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Social Skills and Language Development in Preschool Children with Developmental Disabilities Following Augmented Language Intervention

Candace L. Evans

SOCIAL SKILLS AND LANGUAGE DEVELOPMENT IN PRESCHOOL CHILDREN WITH DEVELOPMENTAL DISABILITIES FOLLOWING AUGMENTED LANGUAGE INTERVENTION

By

CANDACE EVANS

Under the Direction of Rose Sevcik, PhD

ABSTRACT

This study examined the relationship between socialization and language skills. This study then investigated how socialization and language scores predicted preschool educational placement. Results indicated that baseline and follow up socialization and language scores were correlated. Furthermore, a partial transactional relationship was found between language and socialization scores. Measures of language and socialization scores did not predict preschool educational placement, however. Outcomes of this study suggest that language and socialization abilities are interrelated, and clinicians and educators should consider the importance of the social context that is important for children to learn.

INDEX WORDS: augmentative and alternative communications, language scores, socialization scores, inclusive education

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CANDACE EVANS

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by

CANDACE EVANS

Committee Chair: Rose Sevcik

Committee: MaryAnn Romski

Christopher Henrich

Electronic Version Approved:

Office of Graduate Studies

College of Arts and Sciences

Georgia State University

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DEDICATION

To my husband, Daulton Evans, for his support of me pursuing this degree, and for listening to me complain and doubt myself, and believing in me anyway. Thanks, love.

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1 INTRODUCTION

1.1 Purpose of the Study

Language and successful socialization abilities are core skills for everyday living experiences (Guralnick, Connor, & Johnson, 2011; Koenig et al., 2010). For children with developmental delays and language impairment, these skills are oftentimes a challenge to acquire and develop. To aid in communication, some children with significant language impairment use augmentative and alternative communication (AAC), such as a speech generating device (SGD) or sign language (Romski et al., 2010). Communication and social abilities in children are displayed most prominently in school (Rice, Sell, & Hadley, 1991). For a child with developmental delays, educational placement may heavily influence the context in which a child will interact with children who are on both typical and atypical paths to development. Some children may be placed in a more inclusive education setting while others may be placed in a self-contained classroom setting with peers who are also atypically developing (Yeo & Teng, 2015). In recent years, support and research concerning inclusive education has rapidly developed, however there is still very little research surrounding educational placement of children with a developmental delay who also use AAC. This study will examine the social and language skills of young children with developmental delays who also used AAC as part of a language intervention and how each of these variables impacted preschool educational placement.

1.1.1 Language Development

Broadly, for a child to effectively use language, there are perceptual, motor, conceptual, social and linguistic skills that must first be mastered (Bruner, 1974). The development of these skills begins in infancy. In a chapter on language development, de Villiers and de Villiers (1999) propose that in the first year of life, three tasks which are interacting and simultaneous must

occur for a child to communicate. First is a conceptual understanding of the world so that mapping of objects to words can occur. Research has shown that within the first year of life, infants have the ability to attend to color, shape, and the causal and temporal relationship of events, which lay the foundation for words. Second, is the segmentation of speech into words and phrases and also the formation of categories of speech sounds. In the first year, infants can detect familiar sounds, and can segment words from a speech stream. The last component is the intention to communicate with another person. Infants show abilities such as following eye gaze, turn taking in vocalizations, can read facial expressions, and can follow pointing and other gestures.

When difficulties in any of these components are experienced, language development can be delayed. For example, children with cerebral palsy can experience difficulty in the motor component of language development which makes producing speech difficult (Pirila et al., 2007). Children with autism show deficits in following eye gaze and engaging in joint attention which hinders the intentionality component of language development (Yeo & Teng, 2015). Additionally, children with cognitive delay may have a deficit in processing conceptual information needed for communication (de Villiers & de Villiers, 1999). For example, if a child with severe cognitive delay cannot attend to objects in the environment or properties of the environment, they are at risk for not being able to map language onto these environmental factors, hence delaying language development. For children who are having difficulty using spoken language to communicate, AAC is a tool that can be used to aid in communication.

1.1.2 Augmentative and Alternative Communication

Augmentative and alternative communication (AAC) covers a broad range of methods used to communicate. As the name suggests, it is used to either supplement or replace more

typical means of communication (Kent-Walsh & Binger, 2010). The American Speech-Language-Hearing Association (ASHA), which is the scientific, professional, and credentialing association in the United States for audiologists and speech-language pathologists defines AAC as:

> An area of research, clinical, and educational practice. AAC involves attempts to study and when necessary compensate for temporary or permanent impairments, activity limitations, and participation restrictions of individuals with severe disorders of speech-language production and/or comprehension, including spoken and written modes of communication (ASHA, 2005).

AAC is multimodal, meaning a child is encouraged to use every possible mode to relay messages and ideas (Romski, Sevcik, & Forrest, 2001). ASHA defined an AAC system as a group of four components which are integrated to be used by an individual to enhance communicative abilities. The four components are: symbols, aids, techniques, and strategies (Romski et al., 2001).

Romski et al. (2010) conducted a randomized controlled parent coached language intervention study using SGDs with toddlers with developmental delay and less than 10 spoken words. They found that children who were using a SGD showed gains in vocabulary size in both augmented and spoken targeted words. Romski et al. (2010) also followed these children into preschool to assess their continuing development. Their findings suggest that SGD use positively impacted the language development of children who were struggling to communicate. Providing a SGD for children to express wants, needs, and ideas could significantly enhance the social experience of the child. Providing a child with an AAC device that supports social interaction, children who would otherwise not have the tools to actively participate in social interactions are

given the ability to engage with their peers on a more typical level (Beukelman & Mirenda, 2013; King & Fahsl, 2012).

1.1.3 Social Development of Children with Typical Development

Social development begins in infancy, in the context of the parent-child relationship (Serafica, 1990). Children learn how to gain and maintain the attention of a parent, how to manipulate a parent to achieve goals, and how to engage others in social transactions (Shulman & Singleton, 2010). Around six months of age, infants develop the ability to visually fixate on their caretaker's (usually mother's) eyes, hold the fixation, and also widen their own eyes. With this skill comes the ability to initiate interaction as well as terminate it (Westby, 2010). This eye fixation marks the beginning of social play between the infant and adult (Westby, 2010). In the second half of the first year of life, infants' increasing motor control enables object manipulation. Infants' interest in objects changes the social interaction from dyadic (mother and infant) to triadic (infant, object, mother), which increases the complexity of the interaction (Westby, 2010).

