

The art and science of assessing prosocial behaviors in children with and without autism
spectrum disorder

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Abstract

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This study explored the influence of cuing on two prosocial behaviors, comforting and helping, in children with and without autism spectrum disorder (ASD). Twenty children with ASD (4;1-6;7) and 20 with typical development (3;1-6;5) participated in an experimental task that used cuing to elicit one type of comforting and three types of helping. Results revealed a prosocial behavior type by group interaction, indicating that children with ASD required more cues to elicit some, but not all behavior types. Children with ASD also demonstrated more variable response to cuing across behavior types, whereas children with typical development performed more consistently. Prosocial performance was correlated with general verbal and social abilities. Cuing is a critical variable that influences prosocial behaviors in children with and without ASD.

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Prosocial behaviors, defined as actions that are intended for the well-being of others without immediate personal benefit, are fundamental components of social communication that emerge early and easily in typical development. Prosocial behaviors rely on children's ability to interpret and integrate their partner's cues within a social context. They also serve a critical role in cultivating and maintaining friendships. Children with autism spectrum disorder have characteristic deficits in interpreting social cues and making friends, so deficits in prosocial behaviors would be expected. However, previous findings are inconsistent. Some studies have found significant differences in prosocial performance between children with and without autism spectrum disorder; others have shown no differences. Importantly, studies that have found group differences accounted for contextual supports, specifically the amount of cuing required to elicit prosocial responses; studies that did not account for cuing found no differences. Yet, no studies have systematically investigated the effect of cuing on prosocial behaviors in children with autism spectrum disorder. Thus, the present study explores the influence of cuing on prosocial comforting and helping acts in young children with and without autism spectrum disorder.

Types of prosocial behaviors

Comforting and helping are two categories of prosocial behaviors. Both comforting and helping require a child to recognize, integrate, and interpret social, communicative, and contextual cues that signal a partner's needs, and then select an appropriate response (Best 2012; Crick and Dodge 1973; Liebal et al. 2009; Warneken and Tomasello 2006, 2007). For the purpose of the present study, comforting and helping will be differentiated based on both children's behavioral responses and the partner need that those responses address.

Comforting

Comforting refers to actions that respond to a partner's negative emotional state with the primary intention of making him/her feel better (Dunfield et al. 2011). Thus, comforting serves an emotion-based goal: to alleviate others' distress. It is often exhibited in response to a physical injury, hurt feelings (e.g., not being invited to a party), or some other distressing event (e.g., being frightened by a scary movie; Burlison 1982). The current study examines children's comforting in response to a physical injury, the earliest emerging type of comforting (Zahn-Waxler et al. 1992). Behavioral responses associated with such comforting include: giving others a hug, asking if others are okay, or rubbing, kissing, or offering a bandage to put on the injured body part (Zahn-Waxler et al. 1992). For example, if a mother pinches her finger in a drawer and starts crying, her son giving her a hug is an example of *comforting* because the hug is presumably intended to make her feel better.

Helping

Helping refers to actions that respond to a partner's inability to carry out a goal-directed action (Dunfield et al. 2011). Although it can involve completing the desired action, in many cases helping serves as a stepping stone toward achieving the action-based goal. For example, if a father spills a glass of water and points to the paper towel sitting next to his daughter, her handing him a paper towel is an example of *helping* because it assists him in achieving the action-based goal of cleaning up the spill.

The current study addresses helping that meets three different partner needs: request-based needs (*instrumental helping*), information-based needs (*informative helping*), and emotion-based needs (*empathic helping*). To illustrate these three types of helping, imagine that a mother and her four-year-old son are completing an art project together. The mother communicates a

desire to use the glue, either with words or by tapping the picture to refer to her previous use of the glue. If she reaches toward the glue but cannot get it, the boy handing her the glue is an example of *instrumental helping* because it fulfills his mother's request for the glue (Warneken and Tomasello 2006; Svetlova et al. 2010). If instead the mother searches for the glue after distractedly misplacing it (e.g., behind a paint bottle next to her on the table), her son pointing to the glue is an example of *informative helping* because it provides information about the glue's location (Liszkowski et al. 2006).

Finally, if the mother sighs in frustration because the glue bottle she is holding is stuck shut, the boy handing her a different glue bottle, resulting in her smiling and saying "thank you," is an example of *empathic helping* because it alleviates her distress (Svetlova et al. 2010). Note that empathic helping addresses both emotion-based and action-based goals: enabling others to feel better by solving a problem and facilitating a desired action. This contrasts with *comforting*, which only serves the emotion-based goal of making others feel better.

In each example of helping, the son's response is based on his ability to recognize, integrate, and interpret the cues that signal his mother's needs (i.e., communicating a desire to use the glue + reaching, searching, or sighing). Although the specific response differs based on the mother's need (request-, information-, or emotion-based need), each example shares a common outcome: the child's act *helps* the mother because it assists her in achieving her action-based goal of using the glue.

Typical development of prosocial behaviors and the role of adult cuing

In typical development, prosocial behaviors emerge over the first three years of life. Before their first birthday, infants begin to respond to others' distress; during the second year, such responses gradually evolve into empathic concern and overt comforting acts (Brownell

2013; Dunfield et al. 2011; Zahn-Waxler et al. 1992). Instrumental and informative helping develop in the first half of the second year, around the same time that infants are learning to intentionally initiate requests and information-sharing through gaze, gestures, and words (Brownell 2013; Liszkowski et al. 2006; Mundy et al. 2007; Tomasello et al. 2005; Warneken and Tomasello 2006). Empathic helping emerges somewhat later, as children develop an understanding that their partner has different internal states from their own, and becomes consistent by 30 months (Svetlova et al. 2010).

Children's prosocial behaviors evolve over time through interactions with partners during everyday experiences (Zahn-Waxler et al. 1992). Notably, parents use communicative cues within joint activities to scaffold young children's understanding of others' needs, goals, and emotions; potential prosocial responses that could change others' emotions; and consequences associated with those responses (Brownell et al. 2013; Tomasello et al. 2005; Waugh et al. 2015). Through repeated, scaffolded interactions, children construct an understanding of others' mental states, mapping words onto feelings and corresponding events (Carpendale and Lewis 2004). Since language is learned within dynamic interactions with social partners, children's verbal abilities, particularly their receptive vocabularies, are associated with their social cognitive understanding of others in terms of their mental states (Astington and Jenkins 1999). In turn, this understanding of others' mental states supports and reinforces children's engagement in prosocial behaviors (Waugh et al. 2015). Specifically, Brownell et al. (2013) found that when parents ask their children to label and explain emotions more often during book-reading, those children tend to help more quickly and more often during tasks that elicit instrumental and empathic helping. Zahn-Waxler et al. (1992) also reported that maternal sensitivity and reasoning serve as socializing factors that influence the development of prosocial helping and comforting.

Thus, adult scaffolding in the form of social and communicative cues plays a critical role in shaping children's development of prosocial behaviors.

Adults use a range of cues to signal the need for a particular prosocial behavior, including facial expressions conveying emotions (e.g., frustration, sadness), gestures (e.g., reaching, searching), vocalizations (e.g., sighing; saying "Hmm," "Oh"), and verbalizations (e.g., naming an object that fulfills their need, asking "Can you help?") (Brownell 2013; Liebal et al. 2009; Svetlova et al. 2010). Such cues vary on a continuum from explicit and concrete to subtle and abstract. For example, requests for a specific type of comfort or help (e.g., asking "can you give me the glue?") are quite explicit, while references to a previous experience or a general need (e.g., tapping a picture to refer to previous use of glue, saying "I need something to make it stick") are relatively subtle (Liebal et al. 2009; Svetlova et al. 2010).

The explicitness of cues provided by the child's social partner affects the likelihood of a child responding prosocially, with differential effects based on age. Svetlova et al. (2010) examined the influence of such cues on instrumental and empathic helping, and found that 18-month-olds could engage in both types of helping, but required more explicit cues to elicit helping than 30-month-olds. Thus, between 18 and 30-months, the ability to integrate and interpret more subtle communicative cues improves substantially, enabling children to recognize others needs and goals more easily with less adult support (Svetlova et al. 2010). On the other side of the interaction, parents also tend to adjust the explicitness of their cuing based on their child's age. Specifically, parents use more concrete, directive cues to encourage 18-month-olds to help, but shift to more abstract cues by the time children are 24 months of age (Waugh et al. 2015). Cuing may also improve young children's ability to recognize, interpret, and respond to a partner's distress by comforting (Dunfield et al. 2011).

Recognizing, interpreting, and responding to cues with appropriate prosocial behaviors are key components of mature interpersonal interactions and friendships (Bauminger et al. 2008; Brownell et al. 2013; Zahn-Waxler et al. 1992). For example, preschoolers who are more likely to respond to a peer's distress tend to have more than one friend and be more socially interactive (Phinney et al. 1986). Friendships also provide plentiful opportunities to practice and improve communicative, social, emotional, and cognitive abilities, such as perspective-taking, understanding others' feelings, and recognizing and responding to others' needs (e.g., with prosocial comforting and helping) (Bauminger and Shulman, 2003; Guralnick et al 2007; Phinney et al. 1986). Thus, prosocial behaviors and friendships are mutually supportive: prosocial behaviors benefit friendships, and friendships offer opportunities to practice providing appropriate comfort and help to peers. As a result, if children do not comfort or help, peer interactions and friendships will likely suffer, eliminating opportunities to improve social communication abilities and creating a barrier to further social development (Bauminger and Shulman, 2003).

Autism spectrum disorder and prosocial behaviors

Children with autism spectrum disorder (ASD) demonstrate characteristic deficits in social-emotional reciprocity, understanding and use of nonverbal communication, and forming and maintaining relationships (American Psychiatric Association [APA] 2013). These deficits often manifest in reduced initiations and responses within interactions, reduced sharing of emotions and affect, and difficulty interpreting others' nonverbal communicative signals (APA 2013). Thus, deficits in prosocial behaviors would be expected in this population. Because comforting and helping develop early and are key components of friendships, deficits in prosocial behaviors reverberate through social interactions. Specifically, prosocial behaviors are

significantly correlated with peer interactions in children with ASD (Travis et al. 2001); thus, reduced comforting and helping may negatively affect friendships in this population.

Comforting

Previous studies exploring comforting and helping in this population have shown mixed results. Although reduced response to distress (i.e., attention to distressed person, change in affect) has been observed consistently in infants, toddlers, and preschoolers with ASD (Bacon et al. 1998; Charman et al. 1997; Hutman et al. 2010; McDonald and Messinger, 2012; Sigman et al. 1992), overt comforting acts have been found to occur at similar frequencies in children with ASD as in children with typical development (TD) or intellectual disabilities (Bacon et al. 1998; Best 2012; McDonald and Messinger 2012; Sigman et al. 1992). In most cases, overt comforting acts were found to occur in low frequencies across all groups examined (Bacon et al. 1998; McDonald and Messinger 2012; Sigman et al. 1992) or as an action-based, scripted response (e.g., offering a bandage) among children with ASD (Best 2012).

Helping

Studies examining helping in children with ASD have primarily focused on instrumental helping, where differences sometimes exist between children with and without ASD. Specifically, Sigman and Ruskin (1999) found that when an experimenter wanted to put a tray of refreshments on a table covered with other objects, 10- to 12-year-olds with ASD demonstrated reduced instrumental helping relative to same-aged children with developmental delays. Yet, no differences existed in their instrumental helping in response to the experimenter spilling juice (Sigman and Ruskin 1999). Similar to the latter result, no significant differences were found in the instrumental helping (handing others an out of reach object) of two- to five-year-olds with ASD and those with TD or developmental delay (Best 2012; Liebal et al. 2008). Children with

ASD also showed comparable skill in differentiating between situations in which instrumental helping was needed (object accidentally dropped + reach) and those in which it was not (object intentionally thrown away, no reach) (Best 2012; Liebal et al. 2008). Overall, these results suggest children with and without ASD may engage in instrumental helping at similar rates.

