

EMERGENT LITERACY DEVELOPMENT IN CHILDREN WITH  
AUTISM SPECTRUM DISORDERS

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## ABSTRACT

ELIZABETH LANTER (Emergent Literacy in Children with Autism Spectrum Disorders (Under the direction of Linda Watson, Ed.D.)

The term “emergent literacy” is broadly used to characterize the time during which children are developing those skills and abilities that precede independent reading and writing abilities. Since the term was first used, researchers’ and educators’ increasing knowledge of emergent literacy has led to the identification of component skills and characteristics in young children, as well as aspects of their home environments that are associated with their later literacy accomplishments (National Research Council [NRC], 1998). Aspects of the home environment associated with literacy achievements are commonly referred to as the child’s “home literacy practices” (Boudreau, 2005). Component skills include: oral language ability, print concepts knowledge (environmental print recognition, knowledge of print forms, conventions, and functions), alphabet knowledge (letter name and letter sound), name writing and other forms of emergent writing abilities, and phonological awareness. Characteristics include pretend reading and literacy motivation. Home literacy practices associated with later literacy include the parents’: use of behaviors that promote literacy learning, personal literacy abilities, and beliefs and attitudes about their child’s education.

Children’s emergent literacy has not been widely studied in the population affected by autism spectrum disorders (ASD). In order to better understand emergent

literacy development in young children with ASD, this study descriptively explored the component skills and characteristics, as well as the home literacy practices associated with later literacy for children with typical development, in young children with ASD. Forty-one child participants with ASD between the ages of 4 years 0, months and 7 years, 11 months were assessed directly in this study. A clinical diagnosis of ASD was documented via records review; in addition, parents completed the *Social Communication Questionnaire* (SCQ; Rutter, Bailey, & Lord, 2003), a screening tool for autism. Parents of thirty-five of these children took part in a structured interview related to the emergent literacy development and experiences of their children. The child participants' literacy-related behaviors were assessed via direct and indirect assessments. Direct assessments included measures of the children's oral language abilities, nonverbal cognitive abilities and early literacy abilities (print concepts, alphabet knowledge, and name writing). Indirect assessment via a structured interview using the *Home Emergent Literacy Profile for Children with Autism Spectrum Disorders* (HELPA, Lanter, 2008) further explored these early literacy abilities, as well as the children's emergent writing, phonological awareness, pretend reading, and literacy motivation. The HELPA, a measure specifically designed for this study, was the sole instrument used to explore those aspects of children's home literacy practices previously mentioned as being associated with literacy development in children with typical development.

Findings related to the children's component skills and characteristics suggested that oral language skills were moderately correlated with the children's early literacy skills ( $r$ s between .32-.45), and that an uneven pattern of acquisition of

early literacy skills and abilities was observed both within and across early literacy abilities. Relative early literacy strengths in the children included the knowledge of mechanical aspects of print concepts (e.g., book orientation) and letter name identification. Relatively weak skills included pretend reading and understanding the purpose of reading and writing. Variable performance was observed in the other skills measured in this study. The most striking finding was that early literacy skills related to a conceptual understanding of the communicative purpose of reading and writing (e.g., pretend reading, understanding the purpose of reading and writing) were found to be weaker than those that do not require this understanding (e.g., environmental print recognition, book orientation, letter name identification). Although limitations in early literacy skills existed for many of the children in this study, parents of the overwhelming majority of the child participants reported high levels of literacy motivation. Findings related to the children's home literacy practices suggested that: (a) home literacy practices alone may not be sufficient to ensure these children's literacy achievements; (b) the parents' use of home literacy practices may have been influenced by characteristics of the child; and (c) many of the parents reported feeling that their child exhibited a strength in literacy skills, despite reporting that they felt their child may not have a solid understanding of the purpose of literacy.

There are five implications to be drawn from these findings. First, speech-language pathologists and teachers should recognize that, consistent with children who have typical development, oral language skills are associated with early literacy skills among children with ASD, but that some children with significant oral language difficulties may show relative strengths in some early literacy skills. Literacy

instruction should thus focus on both aspects of development, oral language skills *and* traditionally viewed early literacy skills in children with ASD. This recommendation is consistent with best practice recommendations (e.g., Center for Early Literacy Learning [CELL], 2007; NRC, 1998). Second, variability both within and across areas of early literacy development is apparent among children with ASD. While variability also is observed in children with typical development, for the children in this study, there appeared to be relative difficulty with understanding the social communicative purpose of written communication. This parallels what we know about language development in the population with ASD, that pragmatic language abilities are more adversely affected than structural language abilities (Tager-Flusberg, 2004). Further research is needed to consider how the early literacy profile observed in this study speaks to what we know about the disorder. This finding encourages speech-language pathologists and teachers to employ instructional methods that teach of the components of literacy to children with ASD in meaningful literacy activities (e.g., writing notes). This pedagogy should be extended to the children's parents, so that they can consider literacy skills in a framework that includes both component skill development and understanding. This is considered best practice for children with typical development (NRC, 1998).

