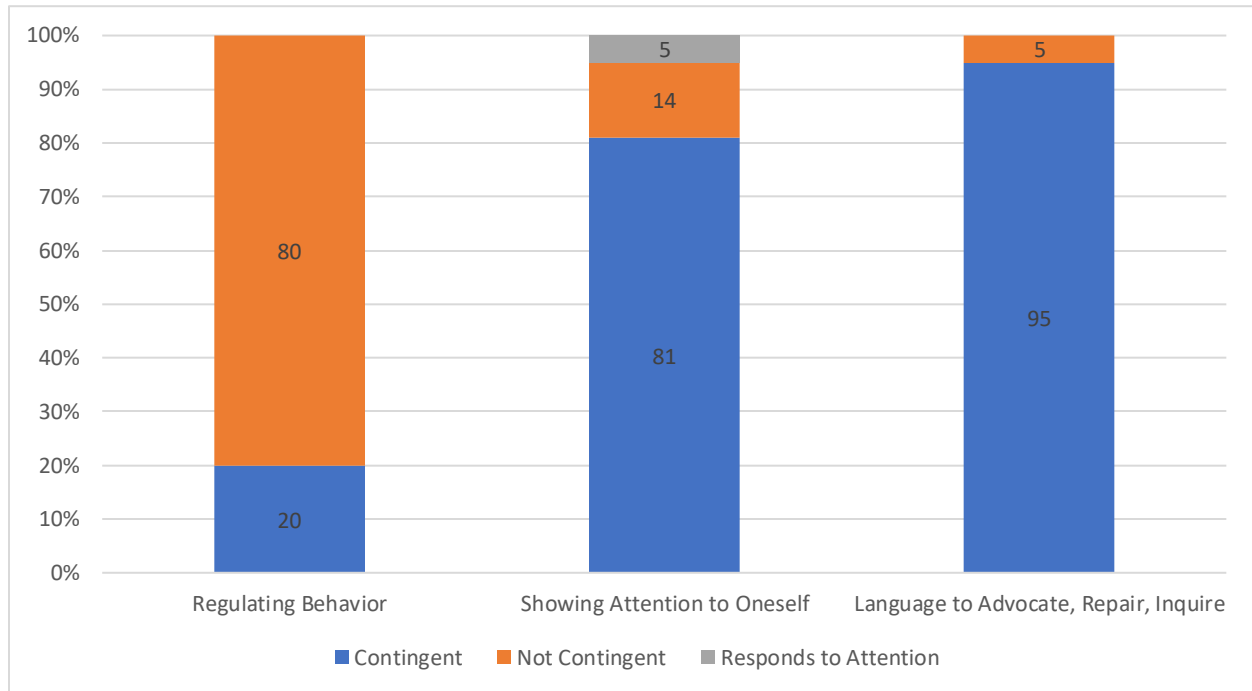
Teacher Affect Groups Across IC Dimensions



Note. Teachers had positive, neutral, and negative responses at different percentages across the various communication functions. There were two (2) initiations for the purpose of “giving”, in which teachers responded positively both times.

Figure 3, Study 2

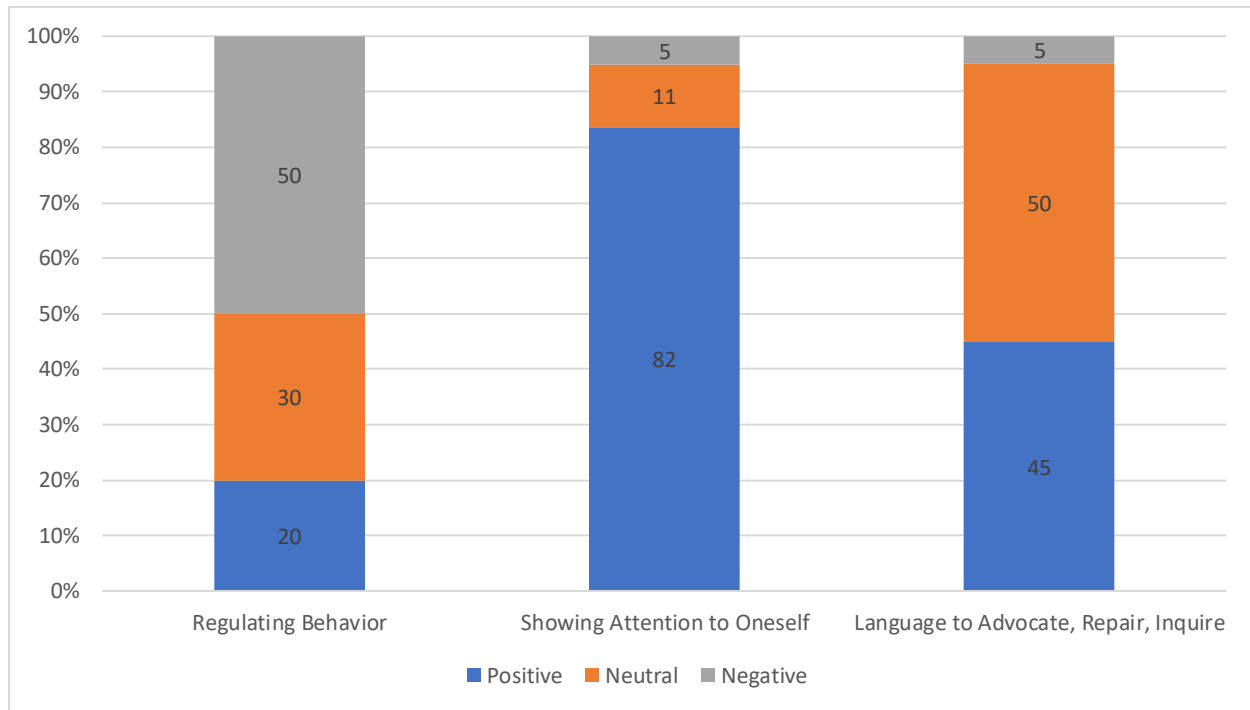
Other Educator Response Types Across IC Dimensions