Informative and empathic helping in children with ASD have received scant attention. In the only known study to examine informative helping, preschoolers with ASD were less likely to help an experimenter search for a lost pen than children with developmental language disorder or TD (Bacon et al. 1998). No studies have yet examined empathic helping in this population.

Methodological considerations

Differences in experimental procedures and methods of measurement likely play a role in the discrepant findings of previous studies examining comforting and helping in children with ASD. In particular, overt comforting acts have typically been elicited in response to an injury, where the injured person used vocal, facial, and bodily cues to indicate pain (e.g., “ouch,” rubbing the injury), but did not look at the child (Bacon et al. 1998; Charman et al. 1997; Hutman et al. 2010; McDonald and Messinger 2012; Sigman et al. 1992). Such studies have primarily been concerned with response to distress, with potential responses ranging from attention to the injured person and concerned facial expressions to overt comforting. Therefore, although response to distress has been measured on a continuum, reflecting the degree of empathy, comforting itself has been defined as an all-or-nothing phenomenon (Bacon et al. 1998; Charman et al. 1997; Hutman et al. 2010; McDonald and Messinger 2012; Sigman et al. 1992).

Likewise, the instrumental helping of children with ASD has often been measured as an all-or-nothing phenomenon, even when a series of communicative cues was provided (Best 2012; Liebal et al. 2008). In particular, Best (2012) and Liebal et al. (2008) credited helping

regardless of whether children responded after the experimenter: 1) reached and gazed only toward the object, 2) alternated gaze between the child and object, or 3) (Liebal et al. only) verbalized a desire for the object. In contrast, Sigman and Ruskin (1999) used a rating scale to account for the amount of cuing required to elicit instrumental helping (4=unsolicited helping, 1= no helping despite hinting and asking). Based on this method of measurement, differences were found for one of two instrumental helping scenarios (Sigman and Ruskin 1999).

Furthermore, Bacon et al. (1998) also accounted for level of cuing, measuring informative helping both before and after an explicit request for help. Findings indicated that informative helping increased in children with ASD after they were explicitly asked to help; however, regardless of experimenter support, this group was less likely to help than children with TD or developmental language disorder (Bacon et al. 1998). Taken together, these results suggest that cuing affects the prosocial behaviors of children with ASD, and may be the key to explaining previously discrepant findings.

The present study

The present study systematically investigated the influence of cuing on prosocial behaviors in young children with and without ASD. Specifically, the study examined the amount and explicitness of cuing required to elicit one type of comforting and three types of helping in children with ASD and those with TD. This study addressed two primary research questions. First, do verbal children with ASD require more cues of increasing explicitness before recognizing and responding to others' need for comforting, instrumental helping, informative helping, and/or empathic helping? Second, is the prosocial performance across groups of children with and without ASD, as measured by their response to cuing, related to general verbal and social abilities? Table 1 summarizes the variables that address these two research questions.

Table 1

Summary of variables and analyses completed for each research question

Research question #1	
<i>Prosocial performance variables</i>	<i>Group variables</i>
Comforting cue score [†]	ASD
Instrumental helping cue score [†]	TD
Informative helping cue score [†]	
Empathic helping cue score [†]	
<i>Analyses:</i>	
<ul style="list-style-type: none"> • 4x2 repeated measures analysis of variance • Between groups t-tests for each prosocial performance variable • Within groups t-tests comparing each pair of prosocial performance variables • Performance profiles for “best” responses and “proforma”/no responses 	
Research question #2	
<i>Prosocial performance variables</i>	<i>Variables related to verbal and social abilities</i>
Overall helping cue score ^{††}	PPVT-4 age equivalent
Total prosocial cue score ^{†††}	Vineland-2 Socialization subscale
	ToMI composite score
	SRS-2 total score
<i>Analyses:</i> Pearson’s correlations, r , between prosocial performance variables and variables related to verbal and social abilities	
Note. ASD: autism spectrum disorder; TD: typically developing; PPVT-4: Peabody Picture	

Vocabulary Test–4th Edition; Vineland-2: Vineland Adaptive Behavior Scales–Second Edition; ToMI: Theory of Mind Inventory; SRS-2: Social Responsiveness Scale–Second Edition.

†Prosocial behavior type cue scores (comforting cue score, instrumental cue score, etc.) reflect the mean of the 3 item-level scores for each prosocial behavior type.

††The overall helping cue score reflects the mean of the 9 item-level scores for the three helping types (i.e., 3 instrumental, 3 informative, and 3 empathic helping items).

†††The total prosocial cue score reflects the mean of the 12 item-level scores for all comforting and helping items (i.e., 3 comforting items, 9 helping items – outlined above).

For the first question, it was hypothesized that children with ASD would require a similar number of cues as children with TD to provide appropriate instrumental (request-based) helping, following their relative strengths in request-based communication (Landa 2007; Liebal et al. 2008). In contrast, children with ASD were expected to require more cues before recognizing and responding to others' need for comforting, informative helping, and empathic helping, because all require skills known to be compromised in this population. Specifically, manifestations of ASD often include reduced responding to others' distress and reduced communication for the purpose of sharing information or emotions (APA 2013; Bacon et al. 1998; Hutman et al. 2010; Landa 2007; McDonald and Messinger 2012; Sigman et al. 1992). Furthermore, different patterns of behavior were predicted in children with ASD than in those with TD. In particular, performance of children with ASD was expected to be more variable across the prosocial behavior types (comforting; instrumental, informative, and empathic helping), whereas performance of children with TD was expected to be consistent across types.

For the second research question, it was hypothesized that prosocial performance would correlate with general verbal abilities because the latter correlate with social cognitive abilities,

which underlie prosocial behaviors (e.g., understanding others' intentions, goals, needs; Astington and Jenkins 1999; Happé 1995). Prosocial performance was also expected to correlate with parent report of social abilities, as both should reflect a common construct: social abilities.

Methods

Participants

Twenty verbal children with ASD and 20 with TD, matched for verbal mental age and gender, were recruited for the present study. Children were matched for verbal mental age 1) to insure groups had similar abilities to comprehend the language used to elicit prosocial behaviors, and 2) because the social cognitive abilities that underlie prosocial behaviors vary based on verbal abilities (Astington and Jenkins 1999; Happé 1995). Matching for gender accounted for the higher incidence of ASD in males (CDC 2015) as well as potential gender differences in children's engagement in prosocial behaviors (Bacon et al. 1998). Recruitment sources included a university participant pool, previous studies at the University of Washington Autism Center, websites/listservs geared toward families of children with ASD, and educational and therapeutic facilities in the Pacific Northwest and the Southwest United States. Participants were recruited with the approval of the university's Human Subjects Division. All parents provided consent prior to participation, and whenever able, children provided verbal assent.

The mean chronological ages of participants in the ASD and TD groups were 63.85 months ($SD=9.53$) and 50.85 months ($SD=13.39$), respectively. Because children in the two groups were matched for verbal mental age, children with TD were younger on average than children with ASD, $t_{(38)}=3.54$, $p=.001$, $d=1.12$. Children with ASD had community diagnoses, which were reported during an informal phone screening and confirmed through administration of the *Autism Diagnostic Interview-Revised* (ADI-R; Lord et al. 1994).

Procedure

Participation was completed in three phases. In the first phase, parents completed an informal phone screening, which gathered information about demographics and children's general health, development, and diagnoses. In the second phase, parents completed standardized interviews and questionnaires, providing additional information about their child's development. For parents of children with ASD, the *ADI-R* (Lord et al. 1994) was administered at this time to confirm diagnoses. In the third phase, each individual child completed a set of behavioral tasks administered by this investigator, a nationally-certified speech-language pathologist. The tasks took approximately 90-120 minutes to complete, and proceeded in the same order for each participant: verbal assent, standardized language tests, and an experimental prosocial task, to be described below. Behavioral sessions were video-recorded for subsequent scoring. Participant demographic information and standardized assessment results are summarized in Table 2.

Measurement

Informal screening

Eighteen parents of children in the TD group reported the race of their child as being Caucasian, while two reported more than one race. Four child participants with TD were identified as having a Hispanic/Latino ethnicity; 16 were non-Hispanic. In the ASD group, 14 parents reported the race of their child as being Caucasian, one as Asian, and one as African-American; four reported more than one race. Three child participants with ASD were identified as having a Hispanic/Latino ethnicity; 17 were non-Hispanic.

Two measures of socioeconomic status were also reported by parents: annual household income and the highest level of education for the primary caregiver. Fourteen children with TD reportedly came from a household with an annual income of \$100,000 or more, two between

Table 2

Demographics and Standardized Test Results

	Group			
	ASD		TD	
<i>N</i>	20		20	
Gender (M:F)	14:6		14:6	
Race	14 Caucasian, 1 Asian, 1 African-American, 4 Mixed		18 Caucasian, 2 Mixed	
Ethnicity	3 Hispanic/Latino 17 Non-Hispanic		4 Hispanic/Latino 16 Non-Hispanic	
Household Income	11 \$100,000 ⁺ 4 \$80,000-89,999 2 \$70,000-79,999 1 \$60,000-69,999 1 No response		14 \$100,000 ⁺ 2 \$90,000-99,999 1 \$60,000-69,999 3 \$50,000-59,999	
Highest level of caregiver education	8 Graduate degree 10 Four-year college degree 1 Associate's degree 1 No response		14 Graduate degree 4 Four-year college degree 2 Associate's degree	
	Mean (SD)	Range	Mean (SD)	Range
Age* (months)	63.85 (9.53)	48-79	50.95 (13.36)	37-77
<i>Vineland-2</i> *	87.35 (11.51)	68-108	105.90 (8.87)	92-119
<i>ToMI</i>	10.83 (2.03)	5.55-13.71	14.25 (2.66)	7.50-18.64

<i>SRS-2</i> *	72.30(9.76)	58-90	45.70(4.21)	37-54
<i>PPVT-4</i> *	100.55(15.07)	77-139	116.75(10.10)	96-137
VMA (months)	65.35(18.86)	35-104	65.50(18.83)	38-106
<i>CELF:P2</i> * (n=18 per group)	92.72(10.59)	73-116	109.28(6.28)	96-121

* $p \leq .001$

Note. ASD: autism spectrum disorder; TD: typically developing; *Vineland-2: Vineland Adaptive Behavior Scales-Second Edition*; *ToMI: Theory of Mind Inventory*; *SRS-2: Social Responsiveness Scale-Second Edition*; *PPVT-4: Peabody Picture Vocabulary Test-4th Edition*; VMA = Verbal Mental Age (i.e., *PPVT-4* Age Equivalent); *CELF:P2 = Clinical Evaluation of Language Fundamentals: Preschool, 2nd Edition*.

\$90,000-\$99,999, one between \$60,000-\$69,999, and three between \$50,000-\$59,999. In the ASD group, 11 parents reported an annual household income of \$100,000 or more, four between \$80,000-\$89,999, two between \$70,000-\$79,999, and one between \$60,000-\$69,999. With respect to caregiver education, 14 parents of children with TD reported a graduate degree; four indicated a four-year college degree; and two reported a two-year Associate's degree. Eight parents of children with ASD reported a graduate degree; 10 indicated a four-year college degree; and one reported a two-year Associate's degree. One parent of a child with ASD elected not to report household income or caregiver education.

In addition to documenting demographics, initial phone screening insured that children were predominantly English speakers (the majority of their day was spent listening to English) with intelligible speech and no history of permanent hearing loss, seizure disorder, or brain injury/ disease. Two children with ASD were the result of a twin pregnancy: one set was born at full term, the other at 34.5 weeks. Screening also confirmed that children with ASD could at

least produce simple sentences (e.g., “I want markers,” “Water is blue”) and respond verbally to questions (e.g., “Are you thirsty?” “Do you want to markers or paint?”). Children with TD had no history of special education services or language disorder, and no family history of ASD.