As infants become children and eventually adolescents, the focus of social development shifts from parent-child interaction to peer interactions (Shulman & Singleton, 2010). However, according to a chronological trajectory of social development by Bornstein and Lamb (1999), children begin engaging in socially oriented behaviors such as sharing in mutual gaze, smiling and vocalizing towards peers within their first six months of life. Within the first year of life, socially oriented behaviors towards peers increase in frequency and become more complex such as responding to a gesture of a peer with a smile or vocalization. In the second year of life, with the onset of locomotion and language, social interactions become more complex in the form of simple games which require turn taking behaviors (Bornstein & Lamb, 1999). By age three, children can share symbolic meaning and can engage in pretend play. From around age 4 and

onward, children's symbolic play increases in quantity and complexity and more rules emerge in social interactions governing play and social exchanges.

Additionally, Social Learning Theory places importance on peers in the socialization process (Bandura & Walters, 1963). According to Social Learning Theory, children learn about their social worlds and how to behave in that context by direct peer shaping such as a peer rewarding a behavior by laughing or punishing a behavior by name calling, and by indirect observation of their peers. In a review of social development of typically developing children, Bornstein and Lamb (1999) agree with Social Learning Theory in that peers serve as a source of behavior control and behavior change.

1.1.4 Social Development of Children with Atypical Development

Children with developmental disabilities oftentimes have delayed or different social abilities compared to children with typical development. Some children with broad developmental disabilities sometimes have difficulty self-managing their emotions or behavior which can lead to difficulty in creating and maintaining social exchanges (Vogtle, 2000). Additionally, children with developmental disabilities may have a challenging time learning social strategies and prosocial skills. They also may tend to make fewer attempts to initiate social exchanges with peers, and may respond in a way that their peers do not understand (Vogtle, 2000).

Though the way that social deficits manifest in children with developmental delays can differ by the type of disability a child has and also by severity of the developmental delay, there are several ways in which many children with atypical development are similar in regards to challenges in social development. For example, difficulty in engaging in joint attention is common in children with autism and Down syndrome (Abbeduto, Warren, & Conners, 2007;

Yeo & Teng, 2015). Similarly, Walz (2007) found that individuals between the ages of 3 and 22 with Angelman syndrome demonstrated a failure to develop imitation skills, which requires joint attention. These skills are involved in early communication and social interaction. Though the literature is expanding regarding the social development of children with developmental disabilities, further research is needed surrounding the interplay between language and social abilities of children with both developmental and language delay.

1.1.5 Language Delay and Social Skills

Communication and socialization are intimately intertwined. Social theories of language learning place the importance of language development on the reciprocal nature of the relationship between language and social contexts (Vygotsky, 1978). One example of a theory that considers social contexts vital for language development is the social gating hypothesis of language development proposed by Kuhl, Tsao, and Liu (2003). The social gating hypothesis of language (Kuhl et al., 2003) suggests that characteristics of social interaction like attention, arousal, and motivation are critical to complex language development, such that the social aspects are the driving forces of language development. For example, in order for a young child to learn language he or she must be motivated to communicate, then also must attend to the source that is providing the language.

Several studies with typically developing children have shown support for the social gating hypothesis of language acquisition. Kuhl et al. (2003) conducted a study to examine if infants could learn to discriminate speech sounds in a new language after minimal exposure. Using 9 month old English speaking infants and "tutors" who spoke only Mandarin, Kuhl et al. (2003) found that the infants who received live interactions with a tutor speaking Mandarin to them were better at discriminating the speech sounds of the language than those who heard the

speech sounds through recordings. In order to further examine the impact of live interaction, some of the infants watched the live tutor on a screen and other infants engaged in the live interaction. Though the information delivered was the same in both conditions and by a human, those in the live interaction condition were able to distinguish the speech sounds better than the infants who watched the tutor on the screen. The researchers suggested that the motivation to learn was higher in the live interaction group which increased language learning. Also, the infants in the live interaction group could have been exposed to supplemental information through gaze and pointing by the live tutor, which aided in language learning. This study was seen as support for the social-gating hypothesis of language because the children who were exposed to language through live interaction showed better sound discrimination than those without the human interaction.

Language abilities and social skills also are linked in the context of education and friendships. Language skills are linked with social status in preschoolers (Hazen & Black, 1989). Children who do not speak, or have difficulty communicating are likely to face social isolation, difficulty forming and maintaining friendships, and hardships in initiating and maintaining conversations (King & Fahsl, 2012; Romski & Sevcik, 2005). Rice et al. (1991) observed children between 39 and 67 months of age who were either models of typical language, children with specific language impairment (SLI), children with speech impairment (SI), and children who used English as a second language (ESL) during free play time at school. Children who were models of typical language were the preferred language partner for all preschool participants, regardless of language ability. Rice et al. (1991) also found that preschoolers with typical language abilities directed more conversation initiations towards peers whereas preschoolers with SLI or SI directed more initiations towards adults.

Similarly, McCabe and Meller (2004) found that both parents and teachers rated children with language impairment as having poorer social skills than children without language impairment. Parents rated children with SLI as having greater internalizing behavior problems (anxiety and withdrawal) than children with typical language abilities on the Social Skills Ratings Scale. Teachers rated children with SLI lower than the non-language impaired group on the sociable composite on the Howes Teacher Ratings which includes items regarding being liked by peers, initiating activities, and showing concern for the distress of others. Hart, Fujiki, Brinton, and Hart (2004) also suggested that children with language impairment oftentimes have difficulties with behaviors such as withdrawal and sociability. Furthermore, Redmond and Rice (1998) proposed that children with delayed language development use compensatory behaviors in order to make up for their relative delay in language ability when interacting in the social world. Those compensatory behaviors, such as fewer attempts to initiate interactions with peers, could lead to a negative spiral wherein children with language delay have fewer opportunities for social interaction, and therefore, fewer opportunities for language development.

Though many researchers have found that language delay hinders social opportunities for children, Robertson and Weismer (1999) found that this reciprocal relationship between language and social abilities can be seen in a positive light. Robertson and Weismer (1999) conducted a language intervention in very young children (M_{age} = 25.6 months) who had language delay, but were typically developing in other areas. The 12 week intervention was conducted by ASHA certified speech-language pathologists and focused on vocabulary development within a social context, meaning that each session included 3 to 4 other children. Gains in language were found in both verbal output and complexity of language used. Improvements also were found for the children's socialization skills as measured by the

Vineland (Sparrow, Balla, & Cicchetti, 1984). The authors suggest that these gains measured by the Vineland were due to the social context in which the intervention was held such that the children were provided the opportunity to practice the skills assessed in the Vineland.

A large portion of the literature investigating the links between social and language abilities has been conducted with children primarily with language delay and who are otherwise typically developing. In the studies that included intervention in an examination of the relationships between language and social abilities, spoken language intervention was the only model used (Robertson & Weismer, 1999). Children who have limited oral language skills and used AAC devices such as speech generating devices (SGD) are a specific subgroup of children who have not been sufficiently examined regarding their social abilities and development (Carter & Maxwell, 1998). Furthermore, children using a SGD and who also have developmental delay are an even more specific subgroup of children where the literature is lacking research regarding social and language abilities. The present study attempts to address this gap.

