



# Considerations About How Emotional Intelligence can be Enhanced in Children With Autism Spectrum Disorder

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In this perspective paper, we review established areas of ASD emotional difficulties in relation to “emotional intelligence” (EI) theoretical frameworks. Existing literature suggests that people with ASD have lower EI on average in the domains of perceiving emotions from the environment and body language, using emotions to relate to other’s experience, understanding emotions based on contextual cues, and managing emotions in the self and others. Poorer EI in ASD may detract from academic success, even when cognitive intelligence is intact. We conclude by considering the manner in which EI interventions in special education classrooms and school settings, formerly termed “Social and Emotional Learning” (SEL) programs, can be adapted to promote EI in children with ASD.

**Keywords:** autism spectrum disorder ASD, emotion regulation, emotional intelligence, social and emotional learning, special education

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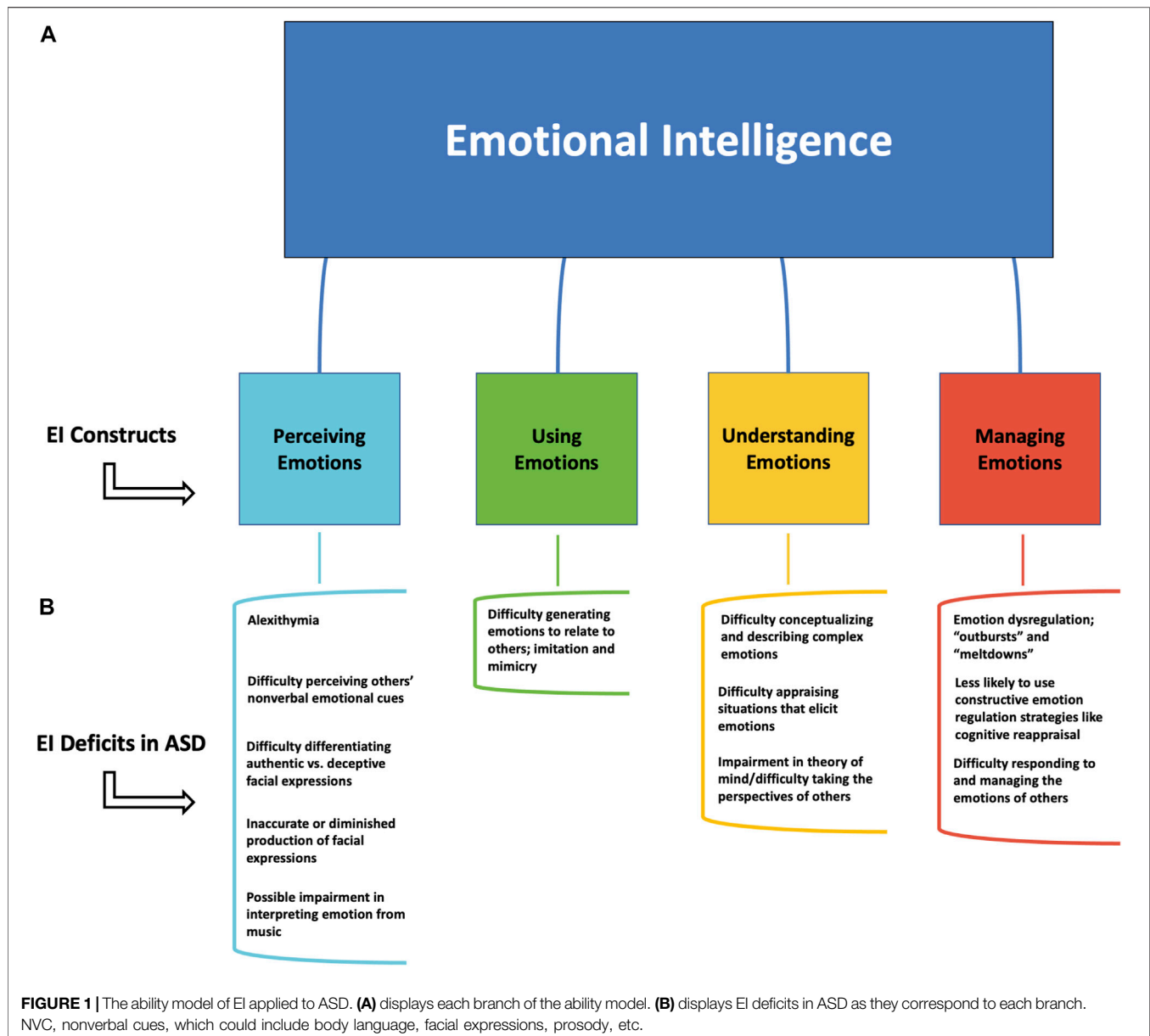
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## INTRODUCTION