Vineland Adaptive Behavior Scales-2

Following initial screening, the *Vineland Adaptive Behavior Scales-2nd Edition* (*Vineland-2*; Sparrow et al. 2005) was conducted as an interview with all parents; this provided a norm-referenced assessment of adaptive functioning and documented functioning within one standard deviation of the mean in participants with TD ($M=104.95$, $SD=7.91$). No minimum performance criteria was set on the *Vineland-2* for children with ASD ($M=87.35$, $SD=11.51$). Because the *Vineland-2* assesses communication and socialization behaviors, children with TD were expected to demonstrate higher scores on this measure as compared to children with ASD. The data confirmed this expectation, $t_{(38)}=5.64$, $p<.001$, $d=1.78$. The Socialization subtest of the *Vineland-2* also provided one measure of children’s everyday social abilities, in the areas of interpersonal relationships, play and leisure activities, and coping skills.

Theory of Mind Inventory

The *Theory of Mind Inventory* (*ToMI*; Hutchins et al. 2010) measures parent perceptions of their child’s social cognitive abilities, namely their ability to understand, recognize, and respond to their own and others’ attention, thoughts, and feelings. Nineteen participants with TD demonstrated scores on the *ToMI* that were within one standard deviation of the mean (\geq 16th percentile); the remaining child (a three-year-old male) scored above the 16th percentile on the Early Theory of Mind subscale of the *ToMI*, but had scores in the 11th percentile and between the 1st-4th percentile on the Basic and Advanced Theory of Mind subscales of the *ToMI*, respectively. Because the *ToMI* assesses social abilities known to be impaired in children with ASD, no

criterion score was set for this group. As expected, *ToMI* scores for children with ASD ($M=10.83$, $SD=2.03$) were significantly lower, indicating more impaired social cognitive abilities, than for children with TD ($M=14.25$, $SD=2.66$), $t_{(38)}=3.52$, $p<.001$, $d=1.45$.

Social Responsiveness Scale-2

The *Social Responsiveness Scale-2nd Edition* (*SRS-2*; Constantino and Gruber 2012) measures parent perceptions of their child's social awareness, social communication, social cognition, social motivation, and restricted behaviors/repetitive interests in everyday situations. All participants with TD demonstrated scores within normal limits on the *SRS-2* ($\leq 59T$). Because the *SRS-2* assesses social abilities known to be impaired in children with ASD, no criterion score was set for this group. As expected, *SRS-2* scores were significantly higher for children with ASD ($M=72.30$, $SD=9.76$), indicating more impaired social abilities, as compared with children with TD ($M=45.70$, $SD=4.21$), $t_{(25.83)}=-11.20$, $p<.001$, $d=3.54$.

Peabody Picture Vocabulary Test-4th Edition

The *Peabody Picture Vocabulary Test – Fourth Edition* (*PPVT-4*; Dunn and Dunn 2007) was administered to assess single-word receptive vocabulary. The age equivalence score on the *PPVT-4* was used for three purposes: 1) to insure children's receptive vocabularies were sufficient to participate in study activities (i.e., verbal mental age ≥ 32 months), 2) to match the verbal abilities of participants across groups (± 3 months for 14 matches, ± 6 months for 6 matches), and 3) to examine correlations between prosocial performance and verbal abilities. With respect to matching, comparison revealed closely matched verbal mental age across groups (ASD: $M=65.20$, $SD=19.13$; TD: $M=65.35$, $SD=18.88$), $t_{(38)}=.03$, $p=.98$, $d=.008$. In addition, for children with TD, *PPVT-4* standard scores were required to be greater than 1.5 standard deviations below the mean. No minimum performance criterion was set for children with ASD.

On average, children with TD ($M=116.75$, $SD=10.10$) received significantly higher *PPVT-4* standard scores than children with ASD ($M=100.55$, $SD=15.07$), $t_{(38)}=3.99$, $p<.001$, $d=1.26$.

Clinical Evaluation of Language Fundamentals-Preschool, 2nd Edition

Administration of the Core Language subtests of the *Clinical Evaluation of Language Fundamentals – Preschool, Second Edition (CELF-P2; Wiig et al. 2004)* was attempted with all children. Two children with TD and two with ASD did not complete all subtests. For children with TD, the *CELF-P2* Core Language Index was required to be greater than 1.5 standard deviations below the mean. No minimum performance criterion was set for children with ASD. On average, children with TD ($N=18$; $M=109.61$, $SD=6.37$) received significantly higher *CELF-P2* scores than children with ASD ($N=18$; $M=92.72$, $SD=10.59$), $t_{(34)}=5.80$, $p<.001$, $d=1.93$.

Prosocial task

Because prosocial behaviors emerge and are nurtured within supported interactions, the experimental prosocial task was embedded within a cooperative joint activity, where opportunities arose during naturalistic interactions between the child and the experimenter. The joint activity, an art project, required that the experimenter and child establish a joint goal (usually a thematic picture, such as “the ocean” or “a park”; occasionally a method, such as painting with trucks) and share materials. This joint activity was designed to encourage children to behave prosocially, and increase the naturalness of experimenter cuing.

A hand puppet was used to elicit the prosocial behaviors. The puppet had the features of a child, and was voiced by the experimenter with a higher pitch than her normal speaking voice. Using a puppet enabled the experimenter to use explicit cues to elicit each behavior without violating social norms. Specifically, an unfamiliar adult requesting a hug during a comforting item would be unusual, but eliciting a hug for a puppet is more socially acceptable. Furthermore,

previous research indicates, “children are comfortable interacting with hand puppets and show realistic social behaviors such as teaching, enforcing social norms, and sharing” (Warneken and Tomasello 2013, p. 343).

A summary of the prosocial task is depicted in Figure 1. In this task, four prosocial behavior types were elicited: comforting, instrumental helping, informative helping, and empathic helping. For comforting items, the puppet experienced something painful. Comforting involved verbal or nonverbal acts intended to make the puppet feel better, such as asking if the puppet was okay, rubbing the injury, or pretending to put a bandage on the injury. For example, when using scissors to cut out a yellow circle (e.g., to make a sun), the puppet accidentally cut its hand. In this case, the child was expected to comfort by hugging the puppet or pretending to put a bandage on its cut.

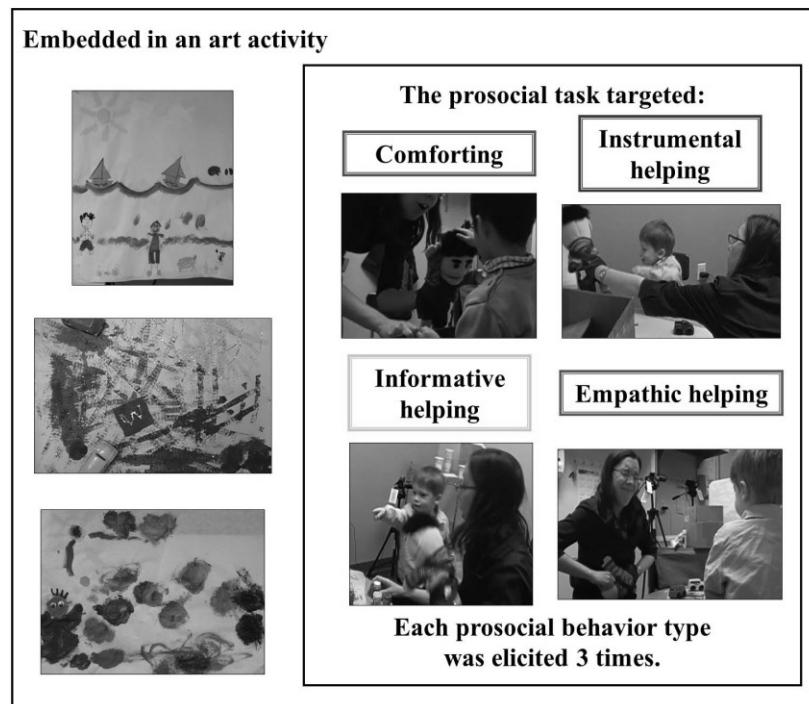


Figure 1. Summary of prosocial task.

For instrumental helping items, an object of interest was close to the child but out of the puppet's reach. Helping involved giving the object to the puppet. For example, in one item, the puppet accidentally painted the experimenter's hand, which interrupted the action-based goal of painting the sun's rays. When the experimenter got up to clean the paint off her hand, she placed the paint on a shelf close to the child. When the puppet indicated a desire to finish painting the sun's rays, the child was expected to help by giving it the paint.

For informative helping items, the puppet "distractedly misplaced" the object on a shelf located next to itself. From the puppet's perspective, the misplaced object was behind a barrier (i.e., an opaque box), but because the shelf was across the table from the child, the object was in the child's line of sight. Helping involved pointing to the location of the object. For example, the puppet drew two clouds with a pencil, put paint on its brush, distractedly placed the paint bottle on a shelf next to itself, but behind the box, and then painted the first cloud. When the puppet indicated a desire to paint the second cloud, but could not find the paint, the child was expected to help by pointing to the paint or identifying its location.

For empathic helping items, the puppet experienced a distressing/ frustrating emotion. Helping involved alleviating this emotion by giving the object to the puppet or engaging in other actions that enabled the puppet achieve its goal. For example, the puppet wanted to cut out a yellow circle to make a sun; unfortunately, the scissors it attempted to use were glued shut. When the puppet attempted to use the glued scissors, it became frustrated, sighing and exerting effort to open the scissors. In this case, the child was expected to help by attempting to open the scissors that were glued shut or by giving the puppet a second pair of scissors, which had previously been used for other art-related activities.

Each of the four prosocial behavior types was targeted three times. The same objects were used for items targeting the three types of helping, to control for children's interest in particular objects (note: comforting items did not involve target objects). The task's 12 items were interspersed throughout the art activity in a consistent order, wherein consecutive items neither targeted the same prosocial behavior type nor used the same object.

In each item, the experimenter provided cues to elicit actions that comforted or helped the puppet. The cues, presented in Table 3, were delivered in a hierarchy from the most subtle and abstract to most explicit and concrete (following Svetlova et al. 2010). The order in which the cues were administered remained constant across items. The first two cues in the hierarchy provided general information about the situation or the puppet's need, first with gestures and vocalizations (e.g., "Hmm" + tapping the picture to refer to prior actions that echoed the current goal), and then with words (e.g., saying "I wanna do more"). The third cue provided a nonverbal indication of the emotion felt or puppet's need (e.g., reaching, searching, sighing). The fourth cue labeled the emotion felt or the target object that met the need (e.g., "the glue"). The fifth cue increased the intensity of the nonverbal signal provided for the third cue (e.g., reaching with effort, searching under the table/papers, sighing more exaggeratedly). This cue offered the child a second opportunity to integrate information about the required prosocial behavior type and the emotion felt/object needed, in case s/he had not been attending to the third cue. The sixth and seventh cues explicitly requested comforting or helping, first in a general request, and then in a specific direction about how to meet the puppet's need (e.g., "Can you help?"; "Can you give [Puppet's name] the glue?", "Can you help [Puppet's name] find the glue?").

After presenting each cue, the experimenter waited at least 4 seconds for the child to respond before delivering the next cue in the hierarchy. Administration of cues continued until

Table 3

Order, description, and point values for experimenter cues

Description of Cue	Example	Points
1. Nonverbal behavior related to stimulus object & vocalization	“Ooh” + whimper, “Hmm” + tapping picture	7
2. Verbal expression describing situation (comforting) or general need (helping)	“[Puppet] bumped his head” “I wanna do more”	6
3. Nonverbal behavior corresponding to emotion felt or type of help needed	Cry & rub head Reach, search, or use distressed facial expression	5
4. Verbal naming of emotion felt or object that meets need	“That really hurts”, “Hmm, the glue”	4
5. Nonverbal behavior corresponding to emotion felt or type of help needed (expressed with increased intensity)	Same as #3, but with increased intensity (e.g., exaggerated distress, reach with vocalization, searching under table)	3
6. Verbal request for comfort or help (general)	“Can you make [Puppet] feel better?” “Can you help?”	2
7. Specific, directed verbal request for comfort or help	“Can you give [Puppet] a hug?” “Can you give me / help me find the glue?”	1

the child provided an expected response that was consistent with the prosocial behavior type being elicited (see Table 4 for expected responses). If the child provided an alternate response (e.g., a response consistent with a different prosocial behavior type or an action that was

Table 4

Operational definitions of prosocial behaviors by type.