1.1.6 Educational Placement and Social Skills

Inclusive education has become a topic of increasing interest in the literature in recent years. Federal laws state that children with disabilities have the right to be educated in the least restrictive environment appropriate and alongside peers (IDEA, 2004; Küçüker & Tekinarslan, 2015; Yeo & Teng, 2015). What is deemed as appropriate is a collaborative effort of Individual Education Program (IEP) team members (IDEA, 2004; Sevcik, Barton-Hulsey, & Romski, 2008). Integrating children who have developmental delays with typically developing peers may look differently depending on the institution, resources, and other factors, and also goes by different names such as inclusion, mainstreaming, or integration (Rafferty, Piscitelli, & Boettcher, 2003).

In regards to the benefits of inclusive education, in the last decade in particular, research has suggested that including peers in social development intervention is effective, especially if the peers have received instruction (e.g. Campbell, 2006; Stanton-Chapman & Brown, 2015; Guralnick, et al., 2011; Hartzell, Liaupsin, Gann, & Clem, 2015; Pierce & Schreibman, 1997). In a study conducted by Chung and colleagues (2007), four children with autism whose ages ranged from 6 years, 8 months to 7 years, 7 months and who had the language skills to at least partake in two turns of back and forth verbal communication participated in an 11 week social skills intervention. The typically developing peers of the children with autism were taught to engage with the students in such a way as to prompt and facilitate social exchanges, thereby providing an environment where the children with autism could practice the social skills they were learning. As a result of the intervention, the children with autism showed improvement in four areas of social communication: appropriate responses, securing attention of a communication partner, initiating comments, and initiating requests.

Furthermore, in a controlled experiment examining differences in peer interactions, Guralnick, Connor, Hammond, Gottman, and Kinnish (1996) found that children (ages ranged from 4 years, 3 months to 5 years, 6 months) with communication disorders were more successful at social bids, or initiating social interaction, when interacting with typically developing peers than when interacting with other children with communication disorders. Guralnick et al. (1996) also found that when comparing specialized classrooms (only typically developing children or only atypically developing children) with mainstreamed ones, children who are typically and atypically developing interacted more often with one another in the mainstreamed setting.

There are studies that also report inconclusive results, however. In a review of the literature, for example, Serafica (1990), reported that the mainstream schooling of children with disabilities did not increase social interactions but did decrease certain isolated behaviors, such as distancing oneself from others. Several other researchers reported mixed findings on the effectiveness of inclusive education as well (Chung et al., 2007; Hartzell et al., 2015; Küçüker & Tekinarslan, 2015). The inconclusive state of the literature regarding the impact that interaction with typically developing peers has on children with developmental delay warrants further investigation so that advancements may be made in the way children with developmental disabilities are educated and socialized.

Additionally, there is very little research on inclusive education with children who have significant language impairment and who use AAC (Anderson, Balandin, & Clendon, 2011; Batorowitcz, Campbell, von Tetzchner, King, & Missiuna, 2014). In a qualitative study examining the friendships between children (ages 7-14 years) who use AAC and their typically developing peers, Anderson and colleagues (2011) discussed the benefits that typically developing children experienced by engaging in a friendship with a peer using AAC. They found that friendship with an atypically developing peer who also used AAC increased disability awareness and fostered personal qualities such as patience and understanding. Typically developing children who had a friendship with a child who uses AAC also showed an increase in their own language ability such as the ability to read body language, and also were given the opportunity to learn about different modes of communication such as sign language. Although research is expanding on the outcomes of inclusive education, there is still little research systematically investigating factors that may play a role in placement in either a self-contained or inclusive classroom, particularly for children who have developmental delay and who also have

language impairment. It is important to understand the role that educational placement and social abilities have on outcomes for this specific group of children so that parents, educators, and other advocates can make the best decisions for this group of children.

1.1.7 Factors Influencing Educational Placement

Though the law mandates that children are to be educated in the least restrictive environment appropriate to suit the individuals' needs (IDEA, 2004), parents play a vital role in deciding the degree to which their children have contact with children who are both typically and atypically developing (Stoneman, 2001). The beliefs of parents with children who are typically developing and beliefs of parents with children who are atypically developing play a role in deciding the environment in which a child will be educated. Stoneman (2001) discussed the attitudes that parents of children who are typically developing had on both a societal and personal level regarding inclusion for children who are atypically developing and reported that although general attitudes around inclusive education are positive, parents of both typically and atypically developing children still have concerns. For parents of children who are typically developing, attitudes around inclusion change based on the severity and type of the disability. For instance, inclusion for a child with physical disabilities is seen more positively than a child with severe emotion regulation difficulties (Stoneman, 2001). Additionally, parents of children who are typically and atypically developing have concerns regarding the qualifications and competencies of the teachers and helpers in the inclusive classroom (Stoneman, 2001). All of the factors previously mentioned may influence whether or not a child is placed in an inclusive setting to be educated.

1.2 Research Questions and Hypotheses

The current study aims to address the gap in the literature surrounding the social abilities of preschool children who have a developmental delay and also use a SGD. By examining the factors that contribute to social skill performance of this subset of preschool children, we hope to contribute useful knowledge to the literature surrounding the abilities and profiles of this population. Additionally, this study also will address the long-term outcomes of language and social development in relation to predicting preschool classroom placement. Four hypotheses were examined, under two main research questions.

1.2.1 How do measures of language and socialization interact?

1.2.1.1 Hypothesis 1a

Children with better language skills (as measured by expressive and receptive SICD scores, as well as functional vocabulary) will have higher socialization scores. This assumption is based on the work of McCabe and Meller (2004) who found that both parents and teachers rated children with language impairment as having poorer social skills than children without language impairment.

1.2.1.2 Hypothesis 1b

The relationship between language and socialization scores will be transactional, such that baseline language scores will predict 12 month follow up socialization scores, and baseline socialization scores will predict follow up language scores. This prediction is based on the findings by researchers such as Kuhl and colleagues (2003) and Robertson and Weismer (1999) who have suggested that language and socialization promote each other.

1.2.1.3 Hypothesis 1c

Children who are speaking at the 12 month follow up will have higher language and socialization scores than children employing a SGD. We are predicting that if a child is using speech as their primary means of communication, then he or she relies on speech, and not AAC, to communicate.

1.2.2 Do measures of language and socialization predict educational placement?

1.2.2.1 Hypothesis 2a

Children with higher socialization scores and better oral language skills will have a higher likelihood of being placed in inclusive education settings.