Note. Educators had contingent and not contingent responses at different percentages across the various communication functions. There were only three (3) initiations for the purpose of “giving”, in which teachers responded contingently once.

Figure 4, Study 2

Other Educator Affect Groups Across IC Dimensions



Note. Educators had positive, neutral, and negative responses at different percentages across the various communication functions. There was one (1) response under the “showing attention to oneself” dimension that was labeled as a nonverbal response to attentional bid and was not judged for affect. There were three (3) initiations for the purpose of “giving”, in which educators responded positively one time. There were two instances where the educator was not visible and could not judge for affect. There were two (2) instances where the function of the initiation could not be determined, and educators responded positively (1) and negatively (1) to these initiations.

Phase 2, Study 3

The first study within Phase 1 and the second study within Phase 2 utilized the ATAM to explore how teacher affect manifests towards autistic students following their communication initiations in both special education and general education classrooms. Together, these studies contribute to the autism literature by providing initial evidence on how teacher affect plays a role in autistic students' learning experiences as well as the links associated between teacher affect and student characteristics.

Even though the literature on teacher affect use towards autistic students continues to expand, there is still limited information on how teacher affect manifests towards autistic students and the rest of the general class. The current literature that has explored teacher affect has used autistic student samples (e.g., Study 1) and neurotypical student samples (e.g., McLean & Jones, 2025), but none, to my knowledge, have explored teacher affect with neurodiverse learners, including those on the autistic spectrum and their nonautistic peers. Exploring this gap in the literature is important as it can provide information on interaction patterns between teachers, autistic students, and their peers within inclusive general education classrooms. The purpose of this third and final study is to explore differences in teacher affect directed towards autistic students and their peers within general education classrooms. The findings from this study will help fill in the gap in the literature, exploring affect within general education inclusive classrooms, as well as provide information that may help future professional development programs related to affect and interaction quality. Study 3 addresses the following research objective:

1. Explore whether and how teacher affect differs when communicating with autistic students compared to the general classroom talk within TK-5th grade general education classrooms during mathematics instruction.

Methods

Participants

This study used the same subset of general education teachers and autistic students as in Study 2. Specifically, participants included 15 general education teachers and their 27 TK-5th grade autistic students ($M_{Age} = 6.65$; $SD = 1.32$). Four autistic students (3 females in kindergarten and 1 male in 1st grade) from the second study were not included in this study due to the different procedures that were used to code the measure of teacher affect during mathematics instruction. This chapter focused on classroom-level communication, specifically teacher affect within their responses to their autistic students' communications and the general classroom talk.

Measures

The parent demographic surveys and teacher-reported measures from Study 2 were used in this present study to characterize the autistic student sample. In addition, this study utilized both dimensions of the ATAM (Response Type and Affect Type dimensions), the Class-MAP initiating communication dimension, and the general classroom talk (i.e., choral responses, nonverbal actions) to examine teacher affect.

Since there were no significant associations between teacher affect and the STRS-SF (Closeness and Conflict composite scores), the STRS-SF was not included in the current study. Refer to Table 7 for more information regarding the measures used for each study.

Classroom Video Observation Measures

ATAM. Both the Teacher Response and Teacher Affect dimensions were used for the purposes of this study. Within the Teacher Affect dimension, we identified a new affect type—Stern affect. The Stern affect type was characterized as a teacher showing facial expressions, body movements, or gestures that were firm, but not harsh (i.e., staring at the student without speaking for 2-3 seconds, having a low tone when speaking). This affect type was displayed generally when teachers wanted to regain attention or redirect one or more students during the whole classroom lessons.

Class-MAP (Sparapani et al., 2016). The Class-MAP Initiating Communication dimension was used to capture spontaneous communication from students. These initiations, in addition to other forms of communication (i.e., choral responses) from autistic students and the general classroom, were used to examine affect. See Appendix 1 for definitions and examples from these measures.

Video Coding Procedures

The same lead coder (author) and undergraduate student researcher coded the ATAM dimensions for every instance that a student received a response from their teacher. These responses followed all students' communication or actions that were directed towards a teacher, a peer, or were not directed. For example, if a student exhibited a choral response (e.g., answered a question with the whole class) and the teacher responded, we judged for affect. Similarly, we assessed teachers' affect when a teacher responded to a student committing an action that was or was not directed to an individual (e.g., student was playing with a ball and the teacher reprimanded the student). See Appendix 2 for more examples.

Sampling Procedures

The current study included 15 videos of general education teachers, their autistic students, and the general class during whole class and small group mathematics instruction. To be included in the study, these videos needed to 1) have one unique teacher and at least one autistic student from the second study and 2) have a minimum of 15 minutes of mathematics instruction.