Prosocial behavior types	Operational definition of prosocial behavior types
Comforting	- Hugging, kissing, patting, rubbing, or pretending to put a bandage on E's injured body part; asking, "Are you okay?"
Instrumental Helping	- Giving SO to E, or moving SO within E's reach - Helping E complete the action (e.g., if the target behavior is giving a glue bottle, C might squirt some glue for E)
Informative Helping	- <u>Not</u> retrieving SO or acting to alleviate E's distress: o Pointing/gesturing toward SO; showing SO's location in another way o Commenting on/describing the location of SO
Empathic Helping	- Engaging in behaviors that attempt to solve the problem created by the emotion-evoking situation o Commenting on/describing a specific solution to the problem (e.g., suggesting E put water on a glue bottle that is stuck). General solutions (e.g., identifying the needed object) are insufficient. o Handing E the SO to solve the problem or helping E complete the action (e.g., squirting glue for E rather than giving the glue bottle) o Engages in another behavior that solves the problem (e.g., opening or attempting to open the "stuck" glue bottle)

Note: C=child, E=examiner/puppet, SO=stimulus object

prosocial, but inaccurate based on the context), the experimenter continued cuing until the expected response was elicited. If the child never provided the expected response, the experimenter comforted the puppet or retrieved the desired object. Regardless of whether an expected response was elicited, items ended with the experimenter neutrally commenting about the result (e.g., “Now [Puppet’s name] can glue it on,” “Now [Puppet’s name] feels better”). No rewards or verbal reinforcement (e.g., “thank you”) were provided for expected responses.

To examine the extent to which the prosocial task was implemented according to its scripted protocol, an independent observer completed a procedural reliability analysis. The observer used a template to check whether the room was set up appropriately, whether items were administered in the correct order, and whether cues within each item were administered faithfully and in the correct order. Procedural reliability was calculated by dividing the number of checked boxes on the template by the total number of boxes (Billingsley *et al.* 1980). Procedural reliability data were obtained for 20% of sessions for each group, resulting in 98.61% reliability for TD sessions and 97.06% reliability for ASD sessions. Thus, a high degree of fidelity was maintained in administering the prosocial task script.

Data preparation and scoring

The primary investigator and one student research assistant in Speech and Hearing Sciences prepared video clips for scoring. Each item began when the experimenter initiated cues from the scripted hierarchy. Items ended after the conclusion of behavioral responses associated with the final administered cue.

Observers, naïve to children’s age, group membership, and study hypotheses, assigned points for participant responses to each task item based on the number of cues required to elicit prosocial behaviors. Reverse scoring was used, in which response to more subtle cues resulted in

a higher score and vice versa (0-7 points, see Table 3). Prosocial behaviors were recognized based on operational definitions, organized according to the prosocial behavior type elicited (see Table 4). Points were assigned only for prosocial responses that were consistent with the context and prosocial behavior type elicited. For example, in response to informative items, points were only assigned if a child provided information about the correct target object's location, by pointing or using words to describe its location. On the other hand, if the child pointed to a different object, no points were assigned because the context had established a need for the target object (*not consistent with the context*). If the child retrieved and gave the experimenter the target object, no points were assigned because this "overly helpful" act fulfilled a request-based need, rather than an information-based need (*not consistent with the prosocial behavior type elicited*).

Six scores were calculated for each participant: four "prosocial behavior type" cue scores, an overall helping cue score, and a total prosocial cue score. Prosocial behavior type cue scores were derived by calculating the mean of each participant's three item-level scores for each prosocial behavior type, yielding a comforting cue score, instrumental helping cue score, informative helping cue score, and empathic helping cue score. For a few participants, one of the three items for a particular prosocial behavior type was not administered (ASD group: n= 4, TD group: n=3). In these cases, item-level scores for the remaining two items were averaged for the corresponding cue score.

In addition to cue scores for each prosocial behavior type, an overall helping cue score and a total prosocial cue score were calculated. Each participant's overall helping cue score was derived by calculating the mean of his/her instrumental, informative, and empathic helping item-level scores. Each participant's total prosocial cue score was derived by calculating the mean of

his/her item-level scores for all four prosocial types. Table 1 summarizes these six scores and how each were calculated.

Interobserver agreement

Five student research assistants in Speech and Hearing Sciences were trained to assign points for children's prosocial responses. Training included a review of the prosocial task and coding manual, which outlined specific procedures for assigning points; this review familiarized observers with task items, prosocial behavior types, experimenter cues, and expected responses. Following this review, observers jointly assigned points for six items from one participant, and independently assigned points for two-to-three additional participants. Training was completed when observers independently scored and reached 80% accuracy for at least 2 of 3 consecutive videos of individual child sessions, at least one of which had to be of a child with ASD. Each observer completed training in 2-5 hours.

Interobserver agreement was calculated for 60% of TD sessions (12 of 20) and 55% of ASD sessions (11 of 20), none of which had been used for training. Point-to-point interobserver agreement was 91.67% (range: 83.33-100.00%) for TD sessions and 87.42% (range: 75.00%-100.00%) for ASD sessions. When agreement fell below 80%, consensus was performed to check whether coding manual rules had been correctly applied. In all cases, consensus increased agreement to levels of 80% or higher.

Data analysis

A summary of data analyses is presented in Table 1. The first research question asked whether verbal children with ASD required more cues of increasing explicitness to recognize and respond with four types of prosocial behaviors, as compared to their TD counterparts. A 4 x 2 repeated measures analysis of variance (ANOVA) was used to test whether a difference existed

in mean cue scores for each prosocial behavior type across groups, controlling for verbal mental age. According to Mauchly's test, the assumption of sphericity was violated, so a Greenhouse-Geiser correction was used to interpret results. Follow-up t-tests were conducted to compare mean comforting, instrumental helping, informative helping, and empathic helping cue scores of the two groups. Corrections were applied in cases where equal variance could not be assumed, and a Bonferroni correction was applied, requiring an alpha of .013 to reach significance.

Follow-up t-tests also examined within group performance on each prosocial behavior type. This analysis enabled a comparison of performance profiles across the four prosocial behavior types between groups. A Bonferroni correction was applied to these 12 follow-up t-tests, requiring an alpha of .004 to reach significance.

In addition, performance profiles were descriptively analyzed to identify 1) the number of children who never responded or consistently required the most explicit cues for a particular behavior, and 2) the number of children who responded to the most subtle cues at least once. The first performance profile corresponded to children who received scores of 0-2 (at least an explicit request for comfort or help) for all items of a particular prosocial behavior type. Scores of 1-2 represented "proforma" or "compliant" responses (following Bacon et al. 1998), while scores of 0 indicated a child never responded. Thus, this measure reflected children who did not recognize, integrate, and interpret the first five cues to generate a "spontaneous" prosocial behavior of a particular type. The second performance profile corresponded to children who received a score of 6-7 (no more than a statement of general need or description of the situation) for at least one item of a particular prosocial behavior type. Scores of 6-7 represented the "best" responses, resulting from very rapid interpretation of general information and leading to an appropriate prosocial response. Because these responses were based only on the most subtle cues, this

measure reflected a stringent test of children's comforting and helping (following Svetlova et al. 2010).

The second research question asked whether children's prosocial performance as measured by response to cuing would be related to their verbal and/or social abilities. Pearson's product moment correlations were used to examine the relationship between the mean total prosocial cue score and scores on measures of verbal abilities (*PPVT-4* age equivalence score) and social abilities (*Vineland-2* Socialization subtest score, *ToMI* Composite score, *SRS-2* Total score). Correlations also examined the relationship between the mean overall helping cue score and scores on these measures.

Results

Group differences in prosocial performance

Figure 2 depicts mean cue scores for each prosocial behavior type in the ASD and TD groups; the upper graph illustrates between group differences. Results of the repeated measures ANOVA indicated that despite a medium effect size, overall prosocial performance in the ASD group was not significantly different from that of the TD group, $F(1, 37)=3.00, p=.09, \eta^2=0.08$. Importantly, the group by prosocial type interaction was significant and demonstrated a medium effect size, $F_{(1,37)}=3.42, p=.03, \eta^2=0.09$. This result indicates that children with ASD required more explicit cues than those with TD for particular prosocial behavior types, but not for all types elicited.

Follow-up t-tests sought to characterize group differences for each prosocial behavior type. Comforting cue scores were not significantly different between groups, demonstrating a small effect size (TD: $M=4.48, SD=2.24$; ASD: $M=4.93, SD=1.58$), $t_{(38)}=0.75, p=.46, d=0.24$. Despite medium effect sizes, group differences also failed to reach significance for the three helping types:

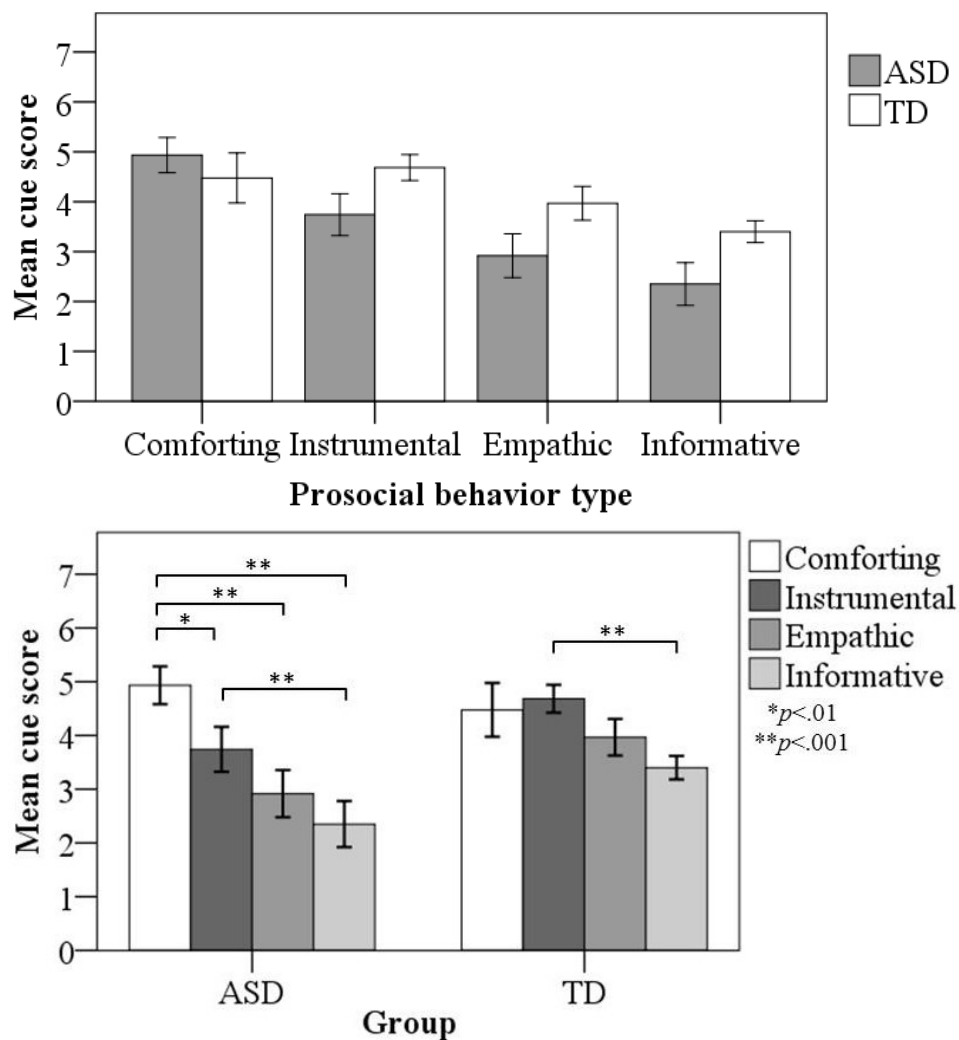


Figure 2. Paneled graphs of mean cue scores for children with ASD and those with TD for each prosocial behavior type – upper graph illustrates between group differences; lower graph illustrates within group differences

- instrumental (TD: $M=4.68$, $SD=1.16$; ASD: $M=3.74$, $SD=1.88$; $t_{(31.70)}=-1.91$, $p=.07$, $d=0.60$)
- informative (TD: $M=3.38$, $SD=1.00$; ASD: $M=2.35$, $SD=1.92$; $t_{(28.70)}=-2.14$, $p=.04$, $d=0.67$)
- empathic (TD: $M=3.97$, $SD=1.52$; ASD: $M=2.92$, $SD=1.96$; $t_{(38)}=-1.89$, $p=.07$, $d=0.60$)

Lack of significance for instrumental and informative helping could be related to the significantly larger variance in the ASD group (instrumental: $F=6.62$, $p=.01$; informative: $F=12.24$, $p=.001$).

