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Teaching Children with Autism Spectrum Disorder to Recognize and Express Emotion: A Review of the Literature

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Abstract

The developmental literature has focused extensively on deficits in the expression and recognition of emotion in people with autism, and has reported on the use of interactive tools to address the problems of affect. The behavioral literature has offered interventions to teach children with autism to engage in appropriate affective displays, and for these gains to generalize more readily to novel conditions. Nevertheless, the topic of affect intervention remains under-researched. Although a handful of affect-training behavioral studies have been published in the last two decades, more research is needed to determine precisely what would constitute science-based best-practice methods to facilitate socialization in autism. This review examines the developmental and behavioral approaches in the study of affect in autism; it reviews behavior analytic interventions that have been carried out in this context and evaluates reasons and potential solutions for the underrepresentation of this topic. Finally, this review offers recommendations for social-skills training that could be adopted by educators and practitioners.

Keywords: Affective behavior, Applied behavior analysis, Autism, Emotion, Facial expression, Vocal intonation

Introduction

It is not uncommon for people with autism spectrum disorder (ASD) to smile or cry. It is uncommon, however, for these and other expressions of emotion to be emitted contextually without the aid of intervention (Daou, Vener, & Poulson, 2014; Gena, Krantz, McClannahan, & Poulson, 1996). For decades, scientists and practitioners across disciplines have addressed this important diagnostic feature of ASD (e.g., Baron-Cohen, 1991; Beall, Moody, McIntosh, Hepburn, & Reed, 2008; Gena et al., 1996; Hollander et al., 2007; Loveland et al., 1994). Hertzig, Snow, and Sherman (1989) noted that "the social

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deficits of autistic persons are among the least well-understood features of the syndrome" (p. 195). This status is still current nearly 30 years and scores of research studies later. Various theories (e.g., Baron-Cohen, 2008; Knickmeyer, Baron-Cohen, Raggatt, Taylor, & Hackett, 2006; Rogers, Dziobek, Hassenstab, Wolf, & Convit, 2007) have been presented to explain those deficits. The purpose of the current paper, however, is to review studies that have described deficits in affective behavior, interventions that have targeted emotion recognition and emotion expression in ASD, and to discuss next steps concerning this domain in science and in practice. First, we present an overview of the benefits of emotional recognition and responding, and of the difficulties that emerge when a person fails to recognize or respond to the emotions of others.

Social-Communicative Functions of Emotional Recognition and Expression

As we indicated elsewhere (Daou et al., 2014), of the numerous functions that emotions serve, the "communicative aspect of emotional expression" is the most important (Knapp, 1963, p. 323). Nonverbal affective displays, and most critically facial expressions and vocal intonation (Ekman, 2009), have important social-communicative functions (Daou et al.; Gena et al., 1996). Recognizing emotion helps one make inferences about another person's emotional or physiological state, which in turn sets the occasion for affectively contextual social interactions (Gena et al., 1996; reviewed in Daou et al., 2014).

Deficits in recognizing emotion and in responding appropriately to nonverbal affective displays are common among people on the autism spectrum, and are detrimental to the development of social interaction skills (Gaylord-Ross, Haring, Breen, & Pitts-Conway, 1984; Krantz & McClannahan, 1993; McEvoy et al., 1988; Rutter & Schopler, 1987; Yirmiya, Kasari, Sigman, & Mundy, 1989). Difficulties in maintaining eye contact and in expressing an interest in others tend to present people with ASD as "markedly aloof and distant" (Rutter, 1966, p. 57). Gena et al. (1996) noted that deficits in displaying appropriate affect are detrimental to "overall social development and reduce the probability of successful interactions" (p. 291) in people with ASD. Furthermore, these deficits are "independent of intellectual functioning" (p. 292) and are persistent if treatment is not provided (Hobson, 1989; as cited in Gena et al.). Before further discussing relevant treatment options, we take a closer look at deficits in affective displays among people with ASD.