Third, for children with ASD, the parents' use of behaviors that promote literacy learning may not be sufficient to ensure these children's literacy achievement. Especially for those children with more significant oral language impairments; school-based instruction using evidence-based teaching methods may be needed in addition to experiences provided in the home environment. For children with typical

development, research has shown that promoting early literacy abilities through an evidence-based curriculum contributes to later reading abilities for some children (Vaughn, Linan-Thompson, & Hickman, 2003). Further research is needed to evaluate the efficacy of emergent literacy programs for children with ASD. Fourth, the literacy teaching behaviors of the children's parents in this study may have been influenced by the child's abilities. This suggests that educational professionals may want to individualize home programs based on the ability of the child and feedback from the family.

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## TABLE OF CONTENTS

LIST OF TABLES.....	xiii
CHAPTER 1: Introduction.....	1
Statement of the Problem.....	1
Children’s Component Skills and Characteristics.....	4
Children’s Home Literacy Practices .....	7
Significance .....	7
Research Questions.....	9
CHAPTER 2: Review of the Literature.....	10
Defining the Autism Spectrum Disorders.....	10
Theoretical Framework.....	13
Children’s Component Skills.....	16
Oral Language.....	18
Print Concepts.....	25
Alphabet Knowledge.....	29
Name Writing and Other Forms of Emergent Writing...	31
Phonological Awareness.....	34
Pretend Reading.....	36
Nonverbal Cognitive Ability.....	37
Children’s Literacy Motivation.....	38

Children’s Literacy-Rich Experiences and Instructional Practices.....	38
Provision of Literacy Materials.....	39
Informal Literacy Activities .....	40
Formal Literacy Activities .....	42
Parents’ Personal Literacy Abilities and Beliefs and Attitudes.....	43
Development of Conventional Literacy Skills .....	44
Development of Conventional Literacy Skills in Children with ASD.....	46
Summary .....	48
CHAPTER 3: Method.....	49
Research Questions.....	49
Participants.....	50
Sample Size.....	50
Recruitment.....	50
Criteria.....	51
Procedures .....	54
Data Collection Measures and Instruments.....	55
Oral Language.....	56
Nonverbal Cognition.....	56
Formal Literacy Measure.....	57
Informal Literacy Measure.....	59
Home Literacy Practices.....	61
Confirming Diagnosis of Autism.....	61

Design.....	63
CHAPTER 4: Results.....	65
Preliminary Analyses.....	67
Oral Language.....	67
Nonverbal Cognition.....	67
Formal Early Literacy Measure.....	68
Implications of Preliminary Analyses for Further Statistical Tests.....	69
Analyses of Research Questions.....	69
What early literacy skills and understandings do young children with ASD possess with regard to print concepts, alphabet knowledge, name and other forms of emergent writing, phonological awareness, pretend reading, and literacy motivation.....	69
How does the performance of young children with ASD on measures of emergent literacy compare to emergent literacy expectations for children with typical development, based on the extant literature and the grade level expectations of the North Carolina Department of Public Instruction Standards.....	75
What are the associations of age, oral language, and nonverbal cognitive skills and abilities of children with ASD with their early literacy skills and abilities.....	92
In families that include a young child with an ASD, what are the primary caregivers' personal literacy abilities, use of behaviors that promote literacy learning, and beliefs and attitudes about their child's education? .....	95
How are the oral language and early literacy abilities of children with ASD associated with primary caregivers' behaviors that may promote literacy learning and caregivers' beliefs and attitudes about their child's education?.....	99

Summary.....	100
CHAPTER 5: Discussion.....	101
Research Question One.....	103
Oral Language.....	103
Print Concepts.....	104
Alphabet Knowledge.....	107
Name and Other Forms of Emergent Writing .....	108
Phonological Awareness.....	109
Pretend Reading.....	111
Literacy Motivation.....	112
Research Question Two.....	114
Research Question Three.....	116
Research Question Four.....	118
Research Question Five.....	120
Limitations.....	121
Future Research.....	123
REFERENCES.....	149