Within group profiles across prosocial behavior types

Twelve additional follow-up t-tests were conducted to examine profiles of children's prosocial performance across prosocial behavior types within each group. The lower graph of Figure 2 illustrates these within group profiles. Overall, these t-tests revealed greater differentiation of performance across prosocial behavior types for children with ASD; performance of children with TD was more consistent across types.

In the ASD group, comforting required fewer cues to elicit than instrumental helping ($t_{(19)}=3.65, p=.002, d=.69$), informative helping ($t_{(19)}=8.75, p<.001, d=1.47$), and empathic helping ($t_{(19)}=6.44, p<.001, d=1.13$). In addition, instrumental helping required fewer cues to elicit than informative helping ($t_{(19)}=4.78, p<.001, d=.73$). There was also a trend toward instrumental helping requiring fewer cues to elicit than empathic helping, but it did not reach statistical significance ($t_{(19)}=2.47, p=.02, d=.43$). No significant differences existed in the number of cues required to elicit empathic and informative helping ($t_{(19)}=1.41, p=.18, d=.29$).

In contrast, children with TD only demonstrated a significant difference between two prosocial behavior types: instrumental and informative helping, $t_{(19)}=5.56, p<.001, d=1.20$. No significant differences existed between other prosocial behavior types.

Additional information about performance profiles across groups was gleaned by examining the number of children in each group who: 1) consistently received item-level scores of 2 or less for a particular prosocial behavior type, reflecting a failure to respond or "proforma" response, and 2) received a score of 6 or more for at least one item for a particular prosocial behavior type, reflecting the "best" comforting and helping responses.

Across groups, very few children consistently received a score of 2 or less on comforting and instrumental helping items. Thus, most children comforted or engaged in instrumental

helping at least once without being explicitly asked to do so. However, children with ASD were more likely than those with TD to consistently demonstrate a proforma response or a failure to respond on informative and empathic helping items.

- Comforting: 0 with ASD, 3 with TD (15%)
- Instrumental helping: 2 with ASD (10%), 0 with TD
- Informative helping: 7 with ASD (35%), 0 with TD
- Empathic helping: 6 with ASD (30%), 1 with TD (5%)

Patterns with respect to “best” responses were similar across groups. The number of children who had at least one “best” response, defined as receiving a score of 6 or 7 for at least one item, was as follows for each prosocial behavior type:

- Comforting: 15 with ASD (75%), 16 with TD (80%)
- Instrumental helping: 7 with ASD (35%), 8 with TD (40%)
- Informative helping: 3 with ASD (15%), 5 with TD (25%)
- Empathic helping, 13 with ASD (65%), 16 with TD (80%)

Correlations between prosocial performance and verbal/social abilities

Figures 3 and 4 depict paneled scatterplots illustrating the relationship between prosocial performance and measures of verbal and social abilities across groups. In Figure 3, prosocial performance (on the y-axis) reflects children’s total prosocial cue score. In Figure 4, prosocial performance reflects children’s overall helping cue score. In both figures, in clockwise order from top left, measures of verbal and social abilities (on the x-axes) include: verbal mental age, *Vineland-2* Socialization subtest scores, *SRS-2* Total scores, and *ToMI* Composite scores. As depicted in Figure 3, prosocial performance as measured by total prosocial cue score was significantly correlated with verbal mental age ($r=.48$, $p<.01$, $r^2=.23$), the *Vineland-2*

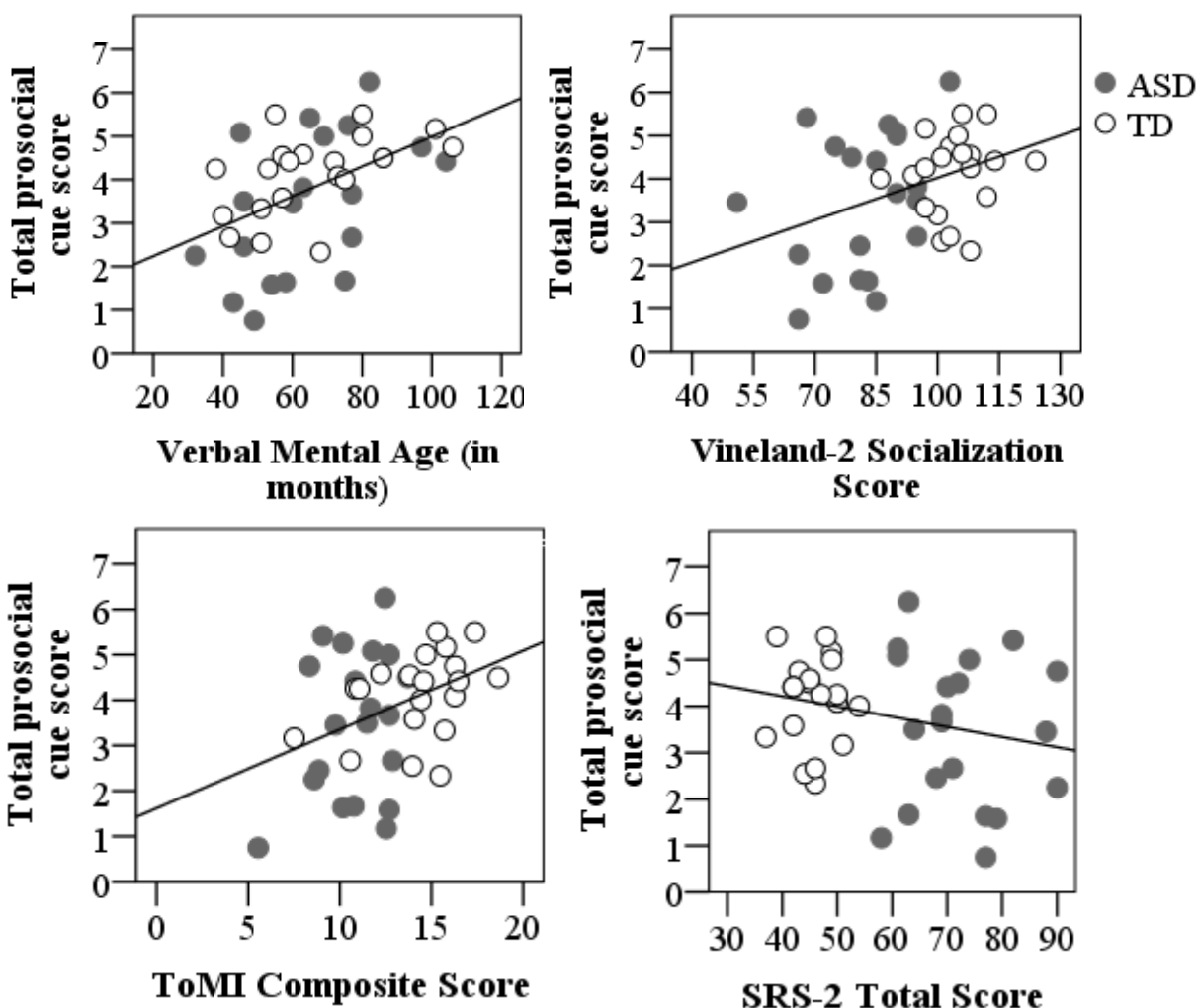


Figure 3. Paneled scatterplots of prosocial performance (total prosocial cue score) versus verbal mental age, *Vineland-2* Socialization subscale scores, *SRS-2* Total scores, and *ToMI* Composite scores (clockwise from top left)

Socialization subtest score ($r=.37, p=.02, r^2=.14$), and the *ToMI* Composite score ($r=.38, p=.02, r^2=.14$). However, total prosocial cue score was not correlated with parent ratings of social abilities on the *SRS-2* Total score ($r=-.25, p=.12, r^2=.06$). When prosocial performance only reflected helping abilities, as depicted in Figure 4, the overall helping cue score was significantly correlated with all four measures: verbal mental age ($r=.47, p<.01, r^2=.22$), *Vineland-2*

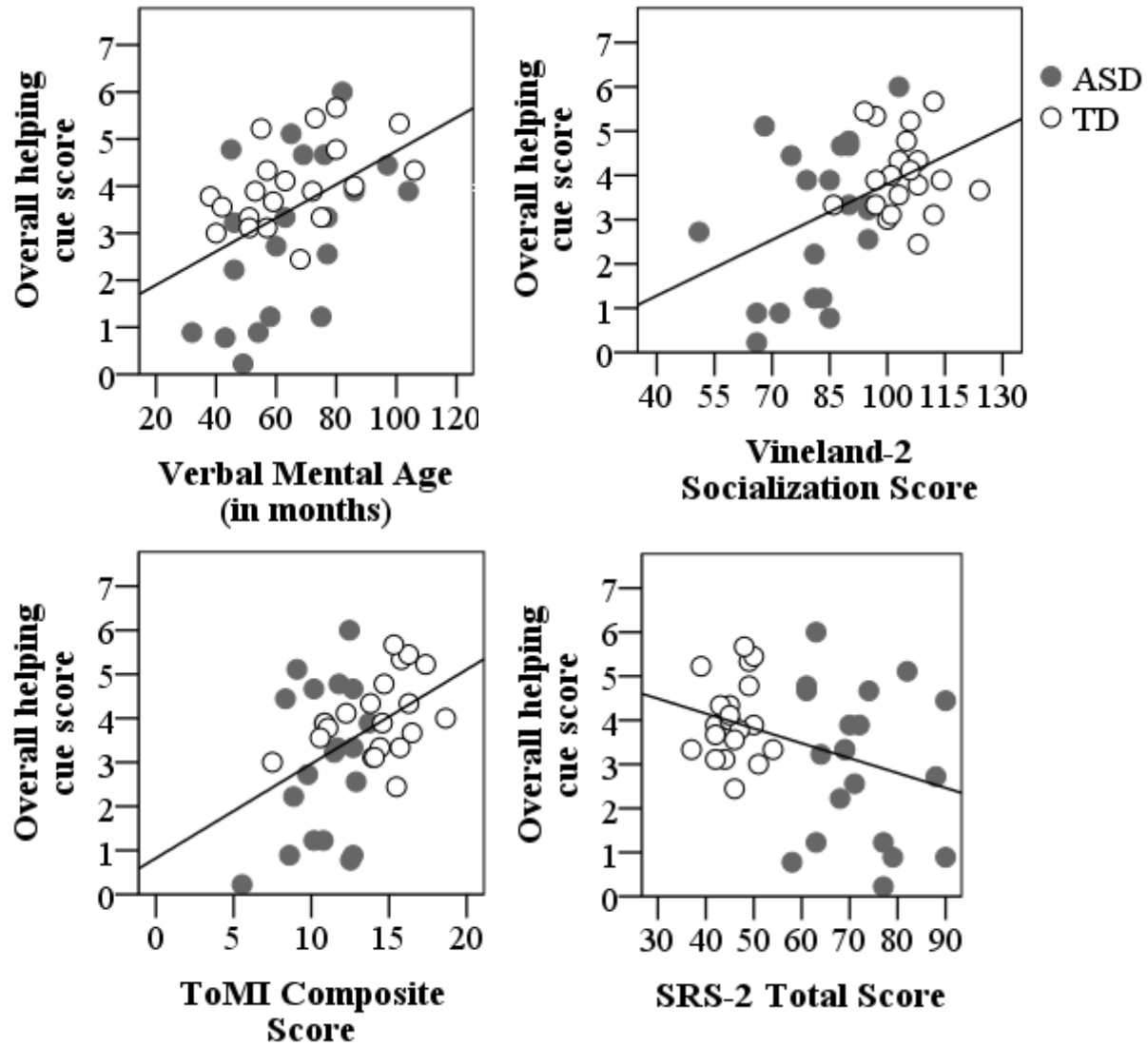


Figure 4. Paneled scatterplots of overall helping performance (overall helping cue score) versus verbal mental age, *Vineland-2* Socialization subscale scores, *SRS-2* Total scores, and *ToMI* Composite scores (clockwise from top left)

Socialization subtest score ($r=.45, p<.01, r^2=.20$), *ToMI* Composite score ($r=.43, p<.01, r^2=.20$), and *SRS-2* Total score ($r=-.36, p=.02, r^2=.13$).