Segmenting Rules

Teacher affect was examined by observing each teacher response that followed their students' communication or actions across three 5-minute sequences of instructional time at the beginning, middle, and end of each video. Teacher response and affect types were coded within 5 seconds from the offset of the students' communication attempts. Teacher affect was also coded following students' actions that were not directed (e.g., individually playing with a ball during the lesson).

Analytical Methods

Descriptive statistics

Descriptive statistics were reported for teachers' response and affect types by group (autistic and nonautistic). Affect types were aggregated to create positive (content, enthusiastic/exuberant) and negative (angry/frustrated, dismissive, stern) affect categories. Frequency counts and rates of response types (contingent and not contingent) and affect categories (positive and negative) were reported.

Chi Square (χ^2) Tests of Independence

Chi-square (χ^2) tests of independence were conducted to examine any potential difference in teachers' response types (contingent and not contingent) and affect categories (positive and

negative) between autistic and allistic students using 2x2 contingency tables. Non-responses and responses to hand-raises were observed minimally thus were not included in the analysis. Neutral responses were also excluded from the analysis due to their monotonous nature (Appendix 1). Effect sizes were reported using the phi coefficient (ϕ), with 0.10 representing a small effect, 0.30 representing a medium effect, and 0.50 representing a large effect (Allen, 2017).

Results

Across the 15 observations, teachers responded to autistic students and the general class 1,172 times in total (940 contingent and 232 not contingent). Specifically, autistic students received 169 responses (14%) and the general class received 1003 responses (86%) from their teachers. When looking at contingent and not contingent responses, autistic students received 122 contingent responses (72%) and 47 not contingent responses (28%). Meanwhile, the general education class received 818 contingent responses (82%) and 185 not contingent responses (18%). There was also a range of negative and positive responses directed towards autistic students and the general education classroom. In total, students received 1,072 positive and negative responses from their teachers (994 positive and 78 negative responses). Autistic students received 148 affective responses (14%) and allistic students received 924 affective responses (86%). When looking at negative and positive responses, autistic students received 20 negative responses (14%) and 128 positive responses (86%) from their teachers. The general education classroom, on the other hand, received 58 negative responses (6%) and 866 positive responses (94%) from their teachers. Interestingly, 3 of the 15 teachers did not exhibit any negative responses towards their students.

(χ^2) Tests of Independence

The relation between teacher response types and student grouping was significant, (χ^2 (1, $n = 1172$) = 7.99, $p < 0.05$). Autistic students were significantly more likely to receive not contingent responses than their allistic peers. The effect size (ϕ) was -0.08, representing a small effect size. Regarding teacher affect categories, there was a significant association between teacher affect and student groups (χ^2 (1, $n = 1072$) =, $p < 0.05$). Autistic students were significantly more likely to receive negative responses than their allistic peers. The effect size (ϕ) was -0.10, representing a small effect size. See Table 8.

Discussion

My third and final study builds upon the findings from the first two studies of this dissertation by addressing the gap pertaining to teacher affect that is directed at autistic students and the general class in inclusive general education classrooms. As more autistic students are included in general education classrooms (NCES, 2024), understanding the quality of teacher-student interactions and classroom experiences becomes increasingly important. Furthermore, the positive impacts of positive affect towards neurotypical students provide a basis for exploring affective responses towards a neurodiverse classroom, including those on the autism spectrum (e.g., Buric et al., 2019; McLean & Connor, 2018). Overall, this study makes two primary contributions: 1) it highlights the general classroom as dynamic and a major source for socialization, and 2) it provides preliminary information on teacher affect directed at autistic students and the general class.

Teacher Responding within General Education Classrooms

This study explored teacher affect that followed all students' communication and actions that were directed towards the teacher, a peer, or not directed. Examining these different

communicative behaviors and interactions not only highlight the dynamic atmosphere of a general education classroom, but it also captures the opportunities for socialization in the classroom for students, including those on the autism spectrum (e.g., Bolourian et al., 2021). One significant finding was the amount of responding teachers did with their students. Overall teachers had 1,072 responses, and 169 of those responses were directed at autistic students. This is different from the first two studies which had a high incidence of non-responses. One reason for this difference could be due to the student communication that was captured. The first two studies focused on student initiations while the current study focused on all communication. It's possible that teachers are ignoring certain kinds of communication over others. For example, teachers might be more likely to respond to a student who is participating (e.g., answering a question) than a student who is initiating and is deemed as off-task (e.g., protesting). The prior literature corroborates this assumption, with studies showing that teachers ignore students' problem behavior (Flower et al., 2014).

The non-responses captured in the second study could also be due to the nature of the general education classroom, particularly in regard to the number of students in the class. Although the second study captured the instances when general education teachers did not respond to students' initiations, the third study might have captured the moments when the teacher responded to another individual or the general class at the same time as the initiation. This study did not capture the rate of teacher responses that occurred in concurrence with a student initiation—future studies should explore this as it can help capture the dynamic nature of a general education classroom.

Last, the difference in responding, particularly with the first study, could be due to the classroom setting. Special education classrooms have been reported as being more focused on

behavior management than general education classrooms (Torregosa et al., 2024). In special education, one common approach to reduce an undesired behavior, especially one that is deemed as problematic, is to ignore the behavior (Suparno et al., 2022). The observed difference in teacher responding between special education and general education could be attributed to this approach, with general education teachers being more prone to taking up neurodivergent initiatives than in the special education environment.

