

EARLY INTERVENTION EFFECTS ON GESTURE
USE IN YOUNG CHILDREN WITH ASD:
A NATIONAL QUERY
OF SLPS

by

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A THESIS

Submitted in partial fulfillment of the requirements for the degree of
Master of Science in the Department of Communicative
Disorders in the Graduate School of the
University of Alabama

TUSCALOOSA, ALABAMA

2020

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ABSTRACT

Gesture development, use, and repertoire differ in young children with ASD compared to those with typical development (Manwaring et al., 2018 and Watson et al., 2013). Gestures play a fundamental role in social interaction and therefore are often an important intervention outcome in early ASD interventions. However, which interventions are most often used and which of those are most effective remains unclear. Naturalistic Developmental Behavioral Interventions (Schreibman et al., 2015) most frequently incorporate gestures into their teaching targets and outcomes though gestures are often measured within a broader scope of social interaction. Therefore, even within the scope of NDBIs, techniques used to teach gestures, how gestures are measured, and how gestures are prioritized vary greatly and are often not reported distinctively. Further, SLPs are the primary interventionists for improving gestures and social communication though very little is understood regarding how SLPs address gestures in early interventions. Therefore, the purpose of this study was to survey practicing SLPs to determine which methods are most frequently used to teach gestures to young children with ASD and which of those methods are considered effective. Overall, SLPs reported a large range of experience in their training, methods used, and perspectives of efficacy as they relate to teaching deictic gestures.

ACKNOWLEDGEMENTS

I wish to express my sincere appreciation to my committee chair, Dr. Angela Barber, who has devoted countless hours to helping me complete this research. This would not be possible without the guidance of my committee members Dr. Paul Reed, Dr. Hyunjoo Yoo, and Dr. Jason Scofield. I wish to recognize each participant who donated their time to completing the survey. I wish to recognize the support of my family and friends and the Department of Communicative Disorders. Without their support and encouragement, this research could not have reached its full potential.

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INTRODUCTION

Deficits in nonverbal communication used for social communication are a core diagnostic criteria of an Autism Spectrum Disorder (ASD; APA 2013) and therefore social communication is often a central focus of early intervention. This domain is a broad construct with behaviors that can range in severity and presentation and are composed of poorly coordinated verbal and nonverbal communication, abnormalities in eye gaze, limited use and understanding of gestures, and lack of facial expression. Depending on each child's unique symptom profile, one or more of these behaviors may be prioritized as an intervention outcome. The focus of the present study centers on deictic gesture as an intervention target. The emergence and use of deictic gestures in particular are delayed or absent in children with ASD thus limiting opportunities for social interaction (Manwaring, 2018). However, very little is known regarding how gestures are taught during early intervention and which intervention(s) are effective in facilitating gesture use.

Deictic Gestures

Deictic gestures include pointing, reaching, showing, and giving and indicate a referent in the immediate environment (Iverson & Thal, 1998). Gestures are typically expressed with fingers, hands and arms, but can also include facial expressions and body motions as described by Iverson & Thal (1998). These gestures precede the development of spoken language and serve as the primary mode of communication for infants and toddlers and demonstrate the

earliest signs of intentionality (Manwaring et al., 2018). Deictic gestures appear as early as 6 months for the purpose of requesting or protesting, and soon thereafter are used for the purpose of joint attention (Crais et al., 2004). Deictic gestures play a critical role in early social interaction, as they equip children with the means to direct and share attention (Franchini et al., 2019), initially with their caregivers, then with other people. However, children with ASD demonstrate a lower rate of deictic gestures and fewer deictic gestures (Shumway & Wetherby, 2009), a profile which deviates from the typical gesture trajectory by as early as 18 months (Manwaring et al., 2019) and therefore serves as an important early identification feature (Crais, Watson, & Baranek, 2009). Compared to typically developing children, children with ASD use gestures for the purpose of behavior regulation (requesting, protesting) than for joint attention (commenting, sharing information) or social interaction (Iverson & Wozniak, 2016).

Deictic gestures usually establish reference by drawing attention to an object or event. These gestures can include actions like pointing, showing and reaching. Early deictic gesture development typically emerges around 7 to 9 months and often start with an open-hand reach, reaching to be picked up, ritualized gestures of refusal or use of body parts to draw attention like arm/leg flailing. Often, children use these early deictic gestures to reach for a desired item or person or to indicate an observation they find interesting. Deictic gestures make up about 88% of infant and toddler gesture use according to Thal & Tobias (1992). This statistic alone, should be enough to show the importance of gesture use in infants and toddlers for communicative purposes.

Crais (2009) profiled children's prelinguistic communication skills and the use of gesture development. This type of developmental profiling creates the best overall portrait of the child and contributes to an appropriate intervention plan. In early intervention services, professionals

look at developmental domains such as cognitive, motor, social, communicative and adaptive/self-help skills. Within the communicative domain, it is important to assess the strengths and challenges across comprehension and production when developing a successful intervention plan for the individual child and their social communication skills. Hadley & Holt (2006) identified individual components of prelinguistic development, such as symbolic play, gesture use, initiating and responding to joint attention and parental interactions, are strong indicators of later language development in both children with typical development and those with atypical development. Recent attention within prelinguistic development has most frequently focused on gesture development.