Discussion

The present study explored the prosocial performance of children with and without ASD as a function of their response to cuing. This exploration focused on two categories of early developing prosocial behaviors: comforting and helping. Despite the commonly held belief that comforting and helping are impaired in children with ASD, prior research was equivocal. The current research examined cuing, an influential variable that affects the emergence of prosocial behaviors in TD, which had not yet been systematically investigated in children with ASD.

Group differences in prosocial performance

The first research question asked whether verbal children with ASD required more explicit cues than children with TD to respond with four types of prosocial behaviors: comforting, instrumental helping, informative helping, and empathic helping. Group differences were expected for comforting as well as informative and empathic helping, while significant differences for instrumental helping were not expected. In addition, differences in profiles of performance (within-group differences across prosocial types) were expected.

Importantly, findings revealed a group by prosocial behavior type interaction, indicating that children with ASD required more cues than children with TD to elicit some, but not all types of prosocial behaviors. Based on visual inspection of mean cue scores for the four prosocial behavior types, children with ASD appeared to require more cuing to elicit the three types of helping, but not comforting. A follow-up t-test revealed no significant between-group differences in the number of cues required to elicit comforting. Moreover, between-group differences in the number of cues required to elicit instrumental, informative, and empathic helping were also non-significant. These findings matched expected outcomes for instrumental helping, but not for comforting or informative or empathic helping.

Despite the lack of significant between-group differences in the number of cues required to elicit the three types of helping, medium effect sizes were found for these comparisons. A meaningful difference existed between the mean number of cues required to elicit instrumental, informative, and empathic helping in children with ASD ($M= 3.74, 2.35, 2.92$, respectively) as compared to those with TD ($M= 4.68, 3.38, 3.97$, respectively). On average, children with ASD required approximately one additional cue to elicit each type of helping (i.e., received a score approximately one point lower) in comparison with children with TD. In everyday interactions, one additional cue can indeed represent a meaningful difference. If a child required one additional cue to respond in every interaction, the cumulative effect over dozens of daily interactions and thousands of yearly interactions would be profound, both for the child and for his/her social partner(s). Furthermore, since contingent communicative responses are typically expected within 2-3 seconds (Scherer and Coggins 1982), and response delays are often not tolerated, this might result in others, most notably peers, “giving up” on an interaction. In the case of helping, adults and peers may not realize that a child with ASD needs more support in the amount or type of cuing, or more time to process their cues. Without these subtle adjustments, the child with ASD may not respond, or their response may be delayed, making others more likely to abandon such interactions. Thus, although children with ASD do not need **significantly** more cues, the difference in the number of cues required to elicit helping may have a **meaningful**, adverse effect on interactions.

Group differences were expected for informative and empathic helping, but not instrumental helping. This expectation was based on previous research regarding instrumental and informative helping (Best 2012; Liebal et al. 2008) as well as findings with respect to emotion-based communication in children with ASD (Landa 2007). Interestingly, the medium

effect sizes for between group differences in responses to cuing were consistent with expectations for informative and empathic helping, but not for instrumental helping. Instead, the medium effect size for instrumental helping was consistent with Sigman and Ruskin (1998), which also used response to cuing to measure helping. Collectively, these findings underscore the powerful influence cuing can have on prosocial performance in this population.

The importance of cuing is further revealed when the different profiles of performance across prosocial behaviors are considered. Both ASD and TD groups required significantly more cues to elicit informative helping than instrumental helping. However, children with ASD also required significantly more cues to engage in all three types of helping as compared to comforting, and there was a trend toward these children requiring more cues to elicit empathic helping as compared to instrumental helping. In contrast, children with TD demonstrated no significant difference in the number of cues required to elicit helping versus comforting, or empathic versus instrumental helping. Thus, as expected, the prosocial performance of children with TD was more consistent across types, whereas the performance of children with ASD varied more, reflecting differences in their ability to recognize, integrate, and interpret cues depending on the prosocial behavior type being elicited.

Additional profiles were revealed through examination of “best” responses and “proforma”/no responses across groups and prosocial behavior types. In terms of “best” responses, similar numbers of children from each group provided an appropriate response at least once within the first two (most subtle) cues for each prosocial behavior type. In terms of “proforma”/no responses, no clear group differences existed in the number of children who failed to respond or only responded to explicit cuing for comforting or instrumental helping items. On the other hand, more children with ASD than those with TD failed to respond or required explicit

cues to respond to informative and empathic helping items. In sum, children's "best" response, or their response to the most subtle cues (following Svetlova et al. 2010) indicated no group differences, yet children with ASD were more likely to require an explicit cue ("proforma" response, following Bacon et al. 1998) or not respond at all for informative and empathic helping. These differences in response to informative and empathic helping items are consistent with hypothesized group differences.

Taken together, these findings suggest that response to cuing is a key methodological variable to consider when examining prosocial behaviors in children with and without ASD. This may be particularly true within research and clinical assessments, where the unfamiliar aspects of the context, such as the examiner and setting, may affect the child's behavior and result in performance that does not adequately represent the child's abilities. In such situations, the provision of cues, which echo the scaffolding of familiar adults in everyday interactions, is likely to yield results that more closely represent that child's social-communication knowledge and his/her ability to deploy that knowledge within an interaction.

It is important to note that virtually all children in both groups responded with each prosocial behavior type at least once. This performance strongly suggests that the hierarchy of cues was effective at eliciting prosocial behaviors within the cooperative joint activity. The number of cues required to elicit a response varied depending on the particular child and item, but in most cases, the cues' cumulative effect eventually led to an "aha" moment, at which point the child's recognition, integration, and interpretation of cues resulted in an appropriate prosocial response. Furthermore, each cue in the hierarchy appeared necessary in triggering that "aha" moment for at least one child in each group. For example, in some cases, children recognized and responded to the experimenter's need immediately after she referenced her previous activity

(e.g., prior use of glue), whereas in other cases, children only responded after the experimenter provided both a nonverbal cue identifying the prosocial behavior required and a verbal label identifying the target object. Finally, some children never responded during the first five cues, consistently requiring an explicit verbal request for help. Therefore, each cue in the hierarchy provided important and meaningful information to children, allowing them to respond prosocially. Regardless of which cue triggered this “aha” moment, children’s actions revealed a desire to respond prosocially. Importantly, most children did respond with each prosocial behavior type at least once, even if explicit cues were required, meaning that most children – regardless of group – demonstrated this desire to act cooperatively by comforting or helping (following Waugh et al. 2015). At the same time, because the number of cues required to elicit those actions varied dramatically, children’s response to cuing revealed different group profiles with respect to their recognition, integration, and interpretation of cues. Thus, the present study reveals that response to cuing is a critical methodological factor to consider when examining prosocial behaviors in young children with and without ASD.

A closer look at comforting

Reading and responding to the emotions of others are characteristic deficits of children with ASD. Thus, this study’s results related to comforting were initially surprising. Three factors, one methodological and two experiential, might account for the present result.

First, several parents of children with TD speculated that using a puppet might have affected their child’s responses, suggesting that an injured person, rather than a hand puppet, might have elicited comforting. Despite parental intuition, children in the current study comforted the puppet at higher rates than have typically been observed when comforting was elicited for a familiar or unfamiliar adult (Bacon et al. 1998; McDonald and Messinger 2012;

Sigman et al. 1992). In fact, 75-80% of children in both groups comforted the injured puppet at least once after the first or second cue. In contrast, previous studies that used people to elicit children's response to distress have shown low rates of overt comforting acts, even in children with TD; instead, children often stared at the adult, demonstrated a concerned facial expression, or deferred to another adult (Bacon et al. 1998; Best 2012; McDonald and Messinger 2012; Sigman et al. 1992). Taken together, these findings suggest that using a puppet to provide cues within naturalistic opportunities embedded in a joint activity, is an effective method for eliciting comforting acts in young children.

Second, the prior experiences of children with ASD, specifically intervention and/or supported interactions with caregivers, might have affected results. Most participants with ASD had received early intensive intervention (e.g., a combination of educational, behavioral, and speech-language therapies). Such intervention might have explicitly taught comforting responses, or more broadly targeted the understanding of others' emotions. Also, reported levels of parent education were quite high; therefore, based on either independent research or interventionists' recommendations, these parents might have provided explicit support or teaching to encourage their child to comfort others in everyday contexts. Overall, previous intervention experiences and/or supported interactions with parents might have influenced children's comforting acts in the present study. Tempering this interpretation, the two lowest-scoring children with ASD (comforting cue score = 2.33 points) each received early intervention and/or preschool services (preschool 4 days/week, plus additional therapies), and had parents with at least a 4-year college degree. Thus, although parent education and prior services might have played a role in some cases, these experiences did not consistently account for comforting results across children.

A final explanation for the high frequency of comforting in the ASD group is that they were able to effectively apply rote responses for what to do when someone is injured or upset. For example, each time the puppet was injured, one child with ASD told him to “take a dee-eeep breath;” the consistency with which she used this phrase and the similarity in her intonation across items strongly suggested she had previously heard this phrase when *she* was distressed. Other common responses included giving the puppet a bandage and rubbing the injury, both of which were action-oriented responses that could be (and often were) provided without a concerned facial expression. Best (2012) proposed a similar interpretation for her finding of commensurate comforting performance in children with ASD and TD, namely that her ASD sample might have applied rote or “scripted” responses based on personal experiences. This finding represents an important deviation from the commonly held belief that children with ASD do not comfort others. While impressive, it is noteworthy that the current sample of children with ASD only demonstrated comforting in response to one scenario: a physical injury. Thus, while all of this study’s children with ASD comforted the injured puppet at least once without explicit cuing, situations requiring other types of comforting, such as recognizing and responding appropriately to a peer whose feelings had been hurt (e.g., due to toys not being shared), might have proved more difficult.