Differences in Teacher Affect Among Autistic Students and the General Class

Despite the high frequency of responses observed in general education, however, there were significant differences in teachers' responses towards their autistic students and the general class. Specifically, autistic students were more likely to receive not contingent and negative responses from their teachers than the general class. Specifically, the high Pearson residuals (residuals > 2) depicted in the χ^2 table demonstrated that both of these responses were observed significantly more with autistic students than what was expected and were thus the primary contributors to the χ^2 statistic (Naioti & Mudrak, 2022). The current literature helps corroborate these findings. For example, not contingent responses, which are defined as teacher responses not aligning with the child's communicative needs (i.e., while working on a math problem, a student asks for some stickers and the teacher responds by redirecting and restating the math problem), were directed at autistic students in both special and general education classrooms at relatively high rates (e.g., Study 1). Directive language, which often does not align with a child's communicative needs, has also been directed at autistic students at high rates in both general and special education classrooms (e.g., Sparapani et al., 2020, 2024). Regarding affect, Study 1 found high rates of negative affect directed towards autistic students in special

education. These results differed from studies who observed few instances of negative affect towards neurotypical students (e.g., McLean & Connor, 2017; McLean & Jones, 2025).

Teachers' Needs in Inclusive Settings

The differences observed in teacher affect among autistic and nonautistic students in general education classrooms might highlight the need for teachers to better understand the communication patterns of autistic students. Studies have found that general education teachers have mixed attitudes towards including autistic students in general education classrooms (Gomez-Mari et al., 2022; Jury et al., 2021), with some reasons attributing to not being knowledgeable in autism or not having the proper training to teach autistic students (Gomez-Mari et al., 2022). This gap of knowledge or training may cause the communication patterns of autistic students (i.e., overcommunicating or communicating for a specific function) to be misinterpreted as off-task. Given that 40% of autistic students are included in general education at least 80% of the time (U.S. Department of Education, 2020), it is essential to train and provide general education teachers with tools that will enhance their knowledge on autism and allow them to teach all students in ways that align with their needs. Moreover, it creates a need for school personnel to continue to provide support to general education teachers, as their students' diverse needs and communication patterns may attribute to teacher burnout or low self-efficacy (Petersson-Bloom & Hansson, 2025; Lu et al., 2020), and could potentially influence the quality of teacher-student interactions.

It is important to note, however, that the increased prevalence of negative affect may be due to the affect types that make up the negative affect category. Compared to other studies that have looked at negative affect (e.g., McLean & Connor, 2017), the current study's negative affect category was composed of angry/frustrated, dismissive, and stern affect types. The

dismissive affect type was added after observing videos of teachers interacting with their autistic students and the stern affect type was added in this chapter to capture teachers' feedback that was firm, but not harsh. Although the stern and dismissive affect types were directed to both autistic students and the general class, it appeared that the dismissive affect type was directed at autistic students significantly more than the general class. Since this affect type was initially added to capture some of the interactions between autistic students and their teachers, it is possible that this affect type is not measuring the same negative affect construct as previous studies that did not have the dismissive affect type within their construct (e.g., McLean & Connor, 2017). Thus, more information is needed to identify the driver of this affect dimension.

Limitations and Future Directions

This study had a few limitations. For instance, while the χ^2 tests of independence produced significant results, both tests yielded small effect sizes. While small effect sizes are common in the realm of general education and can be difficult to interpret (e.g., Gore et al., 2017; Schafer & Schwarz, 2019), it is possible that the significant χ^2 results and small effect sizes were due to the unequal proportions in affective responses received across autistic and nonautistic students. Nonautistic students received more affective responses than their nonautistic peers overall. These differences in proportions could be attributed to reasons such as the number of autistic students versus nonautistic students in a classroom, or just the general flow of an inclusive, general education classroom. The small effect size may suggest that the magnitude of the distribution across not contingent and negative affective responses is not as large. Future studies should replicate this study to confirm our findings.

Despite the limitation, this exploratory study still contributes valuable information to the inclusive general education literature. In order to understand how teacher affect manifests in

general education classrooms more closely, next steps should examine individual teacher-autistic student pair interactions to better understand communication patterns and explore how negative and positive affect is being directed towards autistic students.

Conclusion: Dissertation Overview

The previous studies used an adapted measure of teacher affect, the Autism Teacher Affect Measure (ATAM), to explore teachers' affect towards autistic students in special education and general education classroom settings. Teacher affect is a potential feature of teacher-student interaction (TSI) quality that could impact students' social and academic outcomes (e.g., McLean & Connor, 2018). However, studies that have used teacher affect as a measure of interaction quality within an autistic student sample is understudied in both special and general education settings. Therefore, this dissertation sought to explore this gap in the literature across both settings.

Phase 1, Study 1 explored teacher affect within a primarily special education context. This study laid the foundation for exploring teacher affect with autistic students by adapting McLean and Connor's (2017) measure of teacher affect used within a neurotypical student sample. Specifically, I added new affect types as well as language to already existing affect types to capture the interactions observed between autistic students and their teacher. For example, the introduction of the dismissive affect type highlighted the moments in which students' initiations were dismissed or were redirected without being physical to the skin. Details like teachers' rise in intonation, for example, were also added to demonstrate moments when the teacher responded to a student and was "content." Ultimately, these additions became a stepping-stone in better understanding affective responses towards autistic students by showing the variability in teacher

affect as well as links between affect dimensions and certain characterizing measures (e.g., cognition).