Assessing Gesture Use

Gestures can be assessed formally and informally, but the most current assessment tools have not focused specifically on gesture development. Of the current available assessment tests, the MacArthur-Bates Communicative Development Inventories, Words and Gesture Form documents the largest number of gestures with normative data. Informal assessment should also be used when assessing these gestures including samples of interactive play contexts with the caregivers and other adults. Social situations can be set by the professional to see how the child responds and their use of gestures. When assessing, it is also important to consider variations in parenting styles and individual children. Crais (2009) identified behaviors and factors important to identifying children with disabilities and all of them pertained to children with ASD. The five behaviors and factors are as follows; frequency of gesture use, communicative function, use of gestures paired with eye gaze and/or vocalizations, transition from contact to distal gestures, and

transition from gesture to word use. The frequency of gesture use is an important factor for identifying children with communication deficits. By 12 months of age, children should be using one gesture per minute, 18 months two per minute and 24 months about five per minute (Wetherby et al, 1988). A lower frequency may indicate a communication deficit. Osterling, Dawson and Munson (2002) observed less gesturing in both children with autism and developmental disabilities at one year of age and the lack of appropriate gesture use was observed. Studies like Charman et al., (2003); Stone & Yoder, (2001) have shown there are nonverbal communicative differences within groups of children with autism associated with later language and social skills. Communicative functions expressed by children's gestures can also be an important indicator of deficit in their communicative and social skills. The order of emergence typically falls under the three categories: behavior regulation, social interaction and joint attention. A limited variety of intentional communication has been linked with later diagnoses of ASD and other developmental disabilities (Lord, 1995; Stone et al. 1999). There are several reports of preschool age children with ASD and their lack of acts used for behavior regulation, social interaction, and very few to no joint attention acts. This lack of gesture use for communicative functions is a significant issue for children with ASD and their ability to functionally communicate. Use of gestures paired with eye gaze and/or vocalizations typically emerge around nine months and indicated communication competence. This behavior is developed over months and is usually not occurring frequently until about twelve months of age. Transition from contact to distal gestures is usually indicative of a transition from things of action to things of contemplation, or symbol acquisition. When observing children on the spectrum, many children use primarily contact gestures with little to no pointing. These children may show an overall deficit of means of communication; many end up using hand manipulation

to lead a person or object to their desired action. This lack of symbolic acquisition makes it difficult to effectively communicate for children with autism. Transition from gesture to word use should be monitored closely. By 16 months, infants use both words and gestures interchangeably to name objects. Since gesture use is an early indicator of communicative development, it is important that professionals know how to effectively facilitate gesture development and use in children with ASD.

Gesture profiling is an important first step for providing an effective intervention for a child with ASD. Profiling can help identify specific targets necessary for the individual. An increased use of gestures may not only help the child communicate more effectively, but also help the parent or caregiver have more language input for their child. This input can elicit more child output, increase their overall communication, and expand their vocabulary.

Few studies have examined which method(s) are most effective in developing gestures. Therefore, the purpose of this exploratory study is to review studies that have some evidence of efficacy for what methods increase gestures use and what methods are current Speech-language pathologists implementing in therapy.

Naturalistic Developmental Behavioral Interventions

Naturalistic Developmental Behavioral Interventions (NDBIs; Schreibman et al., 2015) are considered best practice for young children with ASD. This is an umbrella term for evidence-based intervention strategies that incorporate behavioral teaching principles with naturalistic instruction and developmental targets. NDBIs are implemented in natural settings, involve shared control between child, clinician, and parent, utilize natural contingencies, and use a

variety of behavioral strategies to teach developmentally appropriate and prerequisite skills (Schreibman et al., 2015). Examples of NDBIs include, Pivotal Response Training (PRT), Incidental Teaching (IT), Early Start Denver Model (ESDM), Enhanced Milieu Teaching (EMT), Reciprocal Imitation Training (RIT), Project ImPACT (Improving Parents As Communication Teachers), Joint Attention Symbolic Engagement and Regulation (JASPER), etc. Most of these intervention models address gestures, though they do so in different ways and may or may not include gestures as a primary research outcome. Goods et al. (2013) found that two sessions of JASPER per week resulted in more gesture initiation than an Applied Behavior Analysis therapy only control group. Vismara et al. (2009) found that teaching parents naturalistic therapeutic techniques from ESDM demonstrated sustained change and growth in social communication through verbal and nonverbal aspect, including gestures, when applied to their ongoing family routines. Three out of five children increased their spontaneous use of descriptive gestures and four out of five maintained these gains after following Reciprocal Imitation Therapy, and generalized to novel play materials, therapists and setting (Ingersoll, 2006). Ingersoll conducted a second study in 2010 focused on the impact of object and gesture imitation training on language use in children with ASD. This was a modified multiple-baseline study of four children. She found the children showed greater improvements in their use of appropriate language after gesture imitation was taught. The study taught imitation of actions with objects and that indirectly improved verbal imitation skills despite them not being directly targeted. Gestures were taught during play and results were positive for improvement. Object imitation was taught first, followed by gesture imitation staggered within sessions. Therapists used modeling techniques and if that was not effective, physical modeling was used. Imitation is an early-emerging behavior that plays a major role in the development of more complex social-

communication skills. By using RIT, the researchers were able to increase gesture use and in turn, saw greater improvements in their use of appropriate language.

It is more common, however, for gestures are included within a broader social communication outcome. For example, a target may be that a child will increase initiation of joint attention. One way a child could initiate joint attention is through a gesture paired with another form of communication. However, the act of joint attention may be reported rather than the gesture use itself. Therefore, more research is needed to determine with specific methods are most commonly and most effectively used to increase gesture use.