Correlations between prosocial performance and verbal/social abilities

The second research question was concerned with the hypothesized association between performance on the prosocial task and other measures related to social competence, namely general verbal and social abilities. Because the prosocial task relies on social cognitive abilities (i.e., theory of mind) that are associated with verbal abilities (Astington and Jenkins 1999; Happé 1995), significant correlations were expected between prosocial performance and verbal abilities,

as measured by receptive vocabulary. Furthermore, the common underlying construct of social abilities was expected to result in correlations between prosocial performance and children's use of social abilities in everyday interactions, as measured by parent report on the *Vineland-2* Socialization subscale, *ToMI*, and *SRS-2*. Results bore out these hypotheses, with moderate correlations found between total prosocial cue scores and *PPVT-4* age equivalence scores, *Vineland-2* Socialization subscale scores, and *ToMI* scores. In all cases, correlations became stronger when overall helping cue scores were used as the measure of prosocial performance; moderate correlations were also found between overall helping cue scores and scores on the *SRS-2*. Correlations may have been stronger between parent report measures of social abilities and overall helping cue scores because the latter did not include comforting cue scores, whereas total prosocial cue scores did account for comforting performance. If comforting cue scores reflected rote responses, as suggested above, then relationships between such responses and parent report of more spontaneous, dynamic use of social abilities in everyday interactions, would be less likely. This would explain the weaker correlation between parent report of social abilities and total prosocial cue scores, as well as the stronger correlation between overall helping cue scores and parent report of social abilities, which would both reflect spontaneous social abilities. Overall, these findings suggest that prosocial performance as measured by response to cuing likely taps similar underlying constructs as these other measures of verbal and social abilities.

Limitations and future directions

The present study suggests that differences exist in the prosocial performance of children with and without ASD. However, this study's findings must be tempered by the relatively small sample size and the nature of comforting items. With respect to sample size, a larger sample would have improved the power to detect differences between groups, and might have

compensated for the lack of equivalent variances observed for instrumental and informative helping (TD: $SD=1.16, 1.00$; ASD: $SD=1.88, 1.92$, respectively).

Second, in an effort to limit the prosocial task's duration, a conscious decision was made to only elicit one type of comforting: response to a physical injury. This comforting type was selected because it has been the predominant type investigated in prior autism research (e.g., Bacon et al. 1998; Best 2012; McDonald and Messinger 2012; Sigman et al. 1992). Present findings indicated no significant group differences for comforting; however, group differences might have been found if other comforting types were targeted, for example if the puppet were scared by a loud noise or upset about being left out of an activity. In the current study, addressing other comforting types would have increased the prosocial task's length, potentially exceeding participants' attention spans, with fatigue affecting performance of all elicited prosocial behavior types. Future research should investigate group differences in other comforting types, while limiting the overall number of prosocial behavior types elicited to control for fatigue. One potential approach would be to focus exclusively on comforting types, rather than simultaneously eliciting helping acts.

Future research should also refine the prosocial task and its cuing hierarchy to explore their clinical utility. The current study provided preliminary support for the manner in which prosocial behaviors were elicited. The naturalistic task, in which a puppet required comfort and help within a joint activity, was successful in eliciting these prosocial behaviors, often at higher rates than those observed in previous research. Moreover, the moderate correlations between prosocial performance and other measures of verbal and social abilities provided initial criterion-related validity evidence, supporting the use of the present task to identify social deficits. Additional data should be collected to investigate the task's potential usefulness as a criterion-

referenced assessment of prosocial behaviors. Future research should gather additional evidence to support the task's criterion-related validity, and determine a cut-off score that identifies children who require more support than might be expected to engage in prosocial behaviors. Evidence should also be gathered to examine the task's potential utility in identifying treatment targets (i.e., prosocial behavior types for which a child is "stimulable"), identifying cues to which the child does or does not respond (i.e., which cues are most useful, which cues a child might need to be taught to recognize), predicting outcomes, and measuring change following treatment.

Moreover, the current research provided initial evidence to support the cuing hierarchy used to elicit prosocial behaviors, specifically comforting and helping, in children with ASD and TD. Future research should investigate whether the cuing hierarchy: 1) can be shortened by combining cues of similar explicitness to make administration more efficient, and 2) can be used to elicit prosocial behaviors in other populations. As mentioned previously, each cue in the hierarchy appeared necessary in triggering a prosocial response for at least one child in each group. However, it is possible that the important and meaningful information contained in each cue could be consolidated into a hierarchy with fewer cues that would still be effective in eliciting appropriate prosocial responses. Provided that it remained effective, a shortened cuing hierarchy could make task administration more efficient – a clear advantage for both research and clinical use. Furthermore, the present study only utilized the cuing hierarchy to examine prosocial behaviors in children with ASD and TD. Given the promising results in these groups, exploration of the cuing hierarchy in children with different social communication impairments, such as fetal alcohol spectrum disorder or social communication disorder (APA, 2013), is warranted.

Concluding remarks

This study is an important reminder that understanding social communication “is tantamount to understanding context” (Coggins 1991, p. 44). We learn to communicate within a social context, and our primary reason for communicating is to interact with others within that social context. Parents often use an assortment of cues to scaffold the prosocial behaviors of young children within everyday joint activities. Such cuing leads to improvements in children’s ability to not only comfort and help others, but also recognize, integrate, and interpret increasingly subtle cues, enabling them to rapidly identify appropriate social responses in a variety of contexts. Although these abilities greatly improve over the course of childhood, familiar adults continue to provide supportive cuing in everyday interactions.

So, when examining social communication behaviors, like comforting and helping, it *should* be a truth universally acknowledged that we must account for context. We should provide youngsters with opportunities to demonstrate prosocial behaviors within cooperative joint activities, and our measurements should acknowledge the influence of communicative cues provided within that context. In doing so, we learn much more about children’s social competence, especially their ability to recognize, interpret, and appropriately respond to others’ needs based on explicit cues, which occur less frequently in everyday interactions as children age, versus subtle cues, which become increasingly common. Providing contextual supports may be even more important for young children with social communication deficits, who likely need additional, more explicit scaffolding to identify others’ needs and select appropriate social communicative responses. Using response to cuing as a measure of social communication abilities could allow us to identify not only the amount and explicitness of cuing a child currently requires to recognize and respond to others’ needs, but also the communicative cues the child

could potentially be taught to recognize. Yet, even in 2015, research and clinical practice do not consistently consider the influence of context.

The present study suggests that young children with ASD do demonstrate acts that comfort and help others. But there is an addendum: although they demonstrate these acts, children with ASD require more support from their partners – specifically more cues of increasing explicitness provided within a joint activity – before they respond with appropriate helping acts. Children’s response to cuing also reveals different profiles of prosocial performance: children with ASD demonstrate more variable performance across prosocial behavior types, whereas children with TD perform more consistently. Discovering these differences was only possible because the measurement of prosocial performance accounted for context. Thus, when examining children’s social communication, we must remember this simple truth: context matters.

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Appendix A: Prosocial task script

“Today we’re going to do an art project.” <Set up for Practice Item #1> “Sometimes we need help when we do art. When we play today, I may need help. Tony¹ may need help. You may need help, too. Tony and I will help if you need help. I want you to help me and Tony if we need help.”

Set up for Practice Item #1: Clear off table following administration of assessments. Put assessments and child’s file on counter. Put a pencil on the shelf closer to the child than the examiner².

Practice Item #1 (instrumental helping: out-of-reach pencil)

- Environmental set-up: The examiner’s pencil is located on shelf closer to the child than the examiner, and out of the examiner’s reach. Examiner says (in Tony’s voice), ““So when I do art, I like to write my name on it.”
Examiner reaches and says (in Tony’s voice), “[Child’s name], can you give me the pencil?”
- If the child does not respond, the examiner retrieves the pencil and writes the puppet’s name on the back of the paper.
- If the child responds with a helping behavior, the examiner says (in Tony’s voice), “Now, I can write my name.” (Do not say “thank you” or praise the child’s response.)

Practice Item #2 (comforting: paper cut)

- Environmental set-up: As the examiner turns the paper over, the puppet “accidentally” gets a paper cut. Puppet says “Ouch.”
The examiner says, “[Tony] got a paper cut. Can you give him a hug to make him feel better?”
- If the child does not respond, the examiner asks the child to rub the injury, put a “bandage” on the injury, etc. (Continue to provide options until the child complies with some form of comforting).
- If the child responds with a comforting behavior, the examiner says (in Tony’s voice), “Now, I feels better.” (Do not say “thank you” or praise the child’s response.)

Practice Item #3 (informative helping: misplaced pencil)

- Environmental set-up: Examiner lets child write his/her name on the paper as well (if desired).
 - Examiner distractedly puts pencil on the shelf closer to her than the child, and behind a barrier (e.g., an opaque box with craft supplies) but still in the child’s line of sight.
 - Examiner says, “Now, what are we going to draw together? There are lots of things we could draw together. We could draw [option #1]. Or [option #2]. Or we could draw [option #3]³. What do you want to draw together?”

¹ Tony is the name of the puppet used to elicit comforting and helping behaviors. Children were given the choice of whether Tony was a boy or a girl. Male pronouns are used in the script to illustrate the type of response provided.

² Throughout the task, “examiner” refers to both the examiner and puppet.

³ Note options #1, #2, and #3 should vary depending on the child’s interests, which should previously be ascertained through parent report and/or conversations with the child.

- After child responds, examiner says (in Tony's voice), "Okay, I'll write that down."
Examiner engages in search behaviors and says, "Hmm, [Child's name], can you help me find the pencil?"
- If the child does not respond, the examiner points out the pencil's location, retrieves it, and writes down the theme.
- If the child responds with a helping behavior, the examiner says (in Tony's voice), "Now, I can write down what we are going to draw." (Do not say "thank you" or praise the child's response.)

Task Item #1 (informative helping: paints)

- Environmental set-up: The examiner has drawn a theme-related entity (e.g., cloud, star), and sets a paint bottle on the shelf closer to her than the child, and behind the barrier but still in the child's line of sight. Then draws an outline for a second entity.
 - (1) Examiner alternately taps the existing entity and the outline for the second entity with Tony's hand, and says (in Tony's voice), "Hmm."
 - (2) Examiner says (in Tony's voice), "I wanna do more"
 - (3) Examiner searches for paints, looking side to side.
 - (4) Examiner says (in Tony's voice), "Hmm, the paints!"
 - (5) Examiner searches with increased intensity for paints, looking under the table and under the paper/other supplies on the table.
 - (6) Examiner says (in Tony's voice), "Can you help?" (cease searching for paints)
 - (7) Examiner says (in Tony's voice), "[Child's name], can you help me find the paints?"
- After each cue, if the child responds by giving the paints, no further elicitations are provided. If the child does not respond, proceed to the next elicitation.
- After the final cue, if the child does not respond, the examiner retrieves the paints and proceeds with the art activity.
- If the child responds with a helping behavior, the examiner says (in Tony's voice), "Now, I can paint more." (Do not say "thank you" or praise the child's response.)

Task Item #2 (empathic helping: scissors)

- Environmental set-up: The examiner attempts to cut a yellow circle from construction paper or felt, but the scissors are sticky
 - (1) Examiner says (in Tony's voice), "Hmm," and sets the scissors down.
 - (2) Examiner says (in Tony's voice), "These are sticky."
 - (3) Examiner attempts to use the scissors again, then sighs in frustration.
 - (4) Examiner says (in Tony's voice), "Hmm, the scissors"
 - (5) Examiner sighs in frustration (more emphatically), shakes her head, and frowns.
 - (6) Examiner says (in Tony's voice), "Can you help?"
 - (7) Examiner says (in Tony's voice), "[Child's name], can you give me the other scissors?"
- After each cue, if the child responds by giving a second pair of scissors, no further elicitations are provided. If the child does not respond, proceed to the next elicitation.
- After the final cue, if the child does not respond, the examiner retrieves the child's scissors and uses them to cut.
- If the child responds with a helping behavior, the examiner says (in Tony's voice), "Now, I can cut out the sun." (Do not say "thank you" or praise the child's response.)