## LIST OF TABLES

### Table

1. Child Participant Information: Race..... 125
2. Parental Respondents on the Home Emergent Literacy Profile for Children with Autism Spectrum Disorders (HELPA).....126
3. Child Participant Information: TELD Grouped Language Standard Scores and Means and Standard Deviations (SD).....127
4. Child Participation Information: Grouped Standard Scores, Means, and Standard Deviations (SD) of the Child Participants' K-BIT Nonverbal Cognitive Scores.....128
5. Child Participant Information: Means and Standard Deviations (SD) of the Child Participants' ELP Scores Measured as Percent Correct.....129
6. Child Participant Information: ELP Grouped Scores Measured as Percent Correct..... 130
7. Child Participant Information: Question Types Child Most Able to Answer as Reported by Caregiver on the Home Early Literacy Profile for Children with Autism Spectrum Disorders (HELPA).....131
8. Parental Responses to Questions Regarding Child Emergent Literacy Skills on the Home Early Literacy Profile for Children with Autism Spectrum Disorders (HELPA).....132
9. Child Participant Information: Children's Frequency Looking at Books, Asking/Gesturing for Someone to Read, Pretend Reading, Independently Writing, and Interest in Letters According to the Home Early Literacy Profile for Children with Autism Spectrum Disorders (HELPA).....134
10. Child Participant Information: Children's Observed Affect During Shared Reading and Inferred Feelings of Getting a Book as a Gift According to the Home Early Literacy Profile for Children with Autism Spectrum Disorders (HELPA).....135
11. Spearman Rho Correlations between the Children's Language and Nonverbal Cognitive Scores.....136

12. Spearman Rho Correlations between the Children’s Early Literacy, Language, and Nonverbal Cognitive Scores.....	137
13. Spearman Rho Inter-Correlations between the Children’s Early Literacy Skills.....	139
14. Adult Participant Information: Number of Different Types of Child and Adult Reading Materials, Writing Materials, Toy Related Educational Materials, and Books Owned by Child in the Home According to the Home Early Literacy Profile for Children with Autism Spectrum Disorders (HELPA).....	141
15. Adult Participant Information: When Parents Started Reading to Child and the Person Whom Reads Most Often to the Child Participant in the Home According to the Home Early Literacy Profile for Children with Autism Spectrum Disorders (HELPA).....	143
16. Adult Participant Information: Frequency Child is Read to, Frequency Parents Point out Why Someone Would Read, Frequency Parents Teach Reading (Outside Shared Reading), and Frequency Parents Teach Writing According to the Home Early Literacy Profile for Children with Autism Spectrum Disorders (HELPA).....	144
17. Adult Participant Information: Maternal Education and Personal Literacy Abilities of Parents of Child Participants According to the Home Early Literacy Profile for Children with Autism Spectrum Disorders (HELPA).....	145
18. Adult Participant Information: Parents Perception of Importance of Literacy Learning for their Children, Their Confidence to Teach Their Children Literacy, and Parents Perception of Their Child’s Literacy Ability and Parent’s Beliefs Regarding Whose Responsibility they Feel it is to Teach Literacy to Children with Special Needs According to the Home Early Literacy Profile for Children with Autism Spectrum Disorders (HELPA).....	147

## CHAPTER 1

### Introduction

This aim of this study was to describe emergent literacy in children with autism spectrum disorders (ASD). This was accomplished by exploring aspects of emergent literacy development known to be instrumental in future reading development for children with typical development, in children with ASD. This includes examinations of the children's component skills and characteristics, as well as their home literacy practices (National Research Council [NRC], 1998). The following begins with a summary of the problem. It then moves to an introduction of the component skills and characteristics observed in young children and then the children's home literacy practices associated with literacy achievement. The significance of this research and the research questions for the present study are discussed last.

#### Statement of the Problem

The term "emergent literacy" was first used to reflect a perspective which purported that: (a) children develop critical reading and writing skills before they are conventionally literate (i.e., independently and fluently able to read and write words with understanding); (b) children's oral language development contributes to the development of their conventional literacy abilities; and (c) children's parents and home environments play a significant role in the development of their children's

conventional literacy abilities (Teale & Sulzby, 1986). This perspective reflected the ideology that different component skills are captured by the term emergent literacy and that factors outside of the child contribute to their abilities to become successful readers. Today, researchers have identified several component skills that are associated with later literacy in children with typical development. These component skills include: children's oral language ability, print concepts knowledge (environmental print recognition, knowledge of print forms, conventions, and functions), alphabet knowledge (letter name and letter sound), name and other forms of emergent writing abilities, and phonological awareness (National Early Literacy Panel [NELP], 2007). Researchers also have observed that characteristics in children, such as pretend reading (Sulzby, 1985) and their literacy motivation (Durkin, 1966), are associated with literacy development.

Factors outside of the child also have been identified as being instrumental in children's literacy development. What children do in the home environment, in terms of literacy development, is often referred to as the child's "home literacy practices," the "print and related experiences facilitative of literacy development that occur in the child's environment" (Boudreau, 2005, p. 35). Parental behaviors such as supplying reading materials for their child, reading to their child, and teaching their child how to read and write have been associated with literacy achievements for children with typical development (Christian et al., 1998; Frijeters et al., 2000; Petrill et al., 2005; Sénéchal & LeFevre, 2002). The parents' (a) personal literacy abilities (Christian et al., 1998; Gilger et al., 1991) and (b) beliefs and attitudes about their child's



education (Petrill et al; 2005) also are home literacy practices associated with reading achievements for children with typical development.