Examples of Specific Interventions Targeting Gestures

Other non-NDBI intervention methods have also demonstrated gains in deictic gesture production. Charlop (2010) implemented video modeling to improve appropriate verbal comments, intonation, gestures and facial expressions during social interactions for children between 7 and 11 years. A video was made for each individual with different scenarios playing out appropriate responses during different social interactions. Participants were immediately brought into the play room after watching these videos and tested on the gesture-response that was just modeled. Each participant displayed rapid acquisition of the target behaviors. Similarly, Cardon (2012) used VMIT to determine if there was a relationship between caregiver implemented VMIT via iPad and increases in imitation skills in four, 24-50-month-old young children with ASD. All four participants demonstrated increased levels of imitation once therapy was implemented and maintained higher than baseline imitation during therapy. Cardon (2012) was also able to incorporate parent implemented therapy, which contributes to generalization.

Cardon also stated that all participants made gains in expressive language which was not the primary focus of the training, but supports the idea that gestures have an overlapping relationship with social communication, including expressive language. Ingersoll (2010) conducted a study on the impact of object and gesture imitation training on language use in children with ASD and found that adding gestural imitation training alongside object imitation training can lead to greater gains in rate of language use than just object imitation alone. Taken together, these findings suggest that a number of intervention approaches may contribute to deictic gesture gains. Though, in the absence of consistent gesture assessment methods and assessment tools, it's difficult to compare efficacy across studies.

SLPs and ASD Interventions

Delays in language and social communication are the first concerns most commonly reported by parents of children later diagnosed with ASD (Kozlowski, et al., 2011; Siklos & Kerns, 2007). These deficits persist over time, with an estimated 30% of individuals with ASD remaining minimally verbal (Tager-Flusberg & Kasari, 2013). Therefore, early ASD interventions are often delivered by SLPs, who play an essential role in early identification and treatment of symptoms, particularly social communication symptoms (Burnett, 2014; Manwaring & Barber, 2019). However, knowledge and skills among SLPs working with children who have ASD widely vary, and currently no recommendations or measures exist to quantify the knowledge or experience needed to serve this growing population (Casella & Colella, 2004). Further, professional SLPs report feeling underprepared by graduate programs for working with children on the spectrum (Burnett, 2014; Plumb & Plexico, 2013; Schwartz & Drager, 2008),

though to our knowledge, no studies have published on SLP knowledge since the newest prevalence rates have been established.

While previous research demonstrates the value of gestures, how deictic gestures differ in ASD, and their correlation with social communication, there is minimal evidence of what strategies are effective for teaching these gestures and what current SLPs are using. It also remains unclear whether SLPs receive training in deictic gestures, social communication and effective intervention methods. Therefore, the purpose of this exploratory study is to determine which methodologies are most commonly used by SLPs who target deictic gesture production with young children who have ASD and which of those methods are deemed most effective by current practicing Speech-language pathologists. A secondary purpose was to determine the level of training SLPs receive related to gestures and social communication in ASD. Findings have important implications for pre-service and in-service training in the field.

METHODS

In order to provide a sound basis for the intervention methods included on the survey, we conducted a simplified systematic review of available literature. Specifically, we evaluated studies that included interventions targeting deictic gestures as a primary treatment outcome for children under four years of age with ASD. Specific inclusion criteria included: participants had confirmed ASD diagnosis, children were 48 months or younger, deictic/conventional gestures was a dependent variable, articles were published within the last 20 years, and articles were available in English.

Upon the initial search and use of 14 electronic databases, 354 abstracts were reviewed. A total of 318 citations were either not relevant to the original clinical question, inclusion criteria were not met, or a duplicate citation was returned. The remaining 35 articles went through a full text review. An additional 27 citations were further excluded for one or more of the following reasons: age criteria not met, articles did not involve an intervention, or gestures were not a dependent variable. Eight articles evaluated met criteria for inclusion in the current review and final analysis. Six/eight articles evaluated met at least five quality indicators. Three articles had 10 or more participants and randomized participants. Five were single subject/observational designs.

Dependent variables in the 8 articles evaluated targeted gestural imitation, labeling, integrating eye gaze with gesture, and use of conventional gesture. Therefore, researchers were unable to compare efficacy of interventions on a common gesture outcome across studies.

However, five/eight interventions demonstrating gains in gestures were considered NDBIs, which are thought to be most effective for young children with ASD (Schreibman et al., 2015).

These NDBIs included Early Start Denver Model, Reciprocal Imitation Training, Pivotal Response Training, and Responsive Education and Prelinguistic Milieu Teaching resulted in gains in gesture use or imitation. Therefore, these interventions were included in the development of the survey, which represents the primary aim of this study.

Participants

A total of 93 licensed clinical Speech Language Pathologists (SLPs) completed a 11-question survey about their practice with young children who have ASD. Participants were invited to complete the survey via web link. Once consent was given, they completed the 11-item survey. The survey took up to 15 minutes and the participants were able to answer multiple choice questions as well as fill-in-the-blank. Participants were able to discontinue the survey at any point if they felt necessary. See Table 1 for a breakdown of participant demographics including years of practice, location of practice, and number of children with ASD on their caseload. SLPs were recruited through social media posts, ASHA Special Interest Groups, and communication boards. Due to the unlimited resources the Internet and social media provide, it is impossible to estimate how many people were notified of the survey, but a total of 93 total participants were included in this study.