1.2.2.2 Hypothesis 2b

Children who use a SGD will have a smaller likelihood of being placed in an inclusive education setting than children who are using speech as their primary means of communication.

2 METHOD

2.1 Participants

Participants for this study (*N*= 76) were drawn from two larger language intervention studies (Romski et al., 2010; Romski et al., in prep) evaluating the outcomes of a 24 session augmented language intervention, where participants were either in one of three augmented language groups, or a spoken language intervention group. The participants also completed follow up assessment and questionnaires 12 months after the language intervention. Inclusion criteria for the language intervention were that each child had an expressive language vocabulary of less than 10 words, an age equivalent expressive language vocabulary of less than 12 months of age as measured by the Mullen Scales of Early Learning (Mullen, 1995), a chronological age between 24-36 months, adequate upper body gross motor skills to touch symbols on a Speech Generating Device (SGD), used English as their first language, and had a primary diagnoses other than delayed speech and language skills, vision or hearing impairment, or autism.

The children who participated in the intervention had a range of developmental disabilities including Down syndrome, cerebral palsy, Angelman syndrome, fragile X syndrome, premature birth, developmental delay, speech delay, and other disorders. Of those who reported race, Caucasian (N=47) was the dominant race reported followed by African American (N = 21), Asian (N = 5) and Multiracial (N = 3). The mean age of these children at the beginning of the intervention was 34.63 months of age. The sample was largely male (74%). The mean age of the participants at the 12 month follow up after the conclusion of the intervention program was 48.63 months.

2.2 Procedures of the Language Intervention and Current Study

The language intervention studies were designed to teach children and parents how to use a Speech Generating Device (SGD) (Romski et al., 2010; Romski et al., in press). Between the two studies, the researchers randomized participants into 4 different language intervention types, a spoken communication group (SCI), an augmented communication with input from the parents only (ACI), an augmented communication with output only (ACO), and a hybrid augmented communication with both input and output (ACIO) (Romski et al., 2010; Romski et al., in press). The spoken communication group was only used in the first study and was replaced by the ACIO group for the second study. For this secondary analysis, only participants in the augmented groups (ACO, ACI & ACIO) were examined. Participants in the spoken communication group were excluded because the focus of this study was on the relationships of AAC device use, communication abilities, and socialization skills. Of the sample used for this study, 23.7 % of participants were assigned to the ACI group, 46.1% were assigned to the ACO group, and 30.3% were assigned to the ACIO group. The intervention consisted of 24 sessions over 12 weeks, with 8 weeks held in the laboratory and 4 weeks conducted in the participants' home. Baseline measurements were collected before the language intervention began and the follow up assessment of expressive language was conducted immediately following intervention and at 3, 6, and 12 months after the intervention. Socialization scores, using the Vineland ABS and Vineland-II (Sparrows et al., 1984; Sparrows et al., 2005) were measured at baseline and at the 12 month follow up after the completion of the intervention.

2.3 Language Profile Measures

2.3.1 The Mullen Scales of Early Learning (MSEL; Mullen, 1995)

The MSEL contains 144 items, provides T scores, percentiles, and age equivalent scores for early intellectual development. The age equivalent scores were normed based on 1,016 children. The MSEL is comprised of five cognitive scales: Visual Reception, Receptive Language, Expressive Language, and Fine Motor, and Gross Motor Skills. The combined scores of the scales, the Early Learning Composite, can be interpreted as a measure of general intelligence. The MSEL is intended to identify learning ability, learning disability, and intellectual and developmental disability in young children between 21 and 63 months of age. At 24–30 months, alpha ranged from .82 to .88; at 36–42 months, alpha ranged from .87 to .90; at 48–54 months, alpha ranged from .84 to .89; and at 60–66 months, alpha ranged from .74 to .83, suggesting that this scale had adequate reliability. For the intervention study, the baseline T-score on the MSEL was 23, whereas a T-score around 30 is indicative of normal development. This measure was used as part of the initial screening to determine if a child met the inclusion criteria for the language intervention.

2.3.2 The Sequenced Inventory of Communication Development (SICD; Hendrick, Prather, & Tobin, 1984).

The SICD is a measure of expressive and receptive language ability in children aged 4-48 months. This measure was administered at pretest, posttest, and at the 12 month follow up. The expressive component includes items regarding imitation, initiation, response, and length of word productions and use of grammatical structures. The receptive component includes behavioral items that test sound and speech discrimination, awareness, and understanding. Scoring for this measure is an age equivalent score which was obtained by a sample of 252

children with typical development. This measure has an interrater reliability of .96 and a test-retest mean of .93 (Brassard, 2007). The average expressive language age equivalent score was 25.08 months (SD = 12.78) at the 12-month follow up, and the average receptive language age equivalent score was 30.14 months (SD = 9.87) for the current sample.

2.3.3 Functional Vocabulary (Romski et al., 2010)

A set of vocabulary items, that were not comprehended or produced, was chosen for each child individually. These vocabulary items were the targets used for intervention, such that the parent or interventionist were to use each target vocabulary word during each session. The child showed mastery of vocabulary words by communicating the word either vocally, or on the SGD. Each child began with 15 target vocabulary words, but as children mastered them, more words were added. Children in the ACI and ACO conditions showed larger gains in target vocabulary compared to the vocabulary gains in children in the SCI condition. For the purpose of this study, the vocabulary at session 24 of children in the ACI, ACO, and ACIO groups will be examined (M_{words} = 15.70, *SD* = 7.80).

2.4 Social Skills

2.4.1 The Vineland Adaptive Behavior Scales (VABS; Sparrow, Balla, & Cicchetti, 1984) and Vineland II (Sparrow, Balla, Cicchetti & Doll, 2005)

The VABS is a measure of adaptive behavior from birth through adulthood. There are four primary subscales: Communication (Expressive and Receptive Language Skills), Daily Living Skills, Socialization and Motor Skills. The socialization subscale is the only subscale that will be used for the purpose of this study. Additionally, because the data for this study came from two language intervention studies, two versions of the Vineland Adaptive Behavior Scales were used; Vineland ABS (Sparrow et al., 1984) and Vineland II (Sparrow et al., 2005).

Correlations for the socialization domain between the two versions were high for children birth through age 2 (*r* = .85) and for children ages 3 to 6 years (r = .94) (Sparrow et al., 2005). This measure was collected via a semi-structured interview with the participant's parent. This measure also provides a standardized score of socialization abilities. Split half reliability for the socialization subscale was .78. Test-retest reliability for all four domains ranged from .76 to .93 (Frame, 1987). For this study, raw scores for the socialization domain were used. The average socialization domain raw score at the 12 month follow up for the current sample was 55.47 (SD = 20.72). This measure was administered at pre-intervention and at the 12 month follow up.