Salovey and Mayer (1990) defined emotional intelligence as a subset of social intelligence that involves the “ability to monitor one’s own and others’ feelings and emotions, to discriminate among them, and to use this information to guide one’s thinking and actions” (p. 189). Distinct from cognitive intelligence, an accumulating literature base suggests that EI may contribute equally to psychological, academic, professional, and social functioning (Brackett et al., 2019). For example, EI abilities are associated with better prosocial behaviors, teamwork, empathy, and achievement in both educational (Mayer et al., 2008; Brackett et al., 2016) and workplace settings (Côté, 2014; Brackett, 2019). This burgeoning research area has contributed to a growing recognition among policy-makers, educators and employers, that 1) cognitive intelligence is not sufficient for attainment of success in critical areas of life functioning, and that 2) educational programs and public policies should aim to foster neglected skillsets related to EI to produce a happier, healthier, and more productive society (Heckman and Kautz, 2012).

Twenty years of research has shown that EI can be explicitly taught via “social and emotional learning” interventions in school settings. SEL is a broad term encompassing interventions, school practices, and policies aimed at helping students and teachers acquire skills and attitudes that promote personal development, interpersonal skills, ethical behavior, and responsible decision-making (Elias et al., 2015).

Recent meta-analyses examining long-term impacts of SEL have observed that compared to controls, children who participated in SEL programs demonstrated significant gains in social and emotional skills, attitudes, behavior and academic performance, well-being, and higher likelihood of high school graduation (Durlak et al., 2011; Taylor et al., 2017). EI interventions are typically targeted



towards the general population, but there has been limited consideration of how they can be adapted for special populations such as autism spectrum disorder (ASD). ASD is associated with significant difficulties with the processing and regulation of emotions (Gaigg, 2012); yet, the extent to which EI difficulties contribute to adverse life outcomes in this population has not been sufficiently explored. In this paper, we review literature relevant to our perspective that EI domains map closely to established areas of difficulty in ASD and frame ASD symptoms through the lens of EI theory. As very few studies have directly examined EI in ASD, we conducted this review informally by first addressing the key components of the EI construct (Mayer et al., 2016) and then conducting targeted searches pairing the search terms “autism” or “ASD” with select search terms relevant to emotional competencies relevant to the

EI construct. Based on this review, we consider novel approaches for supporting emotional development in school contexts.

## THE ABILITY MODEL OF EMOTIONAL INTELLIGENCE: THE LINK TO AUTISM SPECTRUM DISORDER

In 1997, Mayer and Salovey, (1997) revised their original (Salovey and Mayer, 1990) definition of EI to more specifically define the abilities that comprise this construct. They wrote:

Emotional intelligence involves the ability to perceive accurately, appraise, and express emotion; the ability to access and/or generate feelings when they facilitate

thought; the ability to understand emotion and emotional knowledge; and the ability to regulate emotions to promote emotional and intellectual growth (p. 10).

The relationships among the four components of EI may be best conceptualized in terms of hierarchical factor structures, such that the core abilities are second-order factors that correlate with one another and load onto the single higher-order factor of general EI (Joseph & Newman, 2010; Legree et al., 2014; MacCann et al., 2014) (see **Figure 1A**).

The distinction between cognitive intelligence and EI may be particularly relevant in ASD, a population with notably lower EI compared to neurotypical peers, despite comparable cognitive intelligence (Brady et al., 2014). ASD is associated with a particular set of emotional challenges that correspond to facets of traditional models of EI, such as difficulty perceiving and understanding one's own and others' emotions, expressing emotions nonverbally, and effectively regulating negative emotions (Harms et al., 2010; Mazefsky et al., 2013; Trevisan et al., 2018) (see **Figure 1; Supplemental Material**).