Deficits in Affective Behavior in ASD

One of the very first writings about ASD described "disturbances of affective contact" (Kanner, 1943, p. 217) to be at the core of the disorder. In fact, Kanner had referred to the disorder itself as "inborn autistic disturbances of affective contact" (p. 250) and examined the affective behavior of the 11 children that comprised his case study. For example, he remarked that one child "did not use communicative gestures" (p. 222), that another child had "no affective tie to people" (p. 228), and that yet another had "no indication of any kind of affective contact" (p. 229). Kanner noted that one child's "facial expression was tense, somewhat apprehensive…" (p. 224), two other children had reportedly "never smiled" (p. 230, 235), yet another child "wandered about smiling, making stereotyped movements with his fingers…" (p. 219) and another "jumped up and down" (p. 221) when he was happy. Indeed, researchers (e.g., Snow, Hertzig, & Shapiro, 1987) have noted that children with ASD displayed affective behavior – that their affect was not "flat". Yet, as Kanner concluded in his seminal paper, "these children have come into the world with innate inability to form the usual, biologically provided affective contact with people, just as other children come into the world with innate physical or intellectual handicaps" (p. 250).

Researchers who examined family home movies have found that children later diagnosed with ASD had displayed fewer affective responses (e.g., social smiling; "coordination of gaze, facial expression, gestures, and sounds when communicating", p. 65) during the first two years of life (see Palomo, Belinchon, & Ozonoff, 2006 for a review). With an interest in uncovering the underlying mechanisms of emotion expression, Beall et al. (2008) used facial electromyography to examine differences in rapid facial reactions between children with ASD and those of typical development. They found that, unlike their typically developing peers, participants on the spectrum did not produce consistent rapid facial reactions to the different emotions assessed (happy, angry, and fearful). Rapid facial reactions to happy faces were better in older participants (13 years old) in the autism group (with children of ages 8 to 13), suggesting that the underlying processes of facial reactions develop at that older age in childhood and offering added insight into the nature and causes of rapid facial reactions to emotion expressions in ASD.

In a series of studies comparing children with ASD to those with other developmental disorders and those of typical development, researchers invariantly found children on the spectrum to have more deficits in emotional responsivity. Bacon, Fein, Morris, Waterhouse, and Allen (1998) compared the behavior of 4- to 5-year-old children with ASD (high- and low-functioning, based on the criteria used at the time), developmental language disorder, mental retardation, and of typical development. Children on the spectrum were the least to engage in social referencing. Children on the low-functioning side of the spectrum were least responsive to the simulated distress of an adult – consistent with other research (e.g., Sigman, Kasari, Kwon, & Yirmiya, 1992) – and to the prosocial behavior task. Children on the high-functioning end of the spectrum responded better to the distress of others and on the prosocial behavior task. Using very similar procedures that included semi-structured toy-based interactions, Scambler, Hepburn, Rutherford, Wehner, and Rogers (2007) compared emotional responsivity of 1- to 3-year-old children with ASD, developmental delays (including Down's syndrome), and of typical development. Their findings also showed that children with ASD had the least emotional responsivity, and shed a further light on the strong relation between emotional responsivity and core aspects of social relatedness and communication skills. Scambler et al. (2007) noted that limited emotional responsivity from children with ASD begets fewer emotional displays from adults, and thus fewer social-emotional communication opportunities. Scambler et al. connected this finding to that of Dawson, Hill, Spencer, Galpert, and Watson (1990), where mothers of children with ASD emitted fewer smiles as a function of their children's limited affective repertoire. Consistent with these findings, Joseph and Tager-Flusberg (1997) found that children with ASD displayed less affective responsiveness than peers with Down's syndrome even when the social interactions took place at home and were guided by the mothers.

Research has shown that children on the spectrum (specific diagnosis at the time was Asperger's syndrome) had more difficulty than typically developing peers in understanding emotion from nonverbal components (facial expressions, Grossman, Klin, Carter, & Volkmar, 2000; facial expressions and prosody, Lindner & Rosen, 2006) and that they over-relied on verbal content. These findings parallel nicely with Daou et al.'s (2014) study, which concluded that children with ASD would benefit from learning to use sophisticated verbalizations in affective responding as those responses help compensate for a deficit in nonverbal affective responding.

These important lines of research have advanced our knowledge of the nature of affect in ASD, and they have informed interventions that aim to improve affective behavior and emotion expression of those on the spectrum. Next, we describe those interventions.

Interventions Targeting Emotion Recognition and Emotion Expression in ASD

Developmental Interventions. The developmental approach to affect training has relied on interactive tools that are designed to teach emotion recognition and expression (e.g., Golan et al., 2010; see reviews by Baron-Cohen, Golan, & Ashwin, 2009; Maynard, Monk, & Booker, 2011). In that line of research, watching the colorful, animated cartoon series, The Transporters (Golan et al.) everyday for four weeks led to improvements in emotion-recognition skills in children with ASD. Silver and Oakes (2001) noted that children with ASD seem to prefer computers to toys. Building on that idea, they found that using a computer intervention, the Emotion Trainer, successfully improved recognizing and predicting emotion in others.