Educational programs that have targeted component skills in children and home literacy practices have resulted in literacy gains for some children (Whitehurst et al., 1994; Vaughn, Linan-Thompson, & Hickman, 2003). Accordingly, educational professionals who are responsible for teaching children emergent literacy skills, such as speech-language pathologists and teachers, are encouraged to consider not only the child's skills, but also the child's home literacy practices (NRC, 1998; Snow, Scarborough, & Burns, 1999). Examinations of emergent literacy have, unfortunately, been neglected for children with ASD. ASD includes the diagnoses of autism, Asperger syndrome, and pervasive developmental disorder - not otherwise specified (PDD-NOS). According to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR; American Psychiatric Association, 2000), children who meet the criteria for these diagnoses all demonstrate the same core features: verbal and/or nonverbal communication impairments, deficits in reciprocal social interactions, and restricted and/or repetitive behaviors or interests. The difficulty many children with ASD experience in terms of their expressive and receptive language development may lead educational professionals to presuppose that they are "not ready," or "too cognitively impaired" for formal literacy instruction (Mirenda, 2003, p. 271). Similarly, if children with ASD have significant language difficulties, any early literacy skills they exhibit (e.g., letter name identification) may be dismissed by educational professionals as unrelated to conventional literacy. This helps explain why the U.S. Department of Education (2007) expresses concerns that

our public schools are struggling to respond to the educational needs of children with autism, and why educators and administrators around the U.S. have concerns about the adequacy of their literacy instruction for children with autism (Koppenhaver, Pierce, & Yoder, 1995). This is increasingly problematic as children identified with autism in the U.S. public schools are growing in number (U.S. Department of Education, 2000-2001).

This study attempted to address the problem of teaching children with ASD literacy skills by describing aspects identified as instrumental in literacy development for children with ASD. This is consistent with best practices in teaching which includes understanding the abilities of students (Division of Early Childhood [DEC], 2003). As such, the information presented in this study seeks to help speech-language pathologists and teachers understand not only what emergent literacy component skills and characteristics may be observed in the population, but also what home literacy practices may influence this development. The following summarizes the research regarding children's component skills and characteristics, as well as their home literacy practices.

#### Children's Component Skills and Characteristics

Emergent literacy recognizes the importance of those skills and abilities exhibited by children before they are conventionally literate (Teale & Sulzby, 1989). The terms emergent literacy and conventional literacy have been defined differently by researchers over the years. More recently, the NELP (2007) defined "emergent" literacy skills as those that: (a) precede conventional literacy skills, and (b) predict conventional literacy. They defined "conventional" reading and writing skills as: (a)

children's ability to read words accurately and fluently, while also comprehending those words in the context in which they were presented, and (b) the ability to spell words and write text. Researchers have examined skills and abilities that are associated with and/or characteristic of conventional literacy in children with typical development. The NELP (2007) reported that children's oral language, print concepts knowledge, alphabet knowledge, name writing and other forms of emergent writing abilities, and phonological awareness are predictive of conventional literacy in children with typical development. The Center for Early Literacy Learning (CELL, 2007) supports the position that these component skills fall broadly into two categories, those that are "linguistic processing" skills and those that are "print-related." The CELL argues that the linguistic processing skills include children's oral language and phonological awareness skills, and the print related skills include print concepts knowledge, alphabet knowledge, and name writing and other forms of emergent writing. These components are assessed in this study as are children's pretend reading (Sulzby, 1985) and literacy motivation (Durkin, 1966), because they also have been identified as being associated with reading achievement. All of these skills are described in detail in Chapter 2.

Researchers have examined interrelationships between some of these component skills in children who are not yet conventionally literate. Oral language skills have been found to be moderately correlated ( $r > .40$ ) with early literacy skills (as measured with a composite index of print concepts, alphabet knowledge, name writing) and phonological awareness skills for children with typical development (Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003). Research

further reveals that literacy interventions with preschool age children who have typical development positively affect their oral language skills, such as their expressive vocabulary and oral narrative skills, emphasizing the reciprocal effects of literacy learning and oral language development during this period (Whitehurst et al., 1994; Zevenbergen, Whitehurst, & Zevenbergen, 2003). The interrelationships between children's oral language and traditionally viewed early literacy skills support the position that both linguistic processing and print-related skills are important for children's literacy development.

For children with ASD, little is known regarding the development of the array of skills most associated with literacy development. There is some research, however, that speaks to the interrelationships among these skills in this population. In contrast to children with typical development, children with ASD are likely to exhibit an uneven profile in developing the varied continua of skills associated with reading achievement. For example, data-based case studies and Individualized Education Plan (IEP) chart reviews revealed that children with ASD may have acquired some specific early literacy skills, such as letter name identification, while also having expressive and/or receptive language difficulties (Church, Alisanski, & Amanullah, 2000; Craig & Sexton Telfer, 2005; Diehl, Ford, & Federico, 2005; Koppenhaver & Erickson, 2003). Similar to children with typical development, research supports the belief that the skill sets develop in an interrelated fashion among children with ASD.