## EMOTIONAL INTELLIGENCE DIFFICULTIES IN AUTISM SPECTRUM DISORDER

As shown in **Figure 1** and the Supplemental Material, there is substantial research evidence to suggest EI deficits in ASD. Given the role of EI in successful life functioning and academic success, a more nuanced description of how EI difficulties and their downstream consequences is warranted.

### Perceiving Emotions

#### Perception of One's Own Emotions

Alexithymia is a condition characterized by difficulties identifying and describing one's emotions (Nemiah et al., 1976). Compared to neurotypical peers, individuals with ASD score much higher on continuous measures of alexithymia (Hill et al., 2004; Griffin et al., 2016; Trevisan et al., 2016), even when matched on verbal and nonverbal intelligence (Trevisan et al., 2016). These difficulties in perceiving and reflecting on one's emotions hinder the effectiveness of psychotherapy, the ability to remediate life problems, and ultimately, personal growth (Sifneos, 1973).

#### Perception of Other's Nonverbal Emotional Cues

Basic emotion recognition is the foundation for more sophisticated emotional and social understanding and is necessary for responding empathetically to the emotional signals of others (Izard et al., 2001; Jones et al., 2011). Findings across studies on emotion recognition abilities in ASD are mixed and appear to be subject to task demands and participant characteristics (Harms et al., 2010). However, individuals with ASD generally perform worse than comparison groups on tasks that require recognition of emotion from facial expressions (Uljarevic and Hamilton, 2013; Lozier et al., 2014), prosody (e.g., tone, rhythm),

gestures, and body language (Baker et al., 2010; Stewart et al., 2013; Fridenson-Hayo et al., 2016). While some studies find no evidence of emotion recognition deficits in such tasks (e.g., Loveland et al., 1997; Black et al., 2019), biological differences in eye-tracking, electrophysiological response, and brain imaging, suggest atypical emotion processing even when task performance is intact (Harms et al., 2010). Trevisan and Birmingham (2016) found that emotion recognition abilities in ASD are associated with higher social competence and less severe ASD symptoms, highlighting the importance of emotion recognition for successful adaptive and interpersonal functioning.

### Differentiation of Authentic Versus Deceptive Facial Expressions

“. . . facial expressions are not only the physiological consequences of an internal emotional state (i.e., spontaneous productions), but can also be [consciously controlled social displays] that are monitored and manipulated in order to meet external (social) demands (i.e., voluntary displays).” (Gordon et al., 2014, p. 2486). Individuals with ASD may have difficulties understanding more nuanced displays of emotion, interpreting deceptive facial expressions, and understanding the social reasons prompting deceptive facial expressions, even if they possess the basic ability to label facial expressions with the correct emotional state (Dennis et al., 2000; Rutherford and McIntosh, 2007).

### Facial Expression Production

Despite being less researched than the ability to read others' facial expressions, the ability to accurately produce facial expressions, and integrate gesture during speech, may be just as important for successful social interactions. The facial expressions of those with ASD are rated as more awkward or unusual in appearance in comparison to neurotypical control groups (Faso et al., 2015) and observers are therefore less likely to infer their intended emotional meaning (Brewer et al., 2016). Overall, people with ASD express facial expressions with less clarity, accuracy, and their facial expressions are less likely to match the social context (Trevisan et al., 2018). People with ASD are also less likely to synchronously integrate gesture into spoken communication (de Marchena and Eigsti, 2010). These differences in nonverbal communication detract from fluency and social-emotional reciprocity during social interactions.

### Using Emotions

#### Generating Emotions to Relate to Others

While this branch of the Ability Model of EI may be relatively under-researched in ASD, generating emotions as a means to relate to others' experiences may be central to high-level social and emotional competencies. One mechanism relevant to simulating others' emotions is the “mirror neuron system” (MNS), which is accordingly named due to its' activation both when seeing and doing an action (Iacoboni, 2009). MNS impairment has been hypothesized to be fundamental to difficulties relating to others' emotional experiences in ASD (Williams et al., 2001). As the automatic tendency to imitate others' emotions in the self has been associated with the ability to understand others' emotions (Neal and Chartrand, 2011), this

basic physiological deficit in simulating emotions in the self may detract from higher-order cognitive processes like empathy.