Participants demographics displayed a variety of years of practice, location of practice and number of children with ASD on their caseload. For years of practice, 35.48% had 0-5 years,

19.36% had 6-10 years, 11.83% had 11-15 years, 10.75% had 16-20 years, 6.45% had 21-25 years, 7.53% had 26-30 years and 8.60% had 31+ years of experience. Participants had seven options to choose from for location of practice including: public school, private school, preschool, early intervention, private practice, outpatient rehab, and hospital. The majority of participants (33.3%) practiced in public schools; 24.7% in early intervention; and 3.2% in private schools and hospital settings. Participants were asked to answer how many children with ASD were on their caseload. Five options were presented: 0-5 children, 6-10 children, 11-15 children, 16-20 children, and 21+ children. A little over half stated they have 0-5 children with ASD on their caseload while 7.52% stated they have 21+ children with ASD on their caseload.

Survey

The researchers created a web-based, 11-item survey via Qualtrics software to obtain information about the respondents and to address the research questions. The survey is provided in Table 2. Development of the survey included a series of questions that addressed a variety of demographic information, training experience and intervention techniques implemented. The first three questions ask about the SLPs caseload, place of employment and years of experience. This was included in the survey to assess backgrounds of SLPs who responded to the survey and to see if any of these demographic variables were related to intervention techniques implemented or training experience. The next six questions were included to elicit what types of specialized training these SLPs have received. The researchers asked specifically about specialized training about deictic gestures, ASD, and social communication. Each one of these categories is crucial for implementing interventions for children with ASD and should be received by every SLP that

works with children with ASD. The last two questions pertained to what intervention strategies SLPs are currently using in the field and which they feel has been the most effective.

Within the survey, participants were provided with a comprehensive list of 25 intervention techniques and packages, some of which are considered effective according to the National Autism Center (NAC) Standards Report, some which are considered NDBIs, and some which emerged from the systematic review. SLPs were asked to identify all strategies they use to target deictic gestures. They also had the option of writing in an intervention.

The National Autism Center (NAC) Standards Report serves as a source of guidance for parents, caregivers, educators, and service providers such as SLPs as they make informed intervention decisions. The National Standards Project is a primary initiative of the NAC that addresses the need for evidence-based practice guidelines for ASD. It is their primary goal to provide critical information about which interventions have been shown effective for individuals with ASD. The National Professional Development Center on Autism Spectrum Disorder works to develop free professional resources for service providers who work with individuals with ASD (NPDC, 2017). Part of their program works to monitor and research specific evidence-based practices. The NSP and NPDC extensively examined and quantified level of research supporting research in ASD. The NPDC and NSP findings were used to inform survey development and provided a framework for interpreting qualitative responses of the survey.

RESULTS

Descriptive analyses were conducted to evaluate participant responses. Regarding training, participants were asked to indicate if they have received any specialized training in a variety of areas. See Table 3 for complete breakdown of participant responses. When asked if they have received specialized training about early ASD symptoms, 79.57% stated they have received specialized training and 20.43% indicated they have not. When asked if they have received specialized training about social communication interventions for young children with ASD, 73.12% stated they have received specialized training while 26.88% stated they have not. When asked if they have received specialized training about deictic gesture use in children with or without ASD, 26.88% indicated they have received specialized training while an overwhelming majority of 73.12% indicated they have not received any specialized training in deictic gesture use. Next, we looked at training responses relative to years of service. See Table 4 for results. Participants received more training about ASD than social communication, and more about social communication than gestures. No clear patterns emerged relative to years of experience and gesture training. Given the recent increase in prevalence of children diagnosed with ASD, it seemed likely that SLPs who graduated more recently would report more training in all three domains. However, this was not the case. Participants with the most years of experience had more training in ASD and Social Communication, but less than half had training in gestures. SLPs with 16 or more years of service reported receiving more gesture training than those with fewer than 16. Participants were encouraged to identify what types of training they have received

for each specialized training and most reported CEU activities, ASHA, other conferences, and graduate school courses. Although some indicated they have had specialized training such as Hanen More Than Words, ESDM, Social Thinking and Autism Navigator, etc., there was no specific focus on deictic gesture use as the dependent variable for therapy.

To further examine the data, we next looked at training responses relative to the number of children on SLPs' caseloads under the age of 6. See Table 5 for results. Overall, participants again received more training about ASD than social communication and more about social communication than gestures. Looking closer to the responses, participants who have 21+ children under the age of 6 reported having more training overall in all categories than other participants, with only about 57.14% reporting they have received specialized training about gestures. However, no clear patterns have emerged from number of children on their caseload under the age of 6 and gesture training. Lastly, we looked at the training responses relative to places of employment. See Table 6 for results. Again, overall there was a similar pattern regarding training with more training about ASD than social communication and more about social communication than gestures. No clear patterns have emerged from places of employment and gesture training. Of all the places of employment, no more than 35% of participants have received specialized training about gestures with early intervention having the highest at 34.78%. the only clear pattern that emerged is overall, SLPs are not receiving as much gesture training than other areas like ASD and social communication.

All interventions shown in Figure 1 were endorsed by at least two SLPs, all other interventions were not included in the results. Four interventions were endorsed by 50% of the sample or more. Those were modeling, prompting, following child's lead, and naturalistic intervention. All of these except Following Child's Lead are endorsed as established

interventions by National Standards Project and National Professional Developmental Center (2017). Further, Modeling, Prompting, and Naturalistic Intervention are effective for improving social and communication goals in children 0-5 with ASD (NAC, 2015).