Quantitative and qualitative research studies suggest that via participation in literacy interventions, some children with ASD improved their oral language skills (Broun, 2004; Colascent & Griffith, 1999; Koppenhaver & Erickson, 2003; Wolfberg, 1999).

## Children's Home Literacy Practices

Researchers have found that several aspects of children's home literacy practices are associated with literacy development for children with typical development. Some of these aspects include the parents': (a) use of behaviors that promote literacy learning, such as reading to their child, teaching their child how to read and write, and/or supplying reading materials for their child (Christian, Morrison, & Bryant, 1998; Frijeters, Barron, & Brunello, 2000; Petrill, Deater-Deckard, Schatschneider, & Davis, 2005; Sénéchal & LeFevre, 2002); (b) personal literacy abilities (Christionson et al., 1998; Gilger, Pennington, & Defries, 1991); and (c) beliefs and attitudes about their child's education (Petrill et al; 2005). Examination of the home environment reflects an ecological framework which views children's development as being reflective of their resources and interactions across environments (e.g., home and school) (Aikens & Barbarin, 2008; Bronfenbrenner, 1979).

In contrast to children with typical development, little research has explored home literacy practices for children with ASD. Pilot data from one questionnaire completed by parents of preschool children with ASD revealed that the children's home environments were highly supportive of literacy development. The parents reported abundant reading and writing materials were available in the home and that they read to their children several times a week (Watson, Andrews, & Orovitz, 1996).

## Significance

Research is needed to understand how, in children with ASD, their component skills and characteristics, as well as their home literacy practices, contribute to their

literacy accomplishments. In terms of children's component skills and characteristics, we do not have an established understanding of literacy skill development in this population. Best practice for teaching is that educators understand the abilities in their students (DEC, 2003). Second, we do not know how early literacy skills are interrelated with oral language and nonverbal skills for children with ASD. These limitations in knowledge are problematic for educational professionals in our public schools. Both the Individuals with Disabilities Education Act (IDEA) of 2004 and the No Child Left Behind Act of 2001 encourage school professionals to select assessments, intervention targets, and intervention protocols supported by empirical evidence. The lack of literacy research for children with ASD makes it difficult for educational professionals working in our public schools to implement educational policy. More importantly, the U.S. Department of Education (2000-2001; 2007) expresses concerns that our public schools are struggling to respond to the educational needs of this fast growing group of children, and posits that educational professionals who are knowledgeable about ASD are more likely to effectively teach these children. Speech-language pathologists and other educational professionals who know more about emergent literacy development in children with ASD may choose to adopt a different pedagogical perspective, expand their language and literacy expectations for these children, or engage in more fruitful collaborative efforts with these children's caregivers. More research also is needed to understand how the home literacy experiences of children with ASD contribute to their oral language and early literacy development. This type of research is important because it may be helpful in guiding instructional practices, and promoting collaboration among educators and

parents of children with ASD. This is especially important in today's educational climate because the IDEA (2004) mandates that the parents of children receiving special education services should be a part of their child's educational plan.

### Research Questions

The research questions in this study are as follows:

(1) What emergent literacy skills and understandings do young children with ASD possess with regard to oral language, print concepts, alphabet knowledge, name and other forms of emergent writing, phonological awareness, pretend reading, and literacy motivation?

(2) How does the performance of young children with ASD on measures of emergent literacy compare to emergent literacy expectations for children with typical development, based on the extant research literature and the grade level expectations of the North Carolina Department of Public Instruction Standards of Learning?

(3) What are the associations of age, oral language, and nonverbal cognitive skills and abilities of children with ASD with their early literacy skills and abilities?

(4) In families that include a young child with an ASD, what are the primary caregivers' use of behaviors that promote literacy learning, personal literacy abilities, and beliefs and attitudes about their child's education?

(5) How are the oral language and early literacy abilities of children with ASD associated with primary caregivers' behaviors that may promote literacy learning and caregivers' beliefs and attitudes about their child's education?

## CHAPTER 2

### Review of the Literature

The following presents research summaries in four areas, all of which are intended to contribute to a more complete reflection of our current understanding of emergent literacy development in children with autism spectrum disorders (ASD). The first area provides a definition of ASD. The second area provides a theoretical framework for children's component skills and characteristics and home literacy practices associated with literacy accomplishments. In this part, the children's component skills and characteristics, as well their home literacy practices that have been associated with literacy achievements for children with typical development, are listed, defined, and summarized with reference to the research. The third area discusses the development of conventional literacy skills in children with typical development. In this part, Ehri's (1995) phases of literacy development are discussed. The fourth area discusses the development of conventional literacy skills in children with ASD. In this part hyperlexia and difficulties with reading comprehension observed in children with ASD are reported.