## Understanding Emotions Conceptualizing and Describing Complex and Mixed Emotions

Laboratory research on emotions most often discerns the “basic emotions,” typically comprising universal emotions like fear, anger, sadness, disgust, surprise and joy (Ekman, 2017). Autistic people with normal verbal abilities can discuss their basic emotional experiences with relative ease, but have trouble discussing more complex emotions in themselves and others (Capps et al., 1992; Capps et al., 1995; Kasari et al., 2001). This relatively less nuanced understanding of emotions may limit the ability of individuals with ASD to engage with their own and others’ emotions in order to remediate personal emotional problems and to facilitate social interactions and relationships.

## Appraisal of Situations That Elicit Emotions; Antecedents and Consequences

ASD is characterized by an impaired “Theory of Mind” (ToM), characterized by difficulties attributing mental states such as beliefs, intents, desires and emotions to others (Baron-Cohen, 1997; Baron-Cohen, 2005). ToM difficulties impair the ability to understand the perspectives and feelings of others based on their external causes and situational contexts (Salomone et al., 2019). Losh and Capps (2006) reported that the emotional accounts of children with ASD are less likely to be explained in causal-explanatory frames of reference. Impoverished understanding of emotional antecedents and consequences may be fundamental to other aspects of EI such as the ability to regulate one’s own emotions. For example, emotional meltdowns or outbursts in ASD are due in part to lack of awareness of the antecedents leading to negative emotions, and lack of insight regarding subsequent consequences (Mazefsky and White, 2014).

## Managing Emotions Emotion Regulation

Emotion regulation has been defined as the automatic or intentional modification of a person’s emotional state that promotes adaptive or goal-directed behavior (Thompson, 1994). Functionally, emotion regulation is thought to be critical for constructive management of personal distress and interpersonal conflict, and more broadly for psychological well-being and mental health (Dulewicz et al., 2003; James et al., 2012). Emotion dysregulation is of significant practical concern to parents, clinicians, and educators working with children with ASD (Mazefsky et al., 2013), as emotion dysregulation in this population may result in irritability, emotional outbursts, aggression, self-injury, impulsivity, and anxiety (Lecavalier, 2006; Mazefsky et al., 2013; Mazefsky and White, 2014; Charlton et al., 2019).

## Emotion Regulation Strategies

Emotion regulation is difficult to empirically measure in the lab, but observational studies have shown that children with ASD use

less effective and less adaptive coping strategies compared to their neurotypical peers when confronted with frustrating situations (Konstantareas and Stewart, 2006; Jahromi et al., 2012). Children with ASD use more avoidance and venting strategies to regulate frustration and are less likely to use constructive strategies such as goal-directed solutions or seeking help from an adult (Jahromi et al., 2013). Effective emotion regulation strategies are needed to minimize the negative emotional impact of adverse events and to reframe difficult situations into constructive learning opportunities (Gross and John, 2003; Mandell, 2008; Mazefsky et al., 2013; Charlton et al., 2019).

## Managing Others’ Emotions

While research on managing others’ emotions in ASD has received relatively little empirical attention to our knowledge, there are several considerations worth making. An obvious but relevant point is that lacking awareness and understanding of emotional signals in the first place would make it impossible to respond to and effectively manage others’ emotions (Gaigg, 2012). However, even when an individual with ASD detects and correctly interprets others’ emotions, they may still lack the social competencies to respond in an emotionally intelligent manner. For example, children with ASD are less responsive to the emotional displays of others compared to their typically developing peers, even when they are apparently aware of others’ emotional displays (Yirmiya et al., 1992; Loveland et al., 1994; Bacon et al., 1998; Corona et al., 1998). Difficulty managing and responding to others’ emotions would make it challenging to reconcile interpersonal conflict, to respond to others compassionately, and to help others cope with emotional distress.