The ATAM also provided the opportunity to evaluate teacher affect in general education settings. In Phase 2, I used the ATAM to explore teacher affect within a neurodiverse sample, including those on the autism spectrum, and explore potential links with student characteristics and relationship quality. When looking at Studies 2 and 3 together, the following findings are highlighted. First, similar to Study 1, these studies showed variability in teacher affect that followed autistic students' communication. Second, like in the first study, there were some links between teacher affect and student characterizing measures (e.g., students' socialization). Last, these studies showed that the ATAM was not restricted to only special education settings. This particular finding is especially important because, as autistic students continue to be included in general education classrooms (NCES, 2024), future studies who use a neurodiverse sample could use this measure. However, as this is a newly adapted measure, future studies should explore links with other teacher measures or constructs (e.g., teacher talk) to further validate the measure.

A reoccurring theme that emerged from all studies was the need for professional development and teacher support. Although teacher affect was variable and overall positive, there were high incidences of non-responses and negative affect towards autistic students. While this is currently speculation and more research is needed, these findings could suggest that certain communication attempts are being misinterpreted as problem behaviors or as off-task and resulting in more negative and non-responses. Creating professional development programs that focus on autism and their social communication patterns could alleviate this problem—studies have shown that teachers often feel ill-equipped to teach autistic students in their classes and, in general education classrooms, this sentiment is even more pronounced (e.g., Humphrey &

Symes, 2013). Therefore, providing teachers with the necessary knowledge and training to teach autistic students in their classrooms may help teachers interact with their autistic students in a way that elevates the interaction quality and also meets their students' needs. Similarly, these studies highlight the need for more teacher support. Previous literature has found links between professional stress and teacher burnout with student problem behaviors and social differences (Boujut et al., 2017; Geving, 2007). These factors could in turn impact the affective responses teachers use towards their autistic students, thus signaling the need for more supervisory support to alleviate the symptoms of burnout and stress. Overall, these studies provide initial evidence of teacher affect use on neurodiverse students, including those on the autism spectrum, and bring forth future directions and implications for teachers and researchers as an important topic within the field of education.

Table 8, Study 3*Frequencies and Chi-Square Results for Teacher Affective Responses by Student Group*

Teacher Affective Responses	Student Group				$\chi^2(1)$	ϕ
	Autism		General Class			
	N	%	N	%		
Response Type						
Contingent	122 (-1.2)	72.20	818 (0.50)	81.60	7.99*	-.08
Not Contingent	47 (2.3)	27.80	185 (-1.00)	18.40		
Affect Category						
Positive	128 (-.80)	86.50	866 (0.30)	93.70	9.90*	-.10
Negative	20 (2.80)	13.50	58 (-1.1)	6.30		

Note: Two chi-square tests of independence were ran to explore potential differences in the distribution of teacher response types and teacher affect categories between autistic students and the general classroom. Residuals, which represent the expected count for each variable, are reported in parenthesis. Phi coefficient values indicate small effect sizes (Wiedmaier, 2017).

* $p < .05$

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Appendix A (Phase 1 & Phase 2)

Autism Teacher Affect Measure (ATAM) Codebook

Coding specification:

Step 1: Identifying Communication Initiations and Student Responses to Teacher Language.

Search for **all the communication initiations** and **student responses** directed towards “everyone,” “teacher,” “not directed”, or “unclear.” If the initiation is directed towards “peer/student”, DO NOT CODE.

If it is directed toward the teacher or para (indicated as “teacher), indicate the subject by coding “teacher” or “para” and move to STEP 2. If the initiation is directed toward “everyone,” treat as “teacher” or “para” (same as above) and move to STEP 2.

Step 2-3: Determining the Type of Teacher Responses.

Determine how the teacher/para responds to the student. There are five (5) ways that a teacher can respond: **contingently** [a], **not contingently** [b], **no response** [c], **responds to attentional bid** (*verbal* or *nonverbal*) [d], or **cannot determine** [e].

- If you code *contingently* [a], *not contingently* [b], *responds to attentional bid* (*VERBAL*; [d]), or *cannot determine* [e] you can judge affect and move to **STEP 4**.
- If the teacher/para does not respond, code as *no response* [c] and STOP. If you code *responds to attentional bid* (*NONVERBAL*; [d], STOP here, as you cannot judge affect.

Note: The “*secure attention*” code will be one of the IC student codes. If you see the IC code “*secure attention*”, note that the only possible response choices will be “*responds to attentional*

bid (verbal or nonverbal) [d]” or “*no response[c]*”. If you see the IC code “*undetermined*”, the only possible response choices are “*cannot determine*” [e] or “*no response [c]*”.

Table 1. IC Codes and Teacher Response Types

IC Codes • Protesting • Requesting • Initiating Social Routines • Commenting • Advocating • Seeking Predictability • Using Repair Strategies • Seeking Information • Giving & Other Social Behaviors	Types of Possible Teacher Responses • Responds contingently [a] • Responds not contingently [b] • Does not respond [c] • Cannot determine [e] Note: CAN judge affect if they respond with [a] or [b]
IC Codes • Secures Attention	Types of Possible Teacher Responses • Responds to Attentional Bid [d] • Does not respond [c] Note: CAN judge affect if they respond with [d] VERBAL
IC Codes • Undetermined	Types of Possible Teacher Responses • Does not respond [c] • Cannot determine [e] Note: CAN judge affect if they respond with [e]

Step 2-3 (continued)

Here are two general categories within this coding system: *Teacher Responses* and *Teacher Affect*. Teacher responses are defined as verbal or nonverbal responses to students' initiations.