Task item #3 (comforting: puppet gets cut with scissors):

- Environmental set-up: The examiner pretends to “accidentally” cut [Tony’s] hand with the scissors.
 - (1) Examiner says, “Oh,” and holds the puppet’s hands together.
 - (2) Examiner says, “The scissors cut [Tony]’s hand.”
 - (3) Examiner says (in Tony’s voice), “Ow!”, and presses puppet’s hands together.
 - (4) Examiner says (in Tony’s voice), “That really hurt.”
 - (5) Examiners says (in Tony’s voice), “Ow, ow, ow!”, squints her eyes, and holds puppet’s hands together tightly.
 - (6) Examiner says, “Can you make [Tony] feel better?”
 - (7) Examiner says, “[Child’s name], can you give kiss his boo-boo?” (or alternative comforting response based on response elicited during practice trials)
- After each cue, if the child responds by comforting the puppet, no further elicitations are provided. If the child does not respond, proceed to the next elicitation.
- After the final cue, if the child does not respond, the examiner briefly comforts the puppet and proceeds with the art activity.
- If the child responds with a comforting behavior, the examiner says (in Tony’s voice), “I feel better now.” (Do not say “thank you” or praise the child’s response.)

Task Item #4 (instrumental helping: yellow paint)

- Environmental set-up: Examiner paints a few rays on one side of the sun, but puppet accidentally gets paint on the examiner’s hand. Examiner gets up to wipe her hands, and puts the paint on the shelf closer to the child than the examiner, and out of the examiner’s reach. Upon returning:
 - (1) Examiner taps the side of the sun without any rays and says (in Tony’s voice), “Hmm”.
 - (2) Examiner says (in Tony’s voice), “I wanna do more.”
 - (3) Examiner reaches toward the paint.
 - (4) Examiner says (in Tony’s voice), “Hmm, the yellow paint!”
 - (5) Examiner reaches with effort toward paint.
 - (6) Examiner says (in Tony’s voice), “Can you help?” (cease reaching toward paint)
 - (7) Examiner says (in Tony’s voice), “[Child’s name], can you give me the yellow paint?”
- After each cue, if the child responds by giving the paint, no further elicitations are provided. If the child does not respond, proceed to the next elicitation.
- After the final cue, if the child does not respond, the examiner retrieves the paint and draws additional sun rays.
- If the child responds with a helping behavior, the examiner says (in Tony’s voice), “Now, I can draw more.” (Do not say “thank you” or praise the child’s response.)

Task Item #5 (empathic helping: glue)

- Environmental set-up: Examiner indicates desire to glue yellow circle to picture as a sun by attempting to squeeze glue bottle. No glue comes out (glue bottle is stuck shut).
 - (1) Examiner says (in Tony's voice), "Hmm," and sets the glue bottle down.
 - (2) Examiner says (in Tony's voice), "It's stuck." (set aside glue bottle that's stuck)
 - (3) Examiner attempts to open the bottle again, then sighs in frustration.
 - (4) Examiner says (in Tony's voice), "Hmm, the glue."
 - (5) Examiner sighs in frustration (more emphatically), shakes her head, and frowns.
 - (6) Examiner says (in Tony's voice), "Can you help?"
 - (7) Examiner says (in Tony's voice), "[Child's name], can you give me a different glue?"
- After each cue, if the child responds by giving a second glue bottle, no further elicitation are provided. If the child does not respond, proceed to the next elicitation.
- After the final cue, if the child does not respond, the examiner retrieves the second glue bottle and uses it to attach the yellow circle.
- If the child responds with a helping behavior, the examiner says (in Tony's voice), "Now, I can glue the sun on." (Do not say "thank you" or praise the child's response.)

Task Item #6 (informative helping: scissors)

- Environmental set-up: Examiner cuts 2 pieces of felt for person's hair, and then places scissors on the shelf closer to her than the child, and behind the barrier but still in the child's line of sight. Examiner glues both pieces to one side of a person's head.
 - (1) While holding the felt, examiner uses Tony's hand to tap the other side of the person's head, and says (in Tony's voice), "Hmm."
 - (2) Examiner says (in Tony's voice), "I wanna do more."
 - (3) Examiner searches for scissors, looking side to side.
 - (4) Examiner says (in Tony's voice), "Hmm, the scissors"
 - (5) Examiner searches with increased intensity for scissors, looking under the table and under the paper/other supplies on the table.
 - (6) Examiner says (in Tony's voice), "Can you help?" (cease searching for scissors)
 - (7) Examiner says (in Tony's voice), "[Child's name], can you help me find the scissors?"
- After each cue, if the child responds by giving the scissors, no further elicitation are provided. If the child does not respond, proceed to the next elicitation.
- After the final cue, if the child does not respond, the examiner retrieves the scissors and cuts additional felt for the person's hair.
- If the child responds with a helping behavior, the examiner says, "Now, I can cut more." (Do not say "thank you" or praise the child's response.)

Task Item #7 (instrumental helping: glue)

- Environmental set-up: Examiner is glues one “eye” (e.g., paper, confetti, other craft material) to person’s face, but gets glue on her hand. When crossing the room to wipe the glue off her hands, she puts the glue on the shelf closer to the child than the examiner, and out of the examiner’s reach. Upon returning:
 - (1) Examiner picks up remaining “eye,” uses Tony’s hand to tap the picture close to the eye that has already been glued, and says (in Tony’s voice), “Hmm”.
 - (2) Examiner says (in Tony’s voice), “I wanna do more.”
 - (3) Examiner reaches toward the glue.
 - (4) Examiner says (in Tony’s voice), “Hmm, the glue.”
 - (5) Examiner reaches with effort toward glue.
 - (6) Examiner says (in Tony’s voice), “Can you help?” (cease reaching toward glue)
 - (7) Examiner says (in Tony’s voice), “[Child’s name], can you give me the glue?”
- After each cue, if the child responds by giving the glue, no further elicitations are provided. If the child does not respond, proceed to the next elicitation.
- After the final cue, if the child does not respond, the examiner retrieves the glue and glues the “eye” to the person’s face.
- If the child responds with a helping behavior, the examiner says (in Tony’s voice), “Now, I can glue this on.” (Do not say “thank you” or praise the child’s response.)

Task item #8 (comforting: bumped head):

- Environmental set-up: Paint box is located on a high shelf. When retrieving paint box, the puppet bumps his head on the shelf.
 - (1) Examiner says (in Tony’s voice), “Oh,” and puts the puppet’s hands on its head.
 - (2) Examiner says, “[Tony] bumped his head.”
 - (3) Examiner says (in Tony’s voice), “Ow!”, and puppet’s hands rub its head.
 - (4) Examiner says (in Tony’s voice), “That really hurts.”
 - (5) Examiners says (in Tony’s voice), “Ow, ow, ow!”, squints her eyes, and has the puppet rub/hold its head.
 - (6) Examiner says, “Can you make [Tony] feel better?”
 - (7) Examiner says, “[Child’s name], can you kiss his boo-boo?” (or alternative comforting response based on response elicited during practice trials)
- After each cue, if the child responds by comforting the puppet, no further elicitations are provided. If the child does not respond, proceed to the next elicitation.
- After the final cue, if the child does not respond, the examiner briefly comforts the puppet and proceeds with the art activity.
- If the child responds with a comforting behavior, the examiner says, “I feel better now.” (Do not say “thank you” or praise the child’s response.)

Task Item #9 (empathic helping: paint)

- Environmental set-up: Examiner indicates desire to use her blue paint by opening the container, only to discover it is empty.
 - (1) Examiner says (in Tony's voice), "Hmm," and sets the paint container down (or shows it to the child).
 - (2) Examiner says (in Tony's voice), "It's empty."
 - (3) Examiner sighs in frustration.
 - (4) Examiner says (in Tony's voice), "Hmm, blue paint."
 - (5) Examiner sighs in frustration (more emphatically), shakes her head, and frowns.
 - (6) Examiner says (in Tony's voice), "Can you help?"
 - (7) Examiner says (in Tony's voice), "[Child's name], can you give me some other blue paint?"
- After each cue, if the child responds by giving a second blue paint bottle (same/different color, or a blue marker/craft supply), no further elicitations are provided. If the child does not respond, proceed to the next elicitation.
- After the final cue, if the child does not respond, the examiner retrieves a second blue paint and uses it to paint [theme-related picture].
- If the child responds with a helping behavior, the examiner says (in Tony's voice), "Now, I can paint [theme-related picture]." (Do not say "thank you" or praise the child's response.)

Task Item #10 (instrumental helping: scissors)

- Environmental set-up: Examiner draws two [theme-related pictures, such as space ships, balloons, animals, etc.] on construction paper, cuts one out, and then says (in Tony's voice), "I'm thirsty." When crossing the room to get water, she puts the scissors on the shelf closer to the child than the examiner, and out of the examiner's reach. Upon returning:
 - (1) Examiner picks up construction paper with remaining [theme-related picture] and says (in Tony's voice), "Hmm".
 - (2) Examiner says (in Tony's voice), "I wanna do more."
 - (3) Examiner reaches toward the scissors.
 - (4) Examiner says (in Tony's voice), "Hmm, the scissors."
 - (5) Examiner reaches with effort toward scissors.
 - (6) Examiner says (in Tony's voice), "Can you help?" (cease reaching toward scissors)
 - (7) Examiner says (in Tony's voice), "[Child's name], can you give me the scissors?"
- After each cue, if the child responds by giving the scissors, no further elicitations are provided. If the child does not respond, proceed to the next elicitation.
- After the final cue, if the child does not respond, the examiner retrieves the scissors and cuts out the remaining [theme-related picture].
- If the child responds with a helping behavior, the examiner says (in Tony's voice), "Now, I can cut this out." (Do not say "thank you" or praise the child's response.)

Task item #11 (comforting: puppet gets hand stuck when closing drawer)

- Environmental set-up: After cutting out the two [theme-related pictures], the puppet retrieves the glitter from the top drawer in the shelf next to the child), but his hand gets pinched when closing the drawer.
- (1) Examiner says (in Tony's voice), "Oh," and holds the puppet's hands together.
- (2) Examiner says, "[Tony's] hand got pinched."
- (3) Examiner says (in Tony's voice), "Ow!", and presses puppet's hands together.
- (4) Examiner says (in Tony's voice), "That really hurts."
- (5) Examiners says (in Tony's voice), "Ow, ow, ow!", and holds hands together tightly.
- (6) Examiner says (in Tony's voice), "Can you make [Tony] feel better?"
- (7) Examiner says (in Tony's voice), "[Child's name], can you kiss his boo-boo?" (or alternative comforting response based on response elicited during practice trials)
- After each cue, if the child responds by comforting the puppet, no further elicitations are provided. If the child does not respond, proceed to the next elicitation.
- After the final cue, if the child does not respond, the examiner briefly comforts the puppet and proceeds with the art activity.
- If the child responds with a comforting behavior, the examiner says (in Tony's voice), "I feel better now." (Do not say "thank you" or praise the child's response.)

Task Item #12 (informative helping: glue)

- Environmental set-up: After gluing the two matching [theme-related pictures] to the paper, examiner uses glue on top of one of the two matching [theme-related pictures], and then sets the bottle on the shelf closer to her than the child, and behind a barrier (e.g., an opaque box with craft supplies) but still in the child's line of sight. Examiner shakes glitter onto the glue spot.
- (1) While holding the glitter, examiner taps the second matching [theme-related picture], and says (in Tony's voice), "Hmm."
- (2) Examiner says (in Tony's voice), "I wanna do more."
- (3) Examiner searches for the glue, looking side to side.
- (4) Examiner says (in Tony's voice), "Hmm, the glue."
- (5) Examiner searches with increased intensity for the glue, looking under the table and under the paper/other supplies on the table.
- (6) Examiner says (in Tony's voice), "Can you help?" (cease searching for the glue)
- (7) Examiner says (in Tony's voice), "[Child's name], can you help me find the glue?"
- After each cue, if the child responds by giving the glue, no further elicitations are provided. If the child does not respond, proceed to the next elicitation.
- After the final cue, if the child does not respond, the examiner retrieves the glue and glues glitter to the second matching picture.
- If the child responds with a helping behavior, the examiner says (in Tony's voice), "Now, I can add more glitter." (Do not say "thank you" or praise the child's response.)