As noted by Silver and Oakes (2001), however, the main limitations of using these forms of technology in affect training pertain to the problems of generalization and external validity. Would those improvements in emotion recognition and expression transfer to real-life situations? Would the observed gains appear only in those children on the high-functioning side of the spectrum? Researchers from all traditions have dedicated great attention to these problems, but behavior analysts seem to have achieved more successful outcomes. Behavior analysts have programmed for and achieved generalization of effects from training to teaching contexts across people; places; stimuli; and time, albeit to a lesser extent. The next section takes a closer look at behavioral interventions in affect training.

Behavioral Interventions. In her commentary on interventions that target socialization in people with ASD, Krantz (2000) emphasized the importance of behavioral intervention, especially early intervention that ought to be provided during a child's first five years. Behavioral intervention is based on Applied Behavior Analysis (ABA), a science concerned with improving outcomes that are of clinical and social significance (Baer, Wolf, & Risley, 1968). Nearly 50 years of research and practice have placed ABA as the top empirically validated, federally recommended intervention for ASD in the United States (Dawson, 2008; Department of Health, 1999; Department of Health and Human Services, 1999; Gill, 2001; Jacobson, 2000; Keenan et al., 2015; Rosenwasser & Axelrod, 2001). Although the scientific evidence has long pointed in the same direction for countries outside North America, ABA is still not officially endorsed as the intervention of choice across European (Keenan et al., 2015) and Middle Eastern (Daou, 2014; Kelly et al., 2016; Obeid & Daou, 2015) countries.

Parents of children with ASD have consistently reported being satisfied with ABA-based interventions (e.g., Dillenburger, Keenan, Doherty, Byrne, & Gallagher, 2010). This sentiment has not been shared by professionals or governments, however, perhaps due to the misrepresentation of and misinformation about ABA-based interventions (Daou, 2014; Dillenburger et al., 2010; Keenan et al., 2015). Lovaas and Smith (1989) noted that the challenges faced by children with ASD in typical environments and their "success in special environments indicate that their problems can be viewed as a mismatch between their nervous system and the environment, solved by manipulating the environment, rather than as the result of a diseased nervous system, curable only by identifying and eliminating the disease" (p. 22). Indeed, behavior analysts (e.g., Gena et al., 1996) have taken the lead in manipulating the environment to yield better outcomes in affective behavior. It is these kinds of accomplishments that give parents hope and satisfaction with ABA-based interventions.

Krantz (2000) noted that for socialization to be facilitated in children with ASD, more research is needed in the area of affective behavior, pointing out that at the time of her commentary (2000) only a couple of studies had addressed interventions targeting

nonverbal affective behavior – Gena et al. (1996) and Buffington, Krantz, McClannahan, and Poulson (1998). The prevalence of ASD doubled since Krantz's commentary, but the research has not caught up to meet the demand for socialization training. Indeed, only a handful of studies have been published since (e.g., Argott, Townsend, Sturmey, & Poulson, 2008; Charlop, Dennis, Carpenter, & Greenberg, 2010; Daou et al., 2014; DeQuinzio, Townsend, Sturmey, & Poulson, 2007; Gena, Couloura, & Kymissis, 2005; Schrandt, Townsend, & Poulson, 2009), but more research is needed to determine precisely what would constitute science-based best-practice methods to facilitate socialization in ASD.

Before we could determine where the gap lies, we examine what the research has revealed thus far. To that end, six behavior-analytic research studies targeting affect are reviewed next.

Affect training targeting prerequisite skills. DeQuinzio et al.'s (2007) study was concerned with demonstrating whether generalized imitation of facial models was a possible outcome following intervention that consisted of teaching children with ASD to imitate facial models. The children were between the ages of 3 and 6 years. They received imitation training that relied on the operant procedures of reinforcement, prompting, and modeling. The effectiveness of the training was assessed using a multiple-baseline-across-participants design. The study's main question was answered favorably – two participants displayed generalization across stimuli; the third did so as well, but inconsistently.