The teacher responses that are observed will also apply to the paraprofessionals who are present in the video. We will not code any responses to initiations if the initiation is directed towards "peer". This general category is categorized into five levels and are ranked from most to least responsive. This is an exhaustive code; if the teacher does not respond to the students' initiations, one will code "No Response."

1. **Teacher Response** to Student's Initiations

a. Responds and is **contingent** to the student's initiation

- i. The teacher responds and *does not* change the topic of conversation that was initiated by the student.
- ii. The teacher's responses to students' initiations are *acknowledging and are in alignment with the students' needs*
- iii. The teacher takes up the students' contribution and honors the students' intention of communication.
- iv. Examples of contingent responses can include:
 - 1) Teachers asks students for clarification/to repeat themselves, 2) teachers tell students to wait or hold on due to them helping another student/talking to someone else, 3) a student requests an activity/object and the teacher tells them they'll have access at a later time, 4) the teacher asks the student to request/rephrase their initiation and **then** grants access to that activity/object, 5) teacher

provides an explanation when the student requests an object/activity, 6) teacher praises the student when finishing a task, 7) teacher tells the student to try again or provides them with a correction if the student finishes or is doing a task incorrectly

b. Responds and is **not contingent** to the student's initiation

- i. The teacher responds and does not acknowledge or aligns their response to the students' needs; their response to action is different from the student's intent.
- ii. The teachers' or paraprofessionals' responses *redirects* the student to perform a different task or to stay on the task prior to their initiation.
- iii. Examples of not contingent responses can include:
 - 1) The teacher does not grant or allow access to a student's request for an object/location/activity, 2) the teacher redirects or makes a student finish their task when they are protesting, 3) the teacher makes the student request an object/activity in a different way from how it was originally requested but still does not grant access to that object/activity, 4) a student wants access to an object/activity, but the teacher is not allowing them options or access to that activity or object.

c. Responds to attentional bid **VERBALLY** when student **secures attention**

- i. The student tries to secure the teacher's attention, and the teacher responds to this attentional bid in a verbal manner.

- ii. The teacher or para may move their head or body towards the student to signal that they are responding to the student's bid to secure attention.
 - iii. The teacher must also *direct language towards the student* as a response to the student's bid to secure attention.
 - iv. Note: The IC code **MUST** say "Secures attention" for this to be an option.
- d. **Responds to attentional bid NONVERBALLY** when student **secures attention**
 - i. The student tries to secure the teacher's attention, and the teacher responds to this attentional bid *nonverbally* (may use gestures or body movements to respond).
 - ii. The teacher or para may move their head or body towards the student to signal that they are responding to the student's bid to secure attention
 - iii. Note: The IC code *MUST* say "Secures attention" for this to be an option.
If the teacher/para responds nonverbally, we will NOT code affect.
- e. **No response** to the student's initiation
 - i. The teacher ignores and does not acknowledge the student's initiation.
- f. **Cannot determine** teacher's response
 - i. The students' communication initiation cannot be comprehended by the coder due to the student's initiation being muffled or cannot be picked up by the microphone, and is thus coded as "Undetermined".
 - ii. Since we cannot for certain determine that the teacher's response is contingent or not contingent to the student's initiation, we will code as "cannot determine".

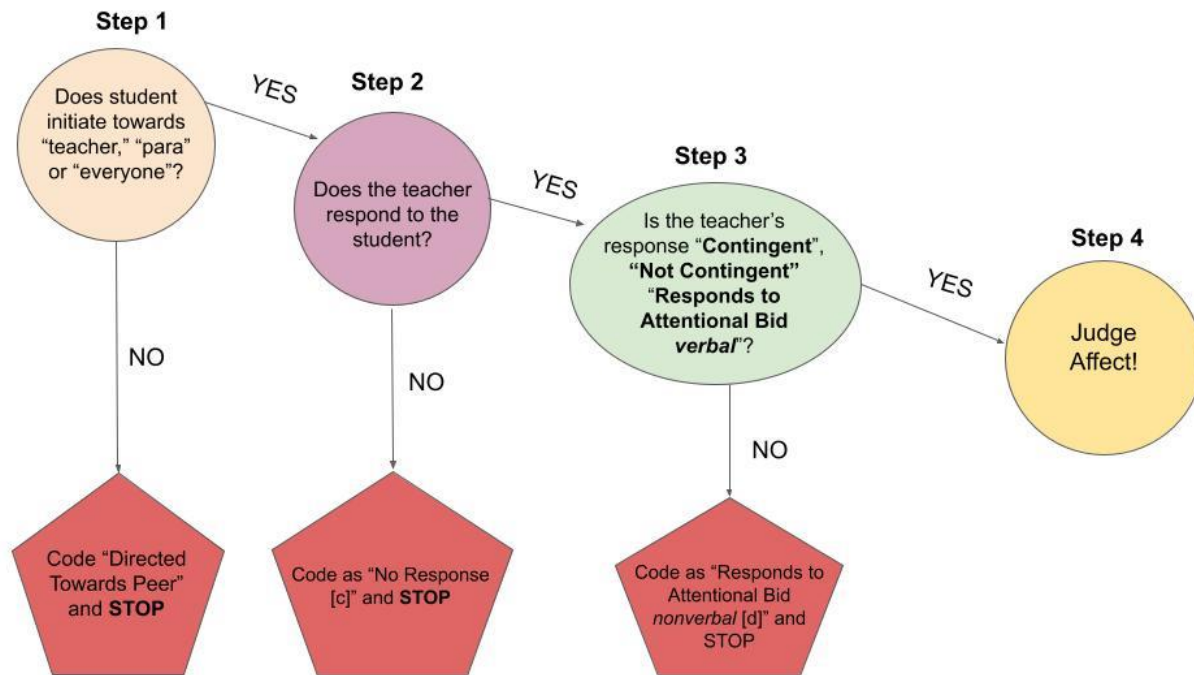
- iii. If the teacher does respond to the student, however, we CAN still judge the affect.