## IMPLICATIONS FOR SCHOOL-BASED SOCIAL AND EMOTIONAL LEARNING PROGRAMMING AND SPECIAL EDUCATION

Understanding emotional difficulties in ASD in the context of EI offers a novel framework for conceptualizing potentially viable intervention strategies. Some prior work has shown promise in teaching children with ASD skills relevant to EI including understanding of their own and others’ emotions, emotional problem solving, and emotion regulation skills in school settings (Wong et al., 2010). Additionally, systematic reviews of evidence-based educational interventions for children with ASD have been conducted and translated into accessible learning modules that can be utilized by educators to teach social-emotional competencies among other skills, using a variety of approaches including peer-mediated instruction, naturalistic intervention, structured play groups, and adult-directed social skills training (Wong et al., 2015; Sam et al., 2020). However, most special education interventions for children with ASD focus either on educational development or on social skill development. These interventions may cover some aspects of social problem solving and understanding



emotions in others but neglect several key EI skills. We are not suggesting that EI difficulties are necessarily the most pressing concerns in all children with ASD, or that SEL interventions should replace existing special education interventions. Rather, interventions that focus on development of EI may complement other interventions by targeting skillsets that do not receive enough attention. In the following sections, we describe a particular set of behavioral and biophysiological interventions that target greater understanding and regulation of emotions in the self, most relevant to EI.

## Biosocial Feedback

Buck and Powers (2013) suggest that when children express emotions verbally and nonverbally, the ways in which caregivers respond to those emotions serve as educational opportunities in a process called “biosocial feedback.” Biosocial feedback helps children understand what emotions they are experiencing, the events that lead to negative emotions, and strategies for regulating those emotions. For example, if a young child expresses frustration, a caregiver or educator may respond in such a way that helps the child understand what emotion he is experiencing, why he is experiencing it, and offer strategies on how to regulate that specific emotion. For children who have a disposition toward suppressing emotional expression or do not express emotions clearly, alexithymia can develop as a result of compromised biosocial feedback. This may be a particular concern for children with ASD given confusing and diminished emotion expression patterns (Snow et al., 1987; Dawson et al., 1990; Capps et al., 1993; Trevisan et al., 2018). School-based interventions that capitalize on teachable moments by encouraging verbal and nonverbal emotional expression and providing educational feedback about their emotional expression may be effective at increasing EI over time.

## Biofeedback

Other interventions aim to promote awareness of emotional arousal with the use of wearable devices and applications (e.g., Kushki et al., 2015; Ness et al., 2019). Such devices warn users and their caregivers when they are experiencing heightened emotional arousal, as measured by significant increases in heart rate or other physiological measures of arousal. An important aspect of the emotion regulation process is to first have awareness that an emotion is arising in the self before one can curb or regulate that emotion trajectory. These devices serve as an “emotional prosthetic” for children with poor emotional awareness and may potentially improve subjective awareness of one’s emotional states over time through repeated learning opportunities. They can also help caregivers and educators understand when the child in their care is overwhelmed or upset, even when the child is not clearly expressing those emotions. Research is needed to evaluate the feasibility and efficacy of such strategies in school-based settings.

## Mindfulness and Meditation

Western therapeutic practices have increasingly drawn from contemplative practices such as Mindfulness and Meditation into interventions such as “Mindfulness-based Stress

Reduction” (MBSR) and “Mindfulness-based Cognitive Therapy” (MBCT). Mindfulness has been defined as, “The awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment” (Kabat-Zinn, 2003), p. 145). It incorporates formal practices such as meditation that are undertaken for specific periods of time, but also encourages living “mindfully,” by maintaining awareness of one’s ongoing stream of consciousness and evolving emotional and physical feelings throughout one’s daily life. Such interventions are effective at improving self-reported and objective measures of emotional awareness over time (Bornemann et al., 2015; Bornemann and Singer, 2017). These interventions are increasingly used in the ASD community and are efficacious in treating depression and anxiety in adults with ASD (Spek et al., 2013), in minimizing aggressive behavior in physically aggressive adolescents with ASD (Singh et al., 2011), and for decreasing stress and improving other health outcomes in parents of children with ASD who experience high degrees of parental stress (Ferraioli and Harris, 2013). Mindfulness and meditative practices have already been successfully implemented into SEL curricula (Lawlor, 2016; Lemberger-Truelove et al., 2018), and future research is needed to examine the effectiveness of school-based mindfulness programs for children with ASD.