2.5 Parent Questionnaire

2.5.1 Educational Placement and Intervention History

Twelve months after the completion of the intervention program, parents were asked about the child's school attendance per week, speech and language therapy delivery model, educational placement, engagement with peers and technology use. Attendance per week was provided by the parent selecting the percentage amount in groups of 20% that described how often children were in school. Speech and language therapy delivery model was provided by the parent choosing from among seven different options. Classroom placement was an open ended survey question where parents could write in the type of education environment the child was placed in upon beginning preschool.

3 RESULTS

Initially, to examine the relationships between measures of SICD expressive and receptive language, functional vocabulary at session 24, socialization score on the Vineland, gender, age, and AAC use, correlation analyses were conducted (see Table 1). Baseline Vineland socialization scores were positively related with both 12 month follow up expressive (r = .35, p = .002) and receptive language (r = .25, p = .03) age equivalent scores on the SICD. Baseline Vineland socialization scores also were positively related with functional vocabulary at session 24 (r = .39, p = .001). Additionally, 12 month follow up Vineland socialization scores were positively related with 12 month follow up expressive (r = .55, p < .001) and receptive language (r = .45, p < .001) scores on the SICD. Similarly, 12 month follow up Vineland socialization scores also were positively related with functional vocabulary at session 24 (r = .41, p < .001) indicating that children with higher Vineland socialization scores had a larger functional vocabulary.

Vineland socialization scores at both baseline (r = -.42, p < .001) and 12 month follow up (r = -.42, p < .001) were negatively related with AAC use suggesting that children who used an AAC device at 12 month follow up had lower socialization scores. AAC use also was negatively related to receptive (r = .51, p < .001) and expressive language (r = -.59, p < .001) on the SICD at 12 month follow up. Lastly, AAC use was negatively related with functional vocabulary at session 24 (r = -.26, p = .03), indicating that children who were using spoken expressive language had higher functional vocabularies than children using an AAC device at 12 month follow up.

3.1 Hypothesis 1a

To test the predictive relationship between language and socialization scores, a hierarchical regression analysis was conducted. Receptive and expressive language as measured

by the SICD at the 12 month follow up and expressive language as measured by functional vocabulary at session 24, and AAC use were used as predictors of 12 month follow up Vineland socialization score. Four models in the regression were created, and all but the last model were significant. The first model, including baseline Vineland socialization score as a control (R^2= .43, $F(1,70) = 52.48$, p <.001), the second model which added expressive and receptive language as measured by the SICD (R^2 = .50, ΔR^2 = .07, $F(2,68) = 4.51$, p = .01), and the third model which added functional vocabulary at session 24 (R^2 = .57, ΔR^2 = .08), were significant, $F(3,65) = 3.76$, p = .02. The fourth model added AAC use, but did not explain significantly more variance (R^2 = .57, ΔR^2 = .00, $F(1, 64) = .20$, p = .65). Expressive language, as measured by the SICD, was the significant predictor uniquely associated with socialization score (B = .59, SE = .25, p = .02). This relationship was positive suggesting that children with better 12 month follow up expressive language scores on the SICD had higher socialization scores. This relationship remained in the presence of all other variables, including controlling for baseline Vineland socialization score, and baseline language scores on the SICD. See Table 2 for the full regression table.

3.2 Hypothesis 1b

To test the transactional relationship between SICD language scores, functional vocabulary at session 24, and socialization scores, hierarchical regressions were conducted using baseline Vineland socialization scores to predict 12 month follow up language scores, and baseline language scores to predict 12 month follow up Vineland socialization scores. The hierarchical regression analysis using baseline language scores to predict 12 month follow up Vineland socialization scores revealed that when receptive and expressive language at baseline were included in the same block of the regression, neither receptive (B = .61, SE = .31, p = .05) nor expressive (B = .43, SE = .36, p = .24) language uniquely predicted socialization scores at the

12 month follow up (see Table 2). However, the change in R^2 from model 1 to model 2 was significant ($\Delta R^2 = .07$, $F = 4.51$, $p = .01$), suggesting that it is the shared variance between SICD expressive and receptive language that is predictive of 12 month follow up Vineland socialization score.

Due to this shared variance, separate regression analyses were conducted for expressive and receptive language (see Tables 3 and 4). After controlling for baseline Vineland socialization scores, baseline expressive language as measured by the SICD significantly predicted 12 month follow up socialization scores ($R^2 = .47$, $F(1,73) = 5.30$, $p = .02$), $B = .74$, $SE = .32$ $p = .02$. Similarly, after controlling for baseline Vineland socialization score, receptive language, as measured by the SICD, significantly predicted 12 month follow up socialization scores ($R^2 = .48$, $F(1, 73) = 6.69$, $p = .01$), $B = .71$, $SE = .27$, $p = .01$.

To test the relationship between baseline Vineland socialization scores and 12 month follow up language scores, further hierarchical regression analyses were conducted. Regression analyses revealed that baseline Vineland socialization score did not significantly predict SICD receptive language score at the 12 month follow up ($B = -.01$, $SE = .08$, $p = .91$); see Table 5. Additionally, baseline Vineland socialization score did not predict expressive language at the 12 month follow up as measured by the SICD when put in the model alone ($B = .04$, $SE = .11$, $p = .71$). However, when 12 month follow up Vineland socialization score and AAC use were added to the model, baseline Vineland socialization score became a significant predictor, $B = -.22$, $SE = .11$, $p = .049$. See Table 6 for the full regression table. Lastly, when using functional vocabulary at session 24 as the measure of expressive language, a significant result was found, such that baseline Vineland socialization score predicted functional vocabulary at session 24 ($B = .21$, $SE = .07$, $p = .01$); see Table 7.

3.3 Hypothesis 1c

In order to investigate the mean differences between socialization scores and language scores between children who continued to use an AAC device at the 12 month follow up and those who were primarily using spoken language, a series of independent samples t tests were conducted (see Table 8). Children who were no longer using an AAC device at the 12 month follow up had higher receptive (M = 20.74, SD = 5.94) language scores on the SICD than children who were using an AAC device (M = 15.12, SD = 6.77) at baseline, ($t(70) = 3.75$, $p < .001$, $d = .89$). Similarly, children who were no longer using an AAC device at the 12 month follow up had higher expressive language scores at baseline (M = 15.89, SD = 5.83) than children who continued to use an AAC device as their primary means of communication (M = 10.06, SD = 5.65), ($t(70) = 4.31$, $p < .001$, $d = 1.02$).