Examples for Type of Teacher Responses.

Video #	Time	Example	Type of Response	Explanation
2	3:18	T: [gestures for S2 to pay attention] S2: [inaudibly replies to teacher in form of protest] T: [walks away to speak to another student]	No Response [c]	Teacher does not acknowledge the student in any way.
88	4:49	S1: [looks at teacher after finishing math problem] T: [looks at S1's work] Try again	Contingent [a]	Teacher is in line with student's initiation; tells student to try the problem again since her answer was incorrect.
MASD 65	6:19	T: "Last one let's find the uhhhh" S1: [screams and yanks his hand away from teacher and leaves iPad] T: Last one, ready? [follows student]	Not Contingent [b]	Here, teacher redirects student to continue the task at hand. Not acknowledging student's need of not wanting to continue the activity.
MASD 63	1:33	S2: [taps teacher's arm] T: [looks away from clipboard and towards student]	Responds to Attentional Bid [d]	IC Code was "Secure Attention". Teacher turns to student nonverbally, so they respond to attentional bid.
Video 70	9:21	S1: [student says something but cannot hear what they said] T: [Responds to student's initiation, but we cannot tell if it was contingent or not contingent]	Cannot Determine [e]	IC Code was "Undetermined". However, since the teacher DID respond, we can code it as Cannot Determine.

Video 88	43	S1: [student says a comment but teacher does not hear] T: “What’s that?”	Contingent [a]	Teacher asks for clarification/for student to repeat themselves despite not understanding the initiation
MASD58	7:22	S1: "Do you have an eraser?" T: “Hey Ms. B may I have an eraser?” S1: “Ms. B may I have an eraser?” T: “Sure no problem” and hands student an eraser	Contingent [a]	Teacher asks student to rephrase the demand, but still gives him the eraser after he asks for eraser in a different way.
MASD 58	2:08	T: “I don’t have a blue marker, only red or black”. S1: “Oh. Well I know of a place to go!” [student begins to get up] T: “Nope, we’re not going anywhere”.	Not Contingent [b]	Even though she is responding directly to his request to go to another location, she's telling him not to go. Not in alignment with students' needs.

Flowchart Showing Type of Teacher Response to Student



Teacher Affect

¹Teacher affect is the second general category and was adapted from the Teacher Feedback Coding System Codebook (McLean & Connor, 2017). Teacher affect is measured by observing the “teachers’ vocal tones, body posturing, body movements and facial expressions” while responding to students (McLean & Connor, 2017, p.11). This general category is categorized into six levels and is ranked by six different affect judgements. Like teacher responses, teacher affect codes are exhaustive since all teacher responses will fit into one of the 5-level categories.

1. Teacher Affect When Responding to Student’s Initiations

¹ Teacher Affect and its descriptors are adapted from the Teacher Feedback Coding Manual (McLean & Connor, 2017).

- a. ²**Content:** The teacher is relaxed, happy, engaged with the student(s) but tones/movements are not exaggerated in any way. Appears that the teacher takes up or uses the initiation to provide a learning opportunity in a positive manner.
- i. Facial expression: Face is generally relaxed, mouth is smiling, cheekbones are slightly elevated. Eyes are open and alert but not wide. Eyes can also be squinting from smiling.
 - ii. Vocal Tones: Calm, positive tones with a friendly intent. Words are positive but not exaggerated, small elements of praise and encouragement that could easily be considered “fillers”. The intonation is rising (often) and may feel affirming or reassuring. It is important to distinguish this from the purposeful, exaggerated praise that often comes with “Enthusiastic/Exuberant”. (Note: the intonation may be lowering if teacher is providing an explanation, but must watch for the context and determine what the teacher is trying to convey).
 - iii. Body Posturing: Shoulders relaxed, not elevated or slumped. Facing the student or slightly turned away, may be circulating the room monitoring all students.
 - iv. Body Movements: Movements are fluid, relaxed and happy. Can be either moving or stationary.
- b. ²**Enthusiastic/exuberant:** The teacher is excited, highly engaged, and provides exaggerated vocal tones, words, and body movements. Note: Unless extremely

² Teacher Affect and its descriptors are adapted from the Teacher Feedback Coding Manual (McLean & Connor, 2017).

exaggerated, there must be *at least* two affect judgements to categorize as enthusiastic/exuberant. **Example 1)** rising intonation (vocal tone) + (facial expression) eyes wide + raised eyebrows (facial expression); **Example 2)** very positive wording (vocal tone) + shoulder pat (body posturing); **Example 3)** raised eyebrows (facial expression) + mouth wide open (facial expression)