Based on thorough review of the literature, four interventions demonstrated gains in deictic gesture use. Of those interventions used by the participants, 18% endorsed Pivotal Response Training, 4% endorsed Reciprocal Imitation Training, 10% endorsed Early Start Denver Model, and 48% Incidental Teaching. This finding highlights a gap between research and practice in that SLPs are not commonly implementing interventions supported by research literature.

About 10% ($n=10$) of sample reported not targeting gestures in therapy. SLPs are using a wide range of interventions to target deictic gestures, indicating a mix of established and non-established interventions. Approximately half of the sample is using methods that have been shown to increase gestures. Of models endorsed by SLPs, the majority are implemented in NDBIs, which are thought to be most effective interventions for young children with ASD in targeting gestures and improving social communication (Schreibman et al., 2015).

Of those intervention methods endorsed by SLPs, they were then prompted to indicate if any methods have been most effective to increase deictic gesture use for social communication in young children with ASD. The most effective method reported was modeling with 16% ($n=15$) support followed closely by prompting with 13% ($n=12$) support. Naturalistic interventions was supported by about 11% ($n=10$) of the respondents. As one can see, three of the top four most used intervention methods were considered as the most effective by currently practicing SLPs for teaching deictic gesture use for social communication. With all the responses for what intervention methods are used, there is little support to whether or not these interventions being

used are considered the most effective by currently practicing SLPs. This supports the lack of research currently out there for targeting deictic gestures for social communication for children with ASD.

DISCUSSION

Deictic gestures are key to early social communication experiences and when delayed or absent impede language development. Children with ASD do not follow the typical trajectory for developing gestures, which coupled with impairments in social communication further compromises the language system (Franchini et al., 2019; Manwaring et al., 2018). Specifically, the emergence and use of deictic gestures in particular are delayed or even absent in children with ASD thus limiting opportunities for social interaction (Manwaring, 2018). Therefore, gestures are a critical aspect of early intervention though very little is known regarding the most effective methods for increasing deictic gestures use. A thorough literature review revealed only eight articles were found during the systematic review that addressed gestures as the dependent variable. This does not provide a lot of support for the Speech Language Pathologists as what is best-practice for teaching these deictic gestures to children with ASD. Speech Language Pathologists are primarily responsible for recognizing, assessing, and targeting gestures in therapy though very little is understood about the level and type of training SLPs receive regarding early gestures and social communication. This study aimed to determine SLPs' experiences and trainings with gesture interventions.

Overall, SLPs reported a large range of experience in their training, methods used, and perspectives of efficacy as they relate to teaching deictic gestures. In fact, only 26.8 % of the sample reported receiving specialized training in deictic gestures although 73.1% reported receiving specialized training in social communication and 79.6% in ASD. This suggests that

deictic gestures are not consistently prioritized in trainings focused on ASD and social communication. When comparing the results of participants who have received specialized training in gestures, the percentages were low no matter the demographic comparison (years of service, number of children on caseload, place of employment). SLPs received training most commonly through graduate courses and CEU activities. Very few have received specialized trainings and even those that did, did not have gestures as the main focus of the training. Although ASD has become more of a focus in our field, many SLPs are not getting training of these gestures past graduate courses. This finding emphasizes the need for pre-professional training programs, state and local conferences, and national conferences to better train SLPs on addressing deictic gestures as an intervention target.

Related to methods of intervention, methods identified through a thorough review of available literature, methods endorsed by the National Autism Center (2015) and National Professional Development Center of Autism (2017), and methods observed anecdotally were included on the survey. A broad range of methods were endorsed by SLPs, the majority of which are not considered effective treatments for either ASD or gesture interventions. Most SLPs reported using more than one intervention, suggesting SLPs try to tailor their approach to best fit the needs of the individual. Furthermore, SLPs reported that they use methods within their practice that they actually don't find effective. Four interventions were endorsed by 50% of the sample or more. Those were modeling, prompting, following child's lead, and naturalistic intervention. All of these except following child's lead are endorsed as established (NPDC, 2017). However, following child's lead is embedded within other strategies that are considered effective (i.e. naturalistic teaching) according to the National Standards Project (2015).

A few studies have demonstrated positive findings from NDBIs. For example, Ingersoll (2006) found four out of five children maintained their gains in increased gesture use after following Reciprocal Imitation Training. Vismara et al. (2009) found that teaching parents naturalistic therapeutic techniques from ESDM demonstrated sustained change and growth in social communication through verbal and nonverbal aspect, including gestures, when applied to their ongoing family routines. Based on a thorough review of the literature, only four interventions met search criteria and targeted deictic gestures as a dependent variable and demonstrated gains in deictic gesture use. Of those four, 18% of our sample endorsed Pivotal Response Training, 4% endorsed Reciprocal Imitation Training, 10% endorsed Early Start Denver Model, and 48% endorsed Incidental Teaching.