## RULER

One approach to teaching EI in schools is RULER ([www.rulerapproach.org](http://www.rulerapproach.org)), developed at the Yale Center for Emotional Intelligence. RULER’s original design was a Tier one or universal approach to SEL for TD children capable of learning social and emotional skills via observational learning and reciprocity in everyday conversation in both social and academic contexts. Adaptations for children with ASD became necessary as the approach was adopted by many large districts and private schools serving children with ASD. The most significant adaptation was a greater focus on explicit instruction of EI skills to address the difficulties of children with ASD in learning SEL skills through incidental learning (Erdödi et al., 2013).

The Mood Meter is one RULER tool designed to help individuals identify and label emotions. Based on the circumplex model of emotion, it is a visual depiction of two components of emotions: pleasantness and energy (Russell, 1980). The *x*-axis describes the degree of pleasantness we feel, ranging from unpleasant to pleasant. The *y*-axis represents our energy, ranging from low to high. The axes cross to create four colored quadrants each depicting a range of emotions. For children with ASD, including those who are non-verbal, teachers have used Mayer Johnson picture symbols depicting various facial expressions on their augmentative communication devices to give students a “voice” to communicate their emotions in each area of the mood meter: happy, sad, calm, angry, etc. Teachers also use mirrors and photographs to point out specific details on faces and in bodies that represent distinct emotions. The use of these visual supports for the Mood Meter more effectively supports learning about emotions for children with ASD.

Given the challenge of children with ASD to apply emotion knowledge across contexts, RULER supports educators who work with children with ASD to break down the teaching of emotion regulation. Instead of brainstorming multiple strategies simultaneously, teachers can address one strategy at a time and provide multiple opportunities for children to practice and receive positive reinforcement on its application across varied roleplay situations. The greater the structure and predictability in their learning of SEL skills the better able children with ASD tend to be at learning and applying the skills. Most school-based research has focused on teaching children with ASD social skills (Watkins et al., 2017). Additional study is needed to unpack best practices for implementing classroom based SEL programs that focus specifically on developing EI skills in children with ASD.

## DISCUSSION

Many individuals with ASD face a unique set of emotional challenges that contribute to high rates of mood disorders and poorer interpersonal function in social, academic, and employment settings. In this paper, we argued that the ability model of EI is a useful framework for conceptualizing the emotional symptoms of ASD. It is not our position that EI difficulties are the only or most pressing challenge faced by children with ASD in school settings; some children with ASD may not present with any EI difficulties at all (McCrimmon et al., 2016). Moreover, many children with ASD have co-occurring disorders such as intellectual disability or language impairment which may alter the presentation of EI difficulties. These differences and variations in cognitive ability among children with ASD may require additional refinements in intervention implementation. Another important question for future research is to understand the first-personal perspectives of individuals with ASD on the topic of EI regarding if, and in what ways, EI interventions should be taught in schools. One first-personal discussion of school inclusivity emphasized the utility of capitalizing on the special interests of students with ASD, so perhaps the content of EI lessons could be adapted and individualized based on the special interests of a particular student with ASD to increase motivation and engagement with the material (Boven, 2018). Other first-personal perspectives emphasize that autistic individuals often experience intense emotional feelings and empathy toward other human and

non-human beings (Davidson and Smith, 2009), so perhaps those feelings can be utilized as a starting point to discuss emotionally intelligent strategies to understand and regulate emotions in those scenarios to meet various interpersonal goals.

We hope this paper will encourage researchers, clinicians, and educators to utilize the ability model of EI to deconstruct, organize, and better understand the emotional challenges faced in ASD. Future ASD research may benefit from drawing on the larger body of EI research in the general population to consider, for example, how SEL initiatives in K-12 educational settings may be modified for students with ASD.

## DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author.

## AUTHOR CONTRIBUTIONS

DT wrote the bulk of the paper. EA reviewed and edited earlier drafts and helped design the figure. MB wrote specific sections and reviewed and edited earlier drafts. JM helped conceptualize the ideas in the paper and reviewed and edited earlier drafts.

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## SUPPLEMENTARY MATERIAL

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