Children who were using speech as their primary means of communication had significantly higher socialization scores (M = 64.45, SD = 19.46) at the 12 month follow up than children who were using a device (M = 46.94, SD = 18.74), t (70) = 3.88, $p < .001$, d = .92. Further t tests also revealed that children no longer using a SGD also had higher receptive language scores (M = 24.71, SD = 7.92) as measured by the SICD than children still using a SGD (M = 24.82, SD = 8.99), t (70) = 4.96, $p < .001$, d = 1.17. Similarly, children who were no longer using an AAC device also had higher expressive language score on the SICD (M = 31.95, SD = 11.73) than children who continued to use a device (M = 17.29, SD = 8.38), $t(66.86) = 6.14$, $p < .001$, d = 1.43. Furthermore, children who were no longer using an AAC device had a higher expressive language ability (M = 17.84, SD = 8.31), as measured by the participant's functional vocabulary at session 24, than children who continued to use a device (M = 13.79, SD = 6.83), t (70) = 2.24, p = .03, d = .53.

3.4 Hypotheses 2a and 2b

In order to investigate the relationship between educational placement, socialization scores, and language scores, logistic regression using AAC use, language ability, and socialization scores to predict educational placement was conducted. This analysis yielded non-significant results, ($\chi^2 = 3.07$, $p = .55$), suggesting that these variables did not significantly predict the odds of educational placement in an inclusive classroom (See Table 9). Additionally, a series of independent samples t tests were conducted to further examine the differences between language ability, social skills, and educational placement. There were no significant differences in socialization score or language score between children placed in inclusive and self-contained preschool classrooms.

Furthermore, Figure 1 shows the grouping of students by educational placement and AAC use. Of the 28 children whose parents reported that they were enrolled in a self-contained classroom, 46.4% were not using an AAC device while 53.6% were. For the 26 children whose parents reported that they were in an inclusive classroom, 55.6% reported that they were no longer using an AAC device, while 40.7% reported that they were employing a device. Cross tabulation was conducted to test for differences between educational placement and AAC use, however the results were nonsignificant suggesting that children were not using AAC differently based on their educational placement, $\chi^2 = .69$, $p = .41$.

Table 1 Correlation Matrix with All Variables Used

Measure	1	2	3	4	5	6	7	8	9	10
1. VABS	-									
2. VABS FU	.66**	-								
3. Gender	-.07	.07	-							
4. Age	.102	.10	-.15	-						
5. Receptive Language	.36**	.44**	.02	-.11	-					
6. Receptive Language FU	.25*	.45**	.06	.66**	.66**	-				
7. Expressive Language	.50**	.50**	-.03	.53**	.53**	.45*	-			
8. Expressive Language FU	.35**	.55**	.02	.54**	.54**	.79**	.61**	-		
9. Vocabulary S24	.39**	.41**	.12	.47**	.47**	.52**	.16	.43**	-	
10. AAC Use	-.42**	-.42**	.03	-.41**	-.41**	-.51**	-.46**	-.59**	-.26*	-

Note. * < .05; ** < .001; FU= 12 month follow up; VABS = Vineland Adaptive Behavior Scales socialization score; Receptive Language = Receptive Language score on the SICD; Expressive Language = Expressive Language score on the SICD; Vocabulary S24 = Functional vocabulary score at session 24

Table 2 ***Regression Table for Variables Predicting 12 MFU VABS***

	Model 1			Model 2			Model 3			Model 4		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β
VABS	1.09**	.15	.65	.86**	.17	.51	.83**	.17	.50	.86**	.18	.51
Receptive Language				.61	.31	.20	.32	.37	.11	.33	.37	.11
Expressive Language				.43	.36	.13	-.09	.41	-.03	-.09	.41	-.03
Receptive Language FU							.01	.33	.00	.03	.33	.01
Expressive Language FU							.59*	.25	.36	.62*	.26	.38
Vocabulary S24							-.00	.29	-.00	-.02	.30	-.01
AAC Use										2.01	4.46	.05
R^2	.43			.50			.57			.57		
F for change in R^2	52.48**			4.51*			3.76*			.20		

Note. * < .05; ** < .001; FU = 12 month follow up; VABS = Vineland Adaptive Behavior Scales socialization score; Vocabulary S24 = Functional vocabulary score at session 24

Table 3 ***Regression Table for Baseline Expressive Language Scores Predicting 12 MFU VABS***

	Model 1			Model 2		
	B	SE	β	B	SE	β
VABS	1.10**	.148	.66	.91**	.17	.54
Expressive Language				.74*	.32	.23
R^2		.43			.47	
F for change in R^2		55.46**			5.30*	

Note. * < .05; ** < .001; 12 MFU = 12 month follow up; VABS = Vineland Adaptive Behavior Scales socialization score

Table 4 ***Regression Analysis for Baseline Receptive Language Predicting 12 MFU VABS***

	Model 1			Model 2		
	B	SE	β	B	SE	β
VABS	1.10**	.148	.66	.96**	.15	.57
Receptive Language				.71*	.27	.24
R^2		.43			.48	
F for change in R^2		55.46**			6.69*	

Note. * < .05; ** < .001; 12 MFU = 12 month follow up; VABS = Vineland Adaptive Behavior Scales socialization score

Table 5 ***Regression Analyses Predicting 12 MFU Receptive Language***

	Model 1			Model 2			Model 3			Model 4		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Receptive Language	.82**	.15	.58	.82**	.15	.58	.74**	.15	.52	.67**	.15	.47
Expressive Language	.20	.16	.13	.20	.18	.13	.15	.18	.10	.05	.17	.03
VABS				-.01	.08	-.01	-.12	.10	-.16	-.16	.09	-.20
VABS FU							.13*	.06	.29	.12*	.06	.25
AAC Use										-5.42**	1.95	-.28
R^2	.43			.43			.47			.53		
F for change in R^2	26.07**			.01			5.23*			7.73*		

Note. * < .05; ** < .001; FU = 12 month follow up; VABS = Vineland Adaptive Behavior Scales socialization score; Vocabulary S24 = Functional vocabulary score at session 24

Table 6 ***Regression Analyses Predicting 12 Month Follow Up Expressive Language***

	Model 1			Model 2			Model 3			Model 4		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Receptive Language	.49**	.20	.27	.48**	.20	.26	.33	.19	.18	.23	.18	.12
Expressive Language	.91**	.21	.46	.87**	.23	.45	.77*	.22	.39	.63*	.21	.32
VABS				.04	.11	.04	-.17	.12	-.17	-.22*	.11	-.22
VABS FU							.25*	.07	.41	.22*	.07	.37
AAC Use										-8.13*	2.37	-.33
R^2	.42			.42			.51			.58		
F for change in R^2	24.86**			.14			11.64*			11.75*		

Note. * < .05; ** < .001; FU = 12 month follow up; VABS = Vineland Adaptive Behavior Scales socialization score; Vocabulary S24 = Functional vocabulary score at session 24