This finding emphasizes the research to practice gaps and suggests the need for more targeted pre-service and in-service trainings focused on deictic gestures. The need for increased academic and clinical training for SLPs working with children with ASD is evident. Deictic gestures emerge as early as 6 months of age for the purpose of requesting or protesting, and soon thereafter are used for the purpose of joint attention (Crais et al., 2004). These deictic gestures play a critical role in early social interaction, as they equip children with the means to direct and share attention (Franchini et al., 2019). These are seen initially with their caregivers, expanding to other people soon after. The focus on children with ASD and gesture use relates to the decrease or lack of use of these gestures hindering language and social communication opportunities for these children. Shumway & Wetherby (2009) stated children with ASD demonstrate a lower rate of deictic gestures. As one can see, the fewer gestures used, the fewer opportunities for these children with ASD to communicate for requesting, protesting and joint attention are available. These gestures are crucial for the development of the child's language

and social communication skills and this area needs to be addressed starting with the clinicians. When provided with appropriate and research-informed trainings, Speech Language Pathologists have the opportunity to intervene early and effectively on social communication, thereby improving long term outcomes.

Delays in language and social communication are the first concerns most commonly reported by parents for children later diagnosed with ASD (Kozlowski, et al., 2011; Siklos & Kerns, 2007). These deficits persist over time, with an estimated 30% of individuals with ASD remaining minimally verbal (Tager-Flusberg & Kasari, 2013). Therefore, early ASD intervention are often delivered by Speech Language Pathologists. However, knowledge and skills among SLPs working with children who have ASD widely vary. Currently, there are no recommendations or measures exist to quantify the knowledge or experience needed to serve this growing population (Casella & Colella, 2004). Findings from this study findings are in line with previous reports that SLPs feel underprepared by graduate programs for working with young children with ASD (Burnett, 2014; Plumb & Plexico, 2013; Schwartz & Drager, 2008). Given that deictic gestures deviate from typical development early in life (Crais et al., 2004) and have important impacts on social communication and language (Manwaring et al., 2017) it is important to educate SLPs on multiple aspects of gestures including how to assess rate and repertoire of gestures; how to determine atypical gesture production (Stone & Yoder, 2001), and how to prioritize gestures in intervention relative to other aspects of social communication and language learning (joint attention, eye gaze, coordination of communication). Certainly, more research is needed to compare the effects on social communication and language skills of interventions who address gestures compared to those who focus on other pre-cursors to language.

Limitations

A primary limitation of this study that must be considered when analyzing the results would be SLPs that responded came from a variety of experience, place of employment, and number of children on their caseload with ASD. It is unclear how many years of experience each SLP has had in the field working specifically with ASD. Participants also reported although they have had specialized training in gesture use, it is unclear to what extent of that training specifically focused on deictic gestures. In addition, the survey was only 12 questions without the ability for follow-up questions from the researchers for points of clarification and elaboration. It is important to note that the majority of these NDBIs require specialized training to reach levels of fidelity, so individual endorsements do not necessarily indicate that the methods are being used reliably. It's also likely that providers are using a combination of methods rather than implementing one method exclusively (Stahmer et al., 2005).

Future Directions

Moving forward, it would be of interest to create a more in-depth survey to analyze more about the execution of methods used for teaching deictic gesture use for social communication with children with ASD. More follow-up questions can be added to ascertain why are methods being used if the SLPs do not believe they are the most efficacious for the individual child. For example, 76% of SLPs reported that they use modeling when teaching gestures, but only 16% stated that is was the most effective. While the primary focus of this study targeted knowledge and implementation of deictic gestures, a finding emerged that compared to general ASD

training, SLPs have fewer training opportunities in social communication. Future research should examine SLPs knowledge and confidence for targeting social communication as a part of ASD intervention and which methods are most commonly used. An additional study focusing on this would be beneficial to help direct SLPs in the next step for finding what is the most effective methods for teaching deictic gestures. After thorough investigation of the current literature for teaching gestures for social communication, it would be beneficial to researching more of the methods being used in the field and their efficacy to help SLPs in the field to determine what should be used.

CONCLUSION

From this sample, SLPs are using a variety of techniques and approaches to target deictic gestures. SLPs are using a mixture of established interventions supported by the National Standards Project and National Professional Development Center, while others are not. Of the other techniques reported implemented by SLPs, there is no supported literature of these techniques being established for gesture use for children with ASD. More research is needed to determine which specific aspects of NDBIs result in gesture production by targeting deictic gestures as a primary dependent variable for intervention within the context of social communication. Furthermore, more standardization/trainings need to be established/implemented to targeting deictic gestures for improved social communication.

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APPENDIX

Table 1

Participant Demographics

Variable (n=93)	% of sample
<u>Years of practice</u>	
0-5 years	35.48%
6-10 years	19.36%
11-15 years	11.83%
16-20 years	10.75%
21-25 years	6.45%
26-30 years	7.53%
31+ years	8.60%
<u>Place of employment</u>	
Public School	33.33%
Private School	3.23%
Preschool	7.53%
Early Intervention	24.73%
Private Practice	17.20%
Outpatient Rehab	10.75%
Hospital	3.23%
<u># of Children with ASD on Caseload</u>	
0-5 children	51.61%
6-10 children	25.81%
11-15 children	9.68%
16-20 children	5.38%
21+ children	7.52%