The authors cautioned against the limitation of having used only one stimulus to test for generalized imitation, yet were still able to show that generalized imitation nonetheless did occur. Importantly, DeQuinzio et al. (2007) were mainly interested in determining whether a generalized imitative repertoire of facial expressions – or a nonverbal component of affective behavior – would expedite the normally laborious, long-running process of affect training (e.g., Daou et al., 2014; Gena et al., 1996; both of which are described further below). DeQuinzio et al.'s (2007) data could not comprehensively answer this question, but the studies by Gena (Gena et al., 1996, 2005) and Daou et al. showed that a history of imitation skills was not sufficient in producing spontaneous affective displays in children with ASD.

Affect training targeting empathy skills. The studies by Argott et al. (2008) and Schrandt et al. (2009) were concerned with enhancing empathy skills in children with ASD. Argott et al. targeted verbal responding to nonverbal affective stimuli, increasing empathic verbalizations through the innovative operant procedure of script-fading (Krantz & McClannahan, 1993, 1998), and analyzing the impact of intervention using a multiple-baseline-across-participants design. The affect categories used included happiness/joy, hurt, and being tired. The authors succeeded in increasing empathic statements across participants, and in demonstrating generalization of outcome from trained to novel affective stimuli and across time in an extended follow-up phase for two of the three participants.

Also concerned with empathic responding, but using a more sophisticated design, Schrandt et al. (2009) examined the extent to which providing an operant treatment package would enhance empathic responding in the context of pretend play among children with ASD. The treatment package consisted of affective discriminative stimuli (one motor and one vocal component), prompt delay, modeling, prompting, behavioral rehearsals, and reinforcement. The affective categories targeted included sadness or pain, happiness or excitement, and frustration. The experimental design used was a multiple baseline across participants, plus for one participant an additional multiple baseline across responses was used. The results were positive; the treatment was effective, and

generalization from teaching to novel stimuli and, to some extent, from responding to puppets in pretend-play context to responding empathically to real people.

Complex affect training: Targeting verbal and nonverbal components across multiple affective categories. Gena et al.'s (1996) study was the first to demonstrate that "the affective behavior of children with ASD can be treated as operant behavior" (Gena et al., 2005, p. 553). To that, Charlop et al. (2010), Gena et al. (2005), and Daou et al. (2014) added further empirical support. Taken together, all four studies were concerned with teaching children with ASD to emit affective responses that were well-suited for the types of scenarios (Gena et al., 1996, 2005) or discriminative stimuli (Charlop et al.; Daou et al.) provided by experimenters. They involved children of different age groups, with Gena et al.'s (2005) participants falling between the ages of nearly 4 and nearly 6 years, Charlop et al. and Daou et al.'s between 7 and 13 years, and Gena et al.'s (1996) involving children of ages 11 through 18 years.

Taking a closer look at the studies by Gena et al. (1996, 2005) and Daou et al. (2014), all used operant procedures to improve appropriate affective behavior. Reinforcement, prompting, and modeling were used across the three studies. Gena et al. further explored the differential effects of in-vivo and video modeling, but while their design did not allow enough comparisons to determine which of the two forms of modeling was more effective experimentally, it did show that the modeling phase that was presented in second place involved faster acquisition than the first and there was some anecdotal evidence in support of video modeling. Daou et al. further examined the use of script-fading and shaping procedures in enhancing verbalizations and facial expressions, respectively.

Gena et al. (1996) and Daou et al. used a multiple-baseline-across-affective-categories design; Gena et al. (2005) used a multiple-baseline-across-participants design. Gena et al. (1996) and Daou et al. analyzed affective behavior in each of their respective affective categories – talking about favorite things (expressing excitement), laughing about absurdities, showing sympathy/empathy, expressing gratitude/appreciation, and only in Gena et al.'s (1996), indicating dislike. Daou et al. further analyzed the verbal and nonverbal (facial expressions and vocal intonation) components of affective behavior and the learning processes involved in each.

Next Steps in Affect Training in Science and Practice

The three studies programmed for generalization of effects from training to probe conditions; and across people, including mothers (Gena et al., 2005). Gena et al. (1996) also examined generalization effects across settings. The take-home message from the all six intervention studies combined consists of four elements.

First, appropriate affective behavior does not emerge in children with ASD unless operant procedures are implemented. Pointed out by Gena et al. (2005), and applicable to all three studies, is that participants had received behavioral intervention prior to their enrolment in the studies – they spoke in full sentences and had good imitative repertoires – yet they neither imitated the nonverbal affect of experimenters displaying the scenarios/discriminative stimuli nor did they emit verbalizations that were suitable to those affective stimuli at baseline. That partially answered a question generated in DeQuinzio et al.'s (2007) study discussed above.