Table 7 ***Regression Table Predicting Functional Vocabulary at Session 24***

	Model 1			Model 2			Model 3			Model 4		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Receptive Language	.62**	.14	.55	.57**	.14	.50	.53	.14	.47	.53	.14	.46
Expressive Language	-.14	.15	-.11	-.31+	.16	-.26	-.34*	.16	-.28	-.35*	.16	-.28
VABS				.21*	.07	.33	.15	.09	.25	.15	.09	.24
VABS FU							.06	.05	.17	.06	.05	.17
AAC Use										-.49	1.86	-.03
R^2	.25			.33			.34			.34		
F for change in R^2	11.26**			8.11*			1.46			.07		

Note. + = .05; * < .05; ** < .001; FU = 12 month follow up; VABS = Vineland Adaptive Behavior Scales socialization score; Vocabulary S24 = Functional vocabulary score at session 24

Table 8 ***T test for Differences between AAC Use and Nonuse in Receptive and Expressive Language, Vineland Socialization Score and Functional Vocabulary at Session 24***

	AAC USE						95% CI for Mean Difference	t	df
	No			Yes					
	M	SD	n	M	SD	n			
Receptive Language	20.74	5.94	38	15.12	6.77	34	2.63, 8.61	3.75**	70
Expressive Language	15.89	5.83	38	10.06	5.65	34	3.13, 8.54	4.31**	70
Receptive Language FU	34.71	7.92	38	24.82	8.99	34	5.91, 13.86	4.96**	70
Expressive Language FU	31.95	11.73	38	17.29	8.38	34	9.89, 19.41	6.14**	66.86
Vocabulary S24	17.84	8.31	38	13.79	6.83	34	.44, 7.65	2.24**	70
VABS FU	64.45	19.46	38	46.94	18.74	34	8.50, 26.51	3.88**	70

Note. * < .05; ** < .001; 12 MFU = 12 month follow up; VABS = Vineland Adaptive Behavior Scales socialization score; Vocabulary S24 = Functional vocabulary score at session 24

Table 9 ***Logistic Regression Predicting Educational Placement***

	Model 1				Model 2				Model 3			
	B	SE	Wald	OR	B	SE	Wald	OR	B	SE	Wald	OR
AAC Use	-.38	.55	.48	.68	-.25	.65	.15	.78	-.06	.68	.01	.95
Receptive Language FU					.03	.04	.40	1.03	.01	.04	.04	1.01
Vocabulary S24					-.02	.05	.20	.98	-.03	.05	.50	.97
VABS FU									.02	.02	2.03	1.02
χ^2			.49				.93				3.07	

Note. FU = 12 month follow up; VABS = Vineland Adaptive Behavior Scales socialization score; Vocabulary S24= Functional vocabulary score at session 24; OR = Odds Ratio

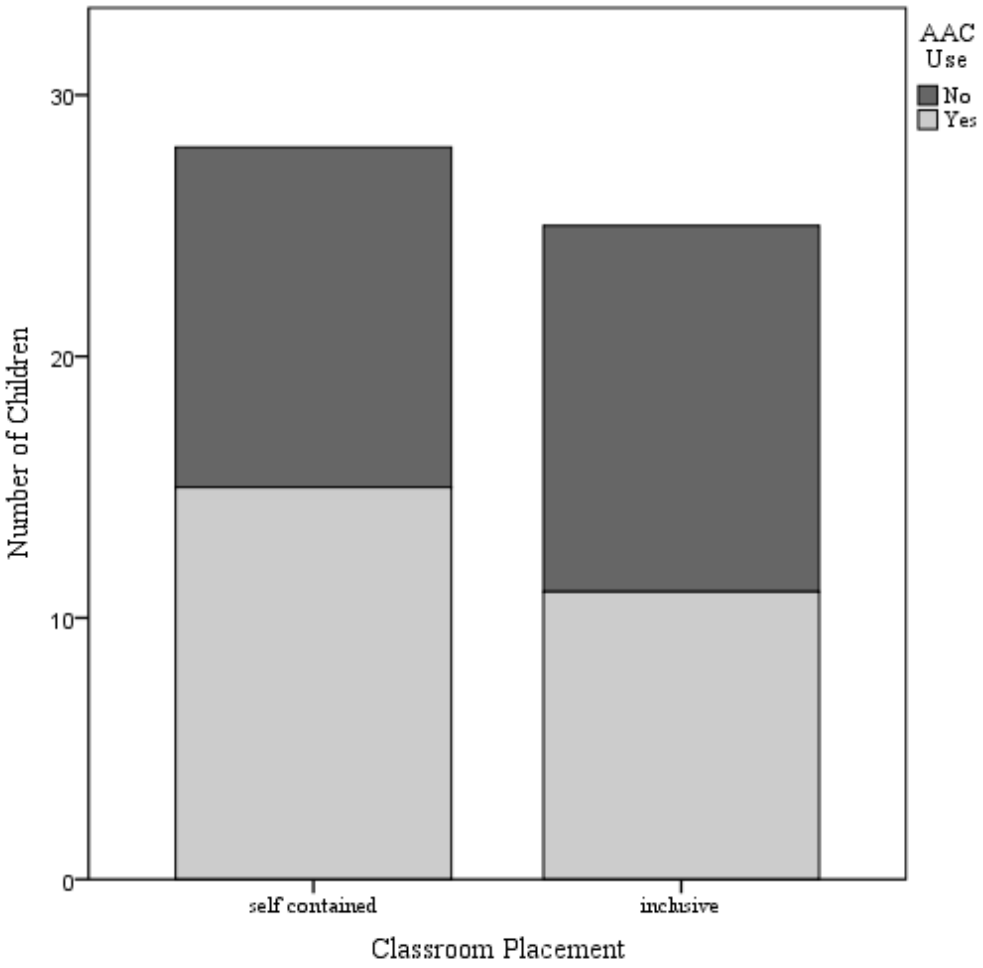

Figure 1. There were no differences in AAC use or placement.

4 DISCUSSION

The first set of hypotheses was intended to examine the nature of the relationship between language ability and socialization skills. We tested this relationship by examining the correlational relationship between language skill and socialization score, and we also examined the predictive relationship of language ability on socialization score.

We first predicted that language ability and socialization score would be positively related. Correlation analyses supported this hypothesis and revealed that those with higher expressive and receptive language scores on the SICD and who had a greater functional vocabulary at session 24 also had higher socialization scores. We also hypothesized that children who are speaking at 12 month follow up would have higher socialization scores than children who were employing AAC. Again, correlation analyses supported that hypothesis.