Table 2

Survey

1. Consent
 I agree I disagree
2. How many years have you practiced as a Speech-Language Pathologist, including your clinical fellowship year?
 0-5 6-10 11-15 16-20 21-25 26-30 31+
3. How many children age 6 and under who have ASD symptoms or a diagnosis of ASD are currently on your caseload?
 0-5 6-10 11-15 16-20 21+
4. How would you describe your place of employment?
 Public School Private School Preschool Early Intervention
 Private Practice Outpatient Rehab Hospital
5. Have you received specialized training about early ASD symptoms?
 Yes No
6. Deictic gestures are used to reference an object in the immediate environment. Have you received specialized training about deictic gesture use in children with or without ASD?
 Yes No
7. If you answered yes to Q5, what type(s) of training did you receive? Training could include a course, CEU activity, ASHA session, etc.
8. If you answered yes to Q6, what type(s) of training did you receive? Training could include a course, CEU activity, ASHA session, etc.
9. Have you received specialized training about social communication interventions for young children with ASD?
 Yes No
10. If you answered yes to Q9, what type(s) of training did you receive? Training could include a course, CEU activity, ASHA session, etc.
11. Which of the following intervention packages or strategies do you use to teach deictic gestures for social communication purposes with young children who have ASD? Select all that apply.
 I do not target gestures in therapy with children who have ASD
 Incidental Teaching
 Modeling Following Child's Lead Discrete Trial Training
 Prompting Differential Reinforcement Scripting
 Video Modeling Time Delay Naturalistic Intervention
 Parent Mediated Intervention Pivotal Response Training
 Social Skills Training Visual Supports PECS
 Functional Communication Training Early Start Denver Model
 Project ImPACT JASPER Early Social Interaction Project
 Reciprocal Imitation Training Floortime Other
12. If you selected multiple answers to Q11, which method has been most effective to increase deictic gesture use for social communication in young children with ASD.

Table 3*Participant Professional Training*

Training (n=93)	% of sample
<u>ASD</u>	
Yes	79.57%
No	20.43%
<u>Social Communication</u>	
Yes	73.12%
No	26.88%
<u>Gestures</u>	
Yes	26.88%
No	73.12%

Table 4*Percent of Participants who Received Training by Years of Service*

Years	ASD	Gestures	SC
0-5	63.89%	16.67%	52.78%
6-10	77.78%	11.11%	66.67%
11-15	72.73%	18.18%	81.82%
16-20	90%	20.00%	80.00%
21-25	100%	83.33%	83.33%
26-30	90%	71.43%	50.00%
31+	100%	42.86%	100%

Table 5*Percent of Participants who Received Training by Number of Children on their Caseload under 6*

# of Children	ASD	Gestures	SC
0-5	79.17%	29.17%	77.08%
6-10	79.17%	16.67%	66.67%
11-15	66.67%	11.11%	66.67%
16-20	80.00%	40.00%	40.00%
21+	100.00%	57.14%	100.00%

Table 6*Percent of Participants who Received Training by Places of Employment*

Places of Employment	ASD	Gestures	SC
Public School	74.19%	22.58%	80.65%
Private School	66.67%	0.00%	66.67%
Preschool	85.71%	28.57%	85.71%
Early Intervention	95.65%	34.78%	69.57%
Private Practice	81.25%	31.25%	75.00%
Outpatient	70.00%	30.00%	70.00%
Hospital	66.67%	33.33%	33.33%