Second, these studies reported that nonverbal components of affective behavior required the most training, and Daou et al.'s (2014) figures showed longer acquisition curves for facial expressions and vocal intonation as compared to verbalizations. Gena et al. (2005) considered this finding to be an important indicator that the challenging nature of affect in ASD pertains to "adjusting one's facial expression to match social demands" rather than a

problem of "comprehending the verbal and nonverbal aspects of social exchanges" (p. 554). This is an empirical question, however; one that should be further explored in future research and one that will be revisited in the context of failures in follow-up assessments below.

Third, affect training is laborious (Daou et al.; Gena et al., 1996), requiring months in treatment and hundreds of emotion-laden statements/scenarios to get the target behavior to generalize within affective categories and across settings and people. Yet, it is the only method to improve affective behavior and contribute to a critical diagnostic feature of ASD.

Finally, despite the painstakingly designed and delivered procedures of these three studies and despite their successes in achieving their respective goals, the required level of affect training and intervention could not have ended with the completion of the studies. One-month follow-up sessions in Gena et al.'s (1996) study showed that responding maintained at asymptotic levels. Later follow-up sessions of three- (Gena et al., 2015) to six-month (Daou et al.) durations did not yield the same maintenance levels for all participants. This failure in maintenance leads us to consider that more training is needed and, as pointed out by Daou et al., leaner schedules of reinforcement should be used before treatment conclusion. It also leads us to consider that perhaps the matter of comprehension alluded to above is not resolved yet, and as previously mentioned, constitutes an empirical question that ought to be answered in order to inform interventions.

This question could be answered by conducting further single-case experimental designs that analyze the differential effects of verbal and nonverbal components of affective behavior over longer periods of time, involving more elaborate training, better programming for generalization and maintenance, and more participants than those in the existing literature. Conducting this kind of research does not come easy, however. The aforementioned studies could not answer all the necessary questions concerning the impact of intervention on affective behavior of children with ASD despite being comprehensive, long-running, and attentive to numerous factors and components relevant to affect. Adding further responsibilities to these kinds of studies might be burdensome, particularly given the limited funding available to examine those designs favored by behavior analysts (Smith, 2012). An alternate way of answering this empirical question could take the form of randomized clinical trials (RCTs) designed to assess the long-term impact of behavioral interventions on complex affective behavior. RCTs have been suggested by Bodfish (2004) and Smith (2012) as potentially useful next steps in ASD intervention research as they might shed a better light on treatment efficacy or the "depth of intervention effect" (Bodfish, 2004, p. 323), and might help "address public health and actuarial concerns" surrounding the long-term impact of behavioral intervention – vs. a different intervention or the absence of intervention – on people with ASD (Smith, 2012, p. 106). Smith (2012) provided a critical analysis of the limitations and advantages of RCTs, explaining why he would endorse them as "the very last type of investigation that a procedure encounters" (Johnston, 1988, as quoted in Smith, 2012, p. 105) despite historical objections from the standpoint of behavior analysts.

Research-Based Recommendations for Educators and Practitioners

School-age children with ASD spend a considerable amount of time in inclusive classrooms or center-based programs. Educators and practitioners would offer these students a great service if they were to dedicate a good portion of instruction time to social-skills training. A study by Gaylord-Ross et al. (1984) was among the very first behavior analytic studies to teach youth with ASD to engage in social interaction with typically developing peers

attending the same school. Social-skills training in that study occurred in the context of age-appropriate activities (playing a videogame, listening to music, or chewing a gum) and it consisted of three phases: social initiation, elaboration, and termination. The training involved the use of task analyses, scripts, prompting, and reinforcement. The authors emphasized the importance of generalization of effects from training to test conditions; they programmed for generalization across persons and time. In a similar study involving preschoolers with ASD, McEvoy et al. (1988) used reinforcement, prompting, and modeling to teach reciprocal peer interactions during play and singing activities in an inclusive classroom. McEvoy et al. used what they called "group affection activities" to prompt children to hug each other or exchange high-fives or pats on the back. Results showed that two of the three children produced favorably to treatment, increasing their reciprocal peer interactions.