#### Defining the Autism Spectrum Disorders

Varying classification systems are used to define ASD. According to the diagnostic criteria in the fourth edition of the American Psychiatric Association's (APA) *Diagnostic and Statistical Manual on Mental Disorders-Text Revision* (DSM-



IV-TR; 2000) and the tenth edition of the World Health Organization's (1992) *International Classification of Diseases (ICD-10)*, children who meet the criteria for an autism diagnosis have social relatedness difficulties, impaired communication, a limited range of interests, and an onset of the condition prior to the age of 3 years (Volkmar & Klin, 2005). These classification systems distinguish Asperger syndrome from autism based on linguistic and cognitive ability in the first 3 years of life (Klin, McPartland, & Volkmar, 2005), specifying that children with Asperger syndrome do not present with substantial impairment in cognitive or structural language development. Most children with autism have cognitive impairments, often defined as individuals who have intellectual quotients (IQs) below 70 (Watson & Ozonoff, 2000). Children with autism who do not have cognitive impairment have been referred to as having "high-functioning autism" (Klin et al., 2005). A diagnosis of Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) in these classification systems is used for children who exhibit behaviors consistent with an autism disorder, but whose symptoms fail to reach the threshold levels for a diagnosis of a specific pervasive developmental disorder such as autism or Asperger syndrome.

There have been confusions and inconsistencies related to the use of the terms high-functioning autism and Asperger syndrome in both clinical and research studies (Klin et al., 2005). For example, a review by MacIntosh and Dissanayake (2004) concluded that the evidence is not convincing that individuals diagnosed with high-functioning autism differ in predictable ways from individuals diagnosed with Asperger syndrome. Klin et al. (2005) argue that the term Asperger syndrome has been used to refer to individuals with high-functioning autism and other milder forms

of autism. Part of the problem is that the research community has not reached a consensus as to the appropriate diagnostic criteria for Asperger syndrome, whether or not to distinguish it from high-functioning autism, and if so, how to distinguish the two. Another part of the problem is that individuals with ASD vary according to their abilities and these abilities change in the same individual across time (Volkmar, Lord, Bailey, Schultz, & Klin, 2004). The Individuals with Disabilities Education Act (IDEA; 2004) provided a definition of autism for the purposes of educational services. This definition, which is the primary reference for public education entities in the United States, categorizes children who fall within the autism spectrum as having “autism,” even if they do not meet the full criteria for autism based on the DSMIV-TR (APA, 2000). The definition provided in IDEA (2004) is as follows:

“Autism means a developmental disability significantly affecting verbal and nonverbal communication and social interaction, generally evident before age 3, which adversely affects a child's educational performance. Other characteristics often associated with autism are engagement in repetitive activities and stereotyped movements, resistance to environmental change or change in daily routines, and unusual responses to sensory experiences. The term does not apply if a child's educational performance is adversely affected primarily because the child has an emotional disturbance as defined by IDEA criterion. A child who manifests the characteristics of "autism" after age 3 could be diagnosed as having "autism" if the criteria in the preceding paragraph are met.” [From the Individuals with Disabilities Education Improvement Act, 34 CFR 300.7, Section 300.7 (c) (1)].

It can be seen that the IDEA (2004) definition was broadly written to encompass the spectrum, but it may be interpreted differently by each state, resulting in varied eligibility criteria for school special education services (Shriver, Allen, & Mathews, 1999). Some children in this study received autism diagnoses from their public schools; thus, their specific spectrum disorder was unknown. In addition, DSMIV-TR criteria for diagnoses other than Asperger disorder are independent of the individual's level of cognitive and language functioning. The children in this study should be viewed as encompassing the autism spectrum.

### Theoretical Framework

Many researchers have examined which factors contribute to children's ability to become successful readers. It has been found that several factors both within and outside of the child contribute to this development. Factors within the child include their abilities in component areas, such as: oral language, print concepts, alphabet knowledge, name and other forms of emergent writing, and phonological awareness (National Early Literacy Panel [NELP], 2007). Characteristics in children, such as pretend reading (Sulzby, 1985) and the child's literacy motivation (Durkin, 1966) also have been identified as being associated with later literacy ability. Factors outside the child include the home literacy practices explored in this study. This includes the parents' personal literacy abilities (Christian, Morrison, & Bryant, 1998; Gilger, Pennington, & Defries, 1991) and beliefs and attitudes about their child's education (Petrill, Deater-Deckard, Schatschneider, & Davis, 2005). It also includes their use of behaviors that promote literacy learning, such as: reading to their child, teaching their child how to read and write, and/or supplying reading materials for

their child (Christian et al., Frijeters, Barron, & Brunello, 2000; Petrill et al., 2005; Sénéchal & LeFevre, 2002). All of these factors, thus, are presumed to serve critical roles in children's development of literacy skills.