- i. Facial expression: Eyebrows raised in interest, eyes wide, mouth open, happy expressions.
 - ii. Vocal Tones: Voice raised in excitement, very positive tones and wording.
 - iii. ³Body Posturing: Will likely be facing the student directly, may use exaggerated gestures or engage in physical connection with student(s) such as a pat on the shoulder.
 - iv. Body Movements: Will likely remain stationary or move towards students.
- c. ²**Neutral:** The teacher is displaying neither positive nor negative characteristics. Teacher is engaged with students but is doing so without any discernible emotion.
- i. Facial expression: Eyebrows flat, eyes relaxed but open, mouth and lips relaxed but not actively smiling, face is not tense.
 - ii. Vocal Tones: No discernable positive or negative tones or wording. Monotonous intonation. It's possible that words of praise are used, but there are no discernable tones in the phrase.
 - iii. Body Posturing: Can be facing student(s) directly or turned away.

² Teacher Affect and its descriptors are adapted from the Teacher Feedback Coding Manual (McLean & Connor, 2017).

- iv. Body Movements: Either stationary or circulating the room. Will likely not move markedly towards or away from student(s).

Possible examples from a neutral teacher: 1) Teacher responds to a student in a monotonous voice; 2) Teacher responds to student using a rising and monotonous intonation, but majority of the phrase has a monotonous intonation; 3) Teacher responds to a student nonverbally but has no expression on their face.

- d. ²**Sad/Depressed:** The teacher is showing visible signs of frustration, irritation, sadness in regard to student(s) or the material being taught. Affect may also be interpreted as flat and/or disengaged.
 - i. Facial expression: Furrowed brow (inner corners move upwards and together), droopy facial features, lips drawn down in a frown.
 - ii. Vocal Tones: Quieter tones, may sound flat and disconnected or noticeably sad. May sigh frequently or take long pointed pauses when addressing student(s).
 - iii. ⁴Body Posturing: Shoulders slumped downwards, head directed downwards and/or to the side, away from the student or situation.
 - iv. Body Movements: Sadness/depression usually involves disengagement from, or movement away from, the student or situation. This could be very subtle, as in turning the head away and down, or it could be more obvious such as slowly walking away.

² Teacher Affect and its descriptors are adapted from the Teacher Feedback Coding Manual (McLean & Connor, 2017).

- e. **²Angry/Frustrated:** Using verbal or nonverbal communication, the teacher is visibly and audibly upset with the student(s) and/or uses harsh tones, wording and/or body posturing in her attempts at feedback. Responds to student in a directive or authoritative manner.
- i. Facial expression: Inner corners of the brow are lowered towards the center of the face, eyes may be tense or squinted, mouth is tense with lips either wide open or tightly pressed together.
 - ii. Vocal Tones: Harsh, negative tones, voice may become louder. The teacher may also exhale sharply in exasperation (frustration). Wording will likely be direct and negative. Teacher may call the student's name in a stern manner.
 - iii. Body Posturing: Tense, raised shoulders. Usually the teacher will be facing the student directly. Gestures may include nudging or pushing.
 - iv. Body Movements: Anger usually involves movement *towards* the student. Teacher may physically touch/redirect students, take objects from students, and make sure objects are out of students' reach. When the teacher is redirecting a student, they are physical to the skin (includes touching the body or clothing).

Possible examples from an angry/frustrated teacher: 1) Teacher takes deep breaths, sighs, or pauses before initiating a demand or request again; 2) Teacher may yell their name multiple times; 3) Teacher physically grabs the student back to their seat when they escape; 4) Teacher pulls/pushes students' body parts or clothing.

f. **Dismissive:** The teacher is dismissive of the student's initiation – does not take it up or simply responds to the student in a directive manner. In other words, the teacher is actively ignoring or dismissing the student's initiations and are not taking those initiations seriously. Note: Look at the teacher's intention -- is the teacher ignoring or providing an opportunity/explanation?

- i. Facial expression: Not a lot of expression on the face. Lips are flat and pressed together. Face is not animated during the lesson.
- ii. Vocal Tones: Tone most likely is flat. The intonation and emphasis of the words may be placed on the directive verbs.
- iii. Body Posturing: Relaxed shoulders. Full body may be partially or completely facing the student.
- iv. Body Movements: Teacher may take objects from students, and make sure objects are out of students' reach. Teacher may also redirect student's actions while performing a separate task (i.e. walking or passing out papers). Teacher may block student's materials with their hands and may not grant access to said materials even when the students requests the teacher to stop or get access to items (in other words, there is physical resistance from teacher despite student's request to STOP).

Some examples of a dismissive teacher include: 1) The teacher may redirect a student or may repeat a demand that was initiated prior to the student's initiation WITHOUT providing an explanation; 2) Teacher blocks or denies access to a material/activity despite student's request or initiation; 3) Teacher does the opposite of what the student requests without an explanation; 4) Teacher redirects student without the opportunity to redo the

task or correct themselves; 5) Teacher cuts student off while they are attempting to initiate; 6) Teacher has a rise in intonation, but still blocks access to materials or does not take the student's initiations up.

Note: If teacher is pulling items away or physically redirecting the student, automatically look at the negative categories of affect. Then determine whether the response is "*angry/frustrated*" or "*dismissive*."