Another important behavior-analytic research line that addressed social-skills training in applied contexts was developed by Krantz and McClannahan (1993, 1998). Mentioned above as the basis of Argott et al.'s research on empathy training, Krantz and McClannahan's (1993, 1998) studies introduced the use of scripts and script-fading procedures in social-skills training. In addition to enhancing social interaction among children with ASD, script-fading is effective in promoting response variability and emergent language.

In our previous work (Daou et al., 2014), we used a script-fading procedure in conjunction with an affect-training program, but only few unscripted verbalizations emerged. This was likely due to the time and effort required for mastery of the nonverbal components (facial expressions and vocal intonation). We suggested that it would be useful to embed affect-training programs in education programming within inclusive or center-based settings. The tight stimulus control in research studies (e.g., Daou et al.) might slow down the development of unscripted verbalizations. It would be valuable for educators or practitioners to develop social-skills training strategies – in line with those developed by behavior analysts (e.g., Gaylord-Ross et al.; Krantz & McClannahan, 1993, 1998) – that target affective responses that will meet natural contingencies of reinforcement.

Other response repertoires that are critical to social interaction have also been investigated in behavioral research. Buffington et al. (1998) used reinforcement, prompting, and modeling to teach four children with ASD to respond appropriately to the discriminative stimuli presented by therapists during social interaction tasks. Target responding consisted of gestural (e.g., pointing, shaking head) and verbal (e.g., saying "Look!" or "No way!") components. Reeve, Reeve, Townsend, and Poulson (2007) taught four children with ASD to help an adult who provided complex discriminative stimuli indicating that help was needed. The multi-component discriminative stimuli not only included the use of objects (e.g., wiping a blackboard), but they also included verbal (e.g., Oh, time to clean the blackboard") and affective (e.g., shaking head) stimuli. Helping behavior under training and probe conditions emerged following a teaching package that consisted of reinforcement, prompting, video modeling, and multiple-exemplar training. In both studies, correct responding generalized to novel settings and stimuli (Buffington et al.; Reeve et al., 2007), and to novel people (Reeve et al.); and was judged as more socially appropriate after treatment by naïve observers obtaining social-validity assessments (Buffington et al.; Reeve et al.).

While Buffington et al.'s (1998) and Reeve et al.'s (2007) studies targeted social interactions between peers and adults, Leaf et al. (2009) were concerned with similar response repertoires, but those involving peer interactions. Leaf et al. used reinforcement, priming, and a Teaching Interaction procedure to enhance peer interactions with respect to the domains of emotion (e.g., including others in games), play (e.g., following designated

partner across play areas), conversation (e.g., initiating to peers), and choosing peers (e.g., choosing the same friends to complete paired activities). Their Teaching Interaction procedure included providing descriptions of target behavior to the child and rationales as to why the behavior was important, modeling the behavior and asking the child to rate the teacher's performance, and asking the child to role-play the target behavior. Ultimately, treatment was effective in improving peer interactions across all domains targeted in the study.

Leaf et al. favor the use of their Teaching Interaction procedure because it is parsimonious and cost-effective, and does not require preparation of material or setting up (see Taubman, Leaf, & McEachin, 2011, for a more thorough guide to social-skills training). Nevertheless, despite requiring preparation and careful execution, video modeling has long been used by behavior analysts as an effective strategy to teach social initiations (Nikopoulos & Keenan, 2004; Özerk & Özerk, 2015), complex social sequences (Nikopoulos & Keenan, 2007; see also Keenan & Nikopoulos, 2006), helping behavior (Reeve et al., 2007), and affective behavior (Charlop et al., 2010; Gena et al., 2005). Irrespective of the nature of the social behavior that is targeted for intervention, it is critical for educators and practitioners to adapt social skills training programs to allow for successful generalization of effects from teaching to probe conditions (see Laugeson & Ellingsen, 2014 for a review).

In conclusion, research has come so far since the early descriptions of ASD almost 75 years ago and since the inception of ABA almost 50 years ago. A lot more needs to be done, however, to enhance social interactions of people with ASD, for better access to opportunities, more independence, and for better psychological outcomes for them and their parents. Irrespective of the direction science will take – whether to more elaborate single-case experimental designs, RCTs, or both – educational and clinical interventions for children with ASD ought to embed affect training in their programs. The intervention studies reviewed here offer researchers, educators, and practitioners ample evidence to identify next steps – whether for the production of new knowledge in this important research area or for the development of creative educational or clinical programs that target the simple and the complex components of affective behavior.

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