The Center for Early Literacy Learning (CELL, 2006) organized these factors into a framework as a means to assist researchers and educators with the development of evidence-based early literacy learning practices. The CELL (2006) framework proposes that children's early literacy abilities include component skills in oral language, print concepts, alphabet knowledge, phonological awareness, and name and other forms of emergent writing. Children's accomplishments across these component skills are reportedly influenced by their: (a) literacy motivation, (b) literacy-rich experiences, and (c) instructional practices. The CELL (2006) framework reports that literacy-rich experiences include those obtained in both the home and outside the home (e.g., community, school). Instructional practices also include those found both within the child's home and outside of the home (e.g., school setting).

The CELL (2006) framework was used in this study as an initial means to examine emergent literacy in children with ASD. This study explored the children's emergent literacy abilities across the component skills identified by the CELL (2007). This includes the children's oral language, print concepts, alphabet knowledge, name and other forms of emergent writing, and phonological awareness. This study also explores the children's literacy motivation, as well as pretend reading. Although pretend reading is not specifically addressed in the CELL (2006) model as a component skill, pretend writing is encouraged in the framework and pretend reading has been identified by researchers as a characteristic observed in young children

before they are conventionally literate (Sulzby, 1985). Nonverbal cognitive abilities also are not in the CELL (2006) framework but are assessed in this study to explore whether the nonverbal cognitive skills of children with ASD shape their literacy development.

The CELL (2006) framework reports that literacy-rich experiences include those obtained in both the home and outside the home (e.g., community, school). The provisions of literacy-rich experiences are believed to “provide children the foundation for later literacy success” (CELL, 2006, p. 6). Instructional practices also include those found both within the child’s home and outside of the home (e.g., school setting). Instructional practices can include both informal and formal styles of instruction. This study explored the children’s access to literacy-rich experiences and instructional practices in terms of their home literacy practices. It should be understood that the CELL (2006) framework highlights both children’s home and school environments; this study did not include an exploration of the children’s educational environments. As such, it highlights many of the factors mentioned in the framework, but not all of the factors. The following discussion presents support for those factors illustrated in the CELL (2006) framework in terms of the children’s component skills, literacy motivation, and provision of literacy-rich experiences and instructional practices with regard to their home literacy practices. It further explores two other aspects related to children’s home literacy practices, their parents’ personal literacy abilities (Christian et al., 1998; Gilger et al., 1991) and beliefs and attitudes about their child’s education (Petrill et al; 2005), as these aspects also are linked to reading achievements for children with typical development.

### Children's Component Skills

As discussed in the Introduction, the terms emergent literacy and conventional literacy have been defined differently by researchers over the years. The NELP (2007) defined “emergent” literacy skills as those that: (a) precede conventional literacy skills, and (b) predict conventional literacy. They defined “conventional” reading and writing skills as: (a) children’s ability to read words accurately and fluently, while also comprehending those words in the context in which they were presented, and (b) the ability to spell words and write text. This definition requires that conventional readers have mastery of word reading and reading comprehension. It is believed that as children become more proficient at word reading, their reading fluency increases and their attention frees for comprehension (McCormick, 2003). Thus, as children with typical development and therefore, typical oral language skills, become more proficient at word reading, their understanding of written language improves. As stated by Scarborough (1998), “as long as the printed words can be efficiently recognized, comprehension of the connected text will depend heavily on the reader’s oral language abilities” (p. 89).

Researchers have found that children’s oral language ability, print concepts knowledge (environmental print recognition, knowledge of print forms, conventions, and functions), alphabet knowledge (letter name and letter sound), name and other forms of emergent writing abilities, and phonological awareness are associated with conventional literacy in children for typical development. It has been theorized that these skills and abilities can be classified as either “linguistic processing” (children’s oral language and phonological awareness skills) or “print-related” (print concepts

knowledge, alphabet knowledge, and name writing and other forms of emergent writing) skills (CELL, 2007). A secondary analysis of the NELP (2007) research by the CELL (2007) supports this postulation. Their analysis found that linguistic processing skills (all  $r$ s > .3) and print-related skills (all  $r$ s > .4) were all at least moderately associated with later word reading and reading comprehension in children with typical development.

The findings from the CELL (2007) highlight the position that there exists a strong intertwined relationship between linguistic processing and print-related skills, and that skills within both of these categories are critical for children's literacy learning. These component skills are believed to develop as a result of instruction and experience (Scarborough, 2003). The implication is that speech-language pathologists and teachers should promote these skills in young children to provide a stronger foundation for literacy learning. In addition to exploring these component skills in the current study, the children's engagement in pretend reading (Sulzby, 1985) was examined because it also has been identified as being characteristic of children's emergent literacy. Nonverbal cognition has not always been found to be strongly associated with early reading development in children with typical development (e.g., Scarborough, 1998), but it is not yet known if the nonverbal cognitive skills of children with ASD may be associated with their literacy development. Therefore, this skill also was formally measured in this study.