By using regression analyses to predict socialization score from language skill, we found that expressive language score on the SICD at 12 month follow up was the only predictor of socialization score at 12 month follow up. This suggests that regardless of receptive language ability or functional vocabulary use across spoken and augmented language, spoken expressive language is the strongest indicator of socialization score. These findings align with literature suggesting that children with better oral language ability are rated by teachers and parents as having better social abilities (McCabe & Meller, 2004).

The literature is clear on the positive relationship between language and socialization ability (King & Fahsl, 2012; Rice et al., 1991; Romski & Sevcik, 2005), however, the reciprocal nature of this relationship is not as well informed. For example, the social gating hypothesis of language (Kuhl et al., 2003) suggests that our social abilities as humans are integral for language learning. In that way, the social gating hypothesis supports the link that socialization abilities

should predict language scores. On the other hand, Robertson and Weismer (1999) found that by intervening on language ability in young children with language delay, socialization score on the Vineland also increased. This supports the link that language ability heavily influences social development.

Therefore, we predicted that there would be a transactional relationship between language and socialization scores. The results from several regression analyses indicated that this hypothesis is partially supported. We found that it is the shared abilities of expressive and receptive language that predict socialization scores, whereas socialization scores only predicted expressive language as measured by both the SICD and functional vocabulary use at session 24. This finding could reflect back on the items of the Vineland socialization subscale. Several questions in this subscale rely heavily on an expressive language ability, therefore, that could explain why only expressive language is being predicted by socialization score.

The second set of hypotheses was intended to examine the predictive nature of language ability and socialization score on educational placement. A logistic regression analysis was used to test these hypotheses. The results indicated that neither language abilities nor AAC use predicted the odds of being placed in an inclusive education setting. Therefore, this second set of hypotheses was not supported. This may not be surprising given our sample size. Educational placement was a parent report measure; several parents did not provide data for several reasons. For example, for several participants the follow up survey was administered during the summer months, so the parents reported that the children were in no type of program due to school being out for summer break. Additionally, several parents provided unclear answers regarding the educational placement of their child, such as selecting more than one educational placement,

which made selecting a dichotomous educational placement category difficult and sometimes impossible.

4.1 Clinical and Educational Implications

These findings support the existing literature suggesting that language and social skills are tightly intertwined. This work is important for clinicians in several ways. First, clinicians should consider this relationship and the interactive nature of language learning for children (Robertson & Weismer, 1999) and include social components as part of linguistic interventions. For example, several researchers (Campbell, 2006; Guralnick et al., 2011; Hartzell et al., 2015; Pierce & Schreibman, 1997; Stanton-Chapman & Brown, 2015) have found that using peers for social skills intervention has been effective. Perhaps including peers for language intervention could provide additional motivation for language learning for young children. Including social components in intervention may mean conducting sessions in a new setting than what has been previously used, or it may also include considering new models of intervention.

Given that a majority of a child's socialization occurs in the context of school, this work is important for educators as well. Though we did not find significant results suggesting that language abilities and socialization scores predict educational placement, the links between language abilities and socialization scores that were significant suggest that children on both typical and atypical paths of development may benefit in both language and social development from interacting with each other.

4.2 Limitations

There are several limitations that restrict our ability to generalize our findings to a broader population. One such limitation was our sample size. Our sample of 76 participants was relatively small for the analyses we conducted. However, given that the data was archival, we

were unable to collect additional data to improve our sample size. However, even with the given sample size, many of the effect sizes from our analyses were moderate to large.

A second limitation for the implications of our findings was the nature of the measures available in the dataset. Several questions on the socialization domain of the Vineland are language based, so it is difficult to determine the true social abilities of children with very limited speech by using this measure. However, Robertson and Weismer (1999) examined this same limitation when they intervened on spoken language for children with language impairment. After finding that their participants showed significant gains on the socialization domain of the Vineland after a language intervention, they conducted an item analysis on the questions on the socialization domain and were able to conclude that their participants still had significant socialization domain gains even after removing the items that were language dependent. Unfortunately, the researchers did not specify which items they labeled as being language dependent.

Along with the issues surrounding the Vineland, the measure we used for educational placement was parent report. There were several complications that came with using a parent report measure. Some parents did not provide responses regarding educational placement. Additionally, parents often reported unclear educational placement data which made it very difficult to use educational placement as a dichotomous variable. For example, some parents provided both an inclusive and a self-contained educational setting for their child. In these cases, these children were considered to be in an inclusive education setting because we assumed that any interaction with children who were typically developing would be beneficial in regards to language and social abilities. Additionally, some parents responded to the survey during summer months and therefore responded that their child was not attending any type of educational

program. Having unclear educational placement data further limited our sample size for the logistic regression we conducted when trying to predict educational placement.

4.3 Future Directions

Due to the limitations of this study, there are several ways that this research can be furthered. First, modeling after Robertson and Weismer (1999), item analyses for the individual items in the socialization domain of the Vineland should be conducted with this sample to determine if the increases in socialization scores are attributed to increases in language ability, or if socialization abilities truly improved. Additionally, this study has provided preliminary evidence for the transactional relationship between language and social abilities. We found that SICD measures of language predicted socialization scores, and that socialization scores predicted measures of expressive language, but not receptive language. However, due to the archival nature of the dataset, this relationship could not be tested without several limitations, such as lack of control variables for functional vocabulary, and the language dependent nature of the measures available from the archival data, particularly the Vineland. Future studies should collect independent data using measures targeted to detect changes in social abilities in a more thorough way to further examine this relationship. For example, using established surveys like the Vineland are helpful, but could provide more conclusive information if paired with observational data.

There are also several future directions to consider regarding the educational placement research questions examined in this study. We examined educational placement as a binary variable of either self-contained or inclusive. There are several other ways to examine educational placement that may be impacted by external factors. For example, investigating the differences in language and social abilities of children who attend public versus private school

may provide helpful information regarding the abilities of children who are placed in schools by their parents due to services offered in different facilities.

Additionally, we only examined how language skill and socialization score predicted educational placement. However, there are several other factors that we did not measure that could play a role in educational placement. For example, the cognitive abilities of a child could influence the type of classroom in which a child is educated. Future studies should include skills and abilities beyond language and socialization in investigating educational placement.

In conclusion, language and socialization scores are positively related at cross sectional levels and also longitudinally in this particular sample of young children who have developmental and speech delays and were taught to use a SGD. Additionally, the relationship between language and socialization appears to be reciprocal in nature, however, more research on this relationship is needed in this population. Furthermore, children who were no longer using a SGD 12 months following language intervention had higher socialization scores and language scores. It also appears that these higher scores indicate that the SGD was no longer used because it was no longer needed for communication. We did not detect any differences in educational placement regarding language skill, socialization score, or AAC use for this population, however more research is needed using larger samples, more rigorous measures for socialization, and additional variables such as cognitive ability.

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