Figure 1

Number of SLPs who Endorsed Each Intervention Method

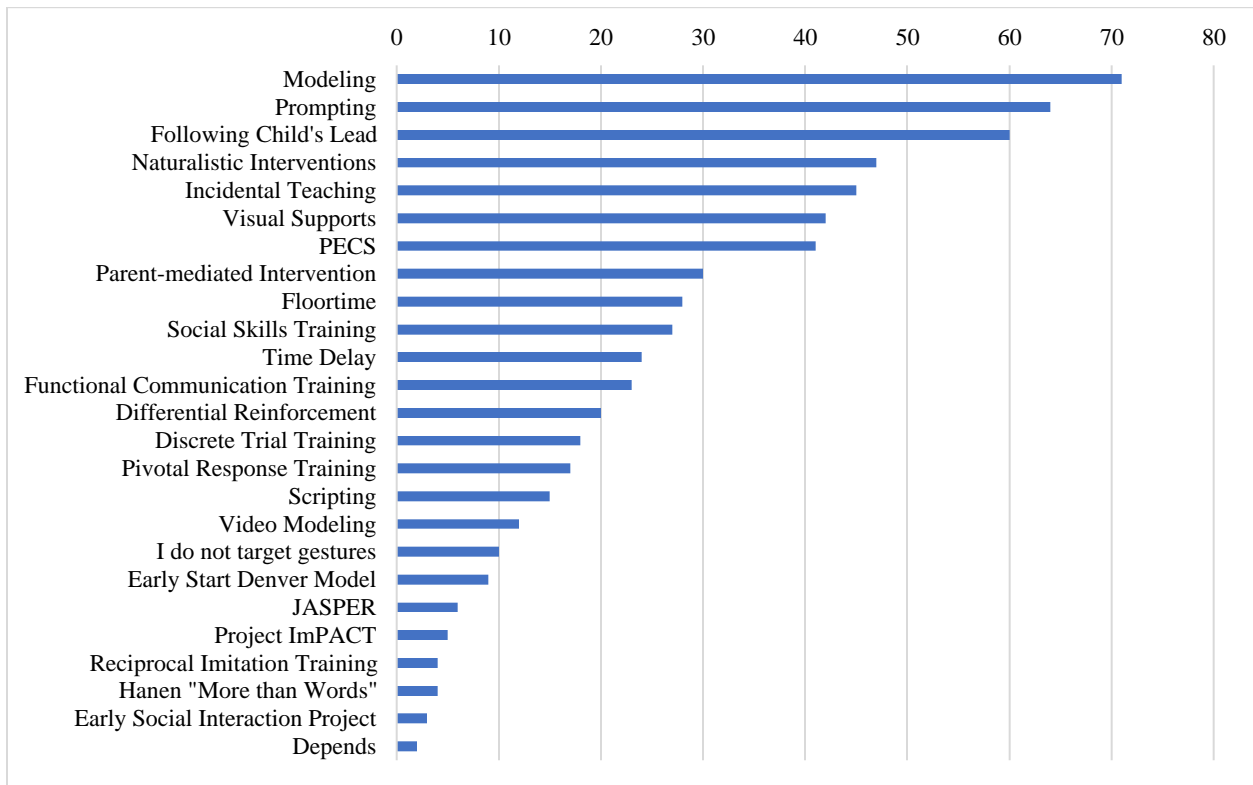
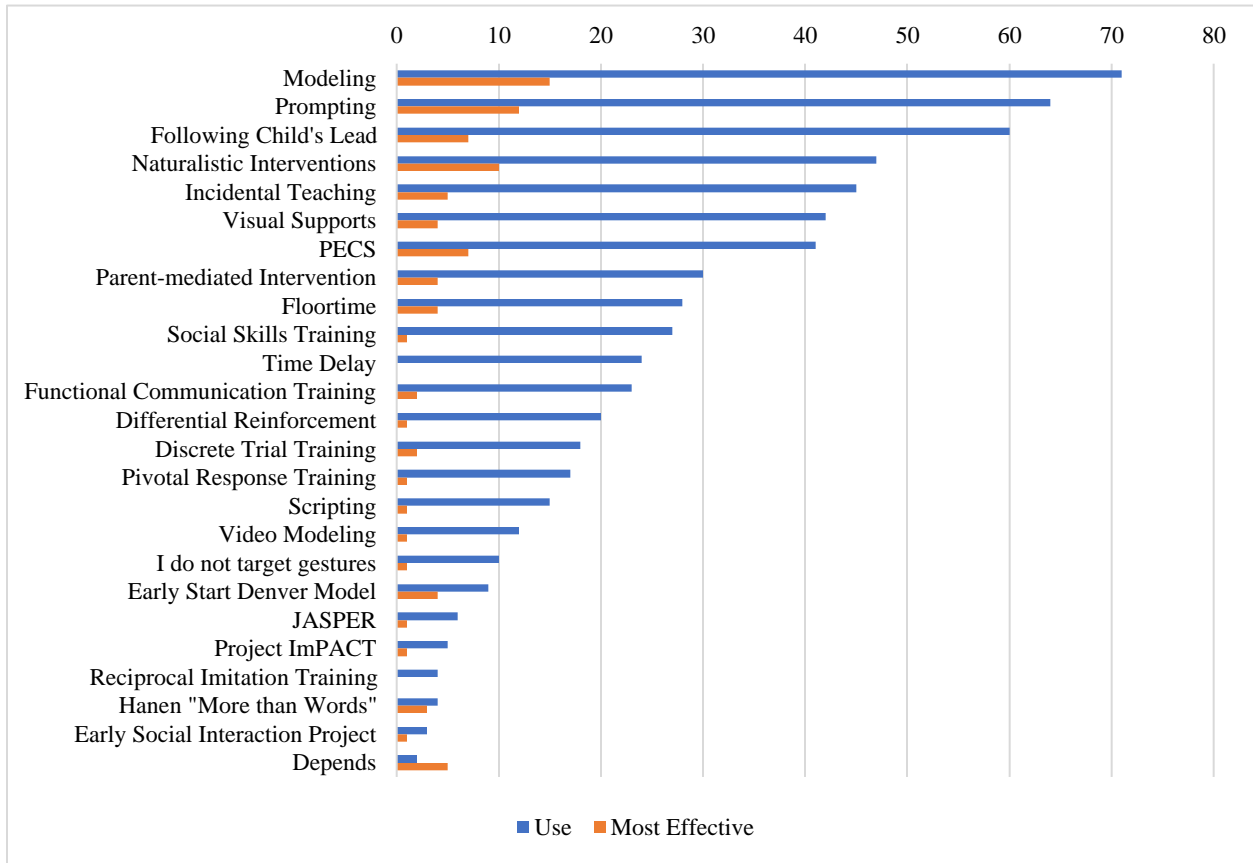


Figure 2

Number of SLPs who Endorsed Each Intervention Method Most Effective



IRB certification



Office of the Vice President for
Research & Economic Development
Office for Research Compliance

August 28, 2019

Julia Miller
Communicative Disorders
Box 870242

Re: IRB # EX-19-CM-180: "Effective Methods for Increasing Gesture Use in Young Children with Autism Spectrum Disorder (ASD): A National Query of SLPs"

Dear Ms. Miller,

The University of Alabama Institutional Review Board has granted approval for your proposed research. Your application has been given exempt approval according to 45 CFR part 46. Approval has been given under exempt review category 2 as outlined below:

(2) Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if: (i) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects.

The approval for your application will lapse on August 27, 2020. If your research will continue beyond this date, please submit the annual report to the IRB as required by University policy before the lapse. Please note, any modifications made in research design, methodology, or procedures must be submitted to and approved by the IRB before implementation. Please submit a final report form when the study is complete.

Please use reproductions of the IRB approved informed consent form to obtain consent from your participants.

Sincerely,

Carpantato T. Myles, MSM, CIM, CHP
Director & Research Compliance Officer

cc: Dr. Angela Barber