In the following discussion, each of these components (children's oral language, print concepts knowledge, alphabet knowledge, name and other forms of emergent writing, phonological awareness, literacy motivation, pretend reading, and

nonverbal cognition) is defined and research is cited that supports its association with literacy success for children with typical development. Consistent with the NELP (2008) interpretations and other research in the behavioral sciences (Green & Salkind, 2003), associations that were .50 or greater were considered to reflect strong relationships, correlations between .30 and .50 were considered to reflect moderate relationships, and correlations lower than .30 were considered to reflect small relationships. For all of the early literacy components (print concepts, alphabet knowledge, name and other forms of emergent writing, phonological awareness), benchmarks of age and grade-level expectations for children with typical development are provided. These benchmarks were based on normative assessments as well as the North Carolina Department of Public Instruction Standards of Learning (NC-SOL; 2008). Literacy achievement is discussed in terms of both age and grade-level expectations because literacy development is largely mediated by a child's instructional experiences (Justice, Invernizzi, & Meier, 2002), and grade-level expectations are easily understood by educational professionals. Lastly, each skill and subskill overview culminates with what is known about this skill development in children with ASD.

### Oral Language

Oral language skills are not consistently measured in the same way by all researchers. In fact, oral language skills have been defined and measured broadly (i.e., composite measures of expressive and receptive language), or with specific reference to sentence/story recall and listening comprehension, oral narrative ability vocabulary knowledge, or grammar skills. For example, the CELL (2006) framework



reports that component areas of literacy development include children's "oral language," "listening comprehension," and "text comprehension." They define oral language as children's understanding and use of phonological, morphological, semantic, and syntactic elements of language; listening comprehension as a child's ability to "listen to, process, and understand the meaning of spoken words and other information heard orally" (p. 3); and text comprehension as a child's ability to comprehend texts. For children who are not yet reading, this would include "the recognition of pictures and symbols in books and the ability to interpret and infer meaning from what is seen" (p. 4). The current study examined the oral language skills of children with ASD using a formal composite measure that is consistent with the CELL's (2006) definitions for oral and listening comprehension and an informal measure narrowly addressing the CELL's definition of text comprehension by asking parents what types of questions they may ask their child during shared readings, and what types of questions their child is most able to answer. In the following, the predictability of broadly measured oral language skills in children with typical development is described, as well as the subskills of broader oral language ability. In each case, what we know about these skills in ASD also is discussed.

Broad oral language skills. A longitudinal study by the National Institute of Child Health and Human Development (NICHD; 2005) indicated that a composite score of broadly measured expressive and receptive oral language skills from a standardized measure (in children with typical development) at age 3 years was directly related to children's word reading abilities in first grade and indirectly related to their reading comprehension abilities in third grade. A meta-analysis conducted by

the NELP (2007) similarly reported that for children with typical development, broadly measured language abilities (i.e., language composite score) were overall strongly associated with children's future decoding ability ( $r = .58$ ) and reading comprehension ( $r = .70$ ). The correlations of receptive language with decoding and reading comprehension were  $r = .52$  and  $r = .63$ , respectively; while the correlations of expressive language were  $r = .48$  and  $r = .59$ , respectively. A meta-analysis conducted by Scarborough (1998) documented that when general expressive and receptive language indexes were used to measure language ability in kindergarten children with typical development, moderate associations were found between these scores and reading achievement measured one to three years later ( $r = .46-.47$ ). This also has been found to be the case for children with language impairments, in the absence of ASD. Catts (1993) found that school-age children with language impairments, based on multiple language measures, were more likely to have reading difficulties than children without language impairments.

In terms of children with ASD, there is limited information regarding the relationship between oral language and literacy achievement. Pragmatic language difficulties have been well documented in the population, whereas variable performance has been observed among other language parameters (Tager-Flusberg, 2004). Young children with ASD also have been observed to present with uneven language profiles (Charman, 2004). For example, receptive language abilities are often more delayed than expressive language abilities in preschool children with ASD (Charman, Drew, Baird, & Baird, 2003).

Sentence/story recall and listening comprehension. Sentence or story recall measured in kindergarten children with typical development was found to be moderately associated with literacy achievement in these children measured one to three years later ( $r = .45$ ) in a meta-analysis conducted by Scarborough (1998). A meta-analysis conducted by the NELP (2007) similarly reported that for children with typical development, listening comprehension was moderately associated with decoding ( $r = .33$ ) and reading comprehension ( $r = .43$ ). The research suggests that individuals with ASD are especially challenged by language comprehension that involves broader, more complex language abilities requiring interpretation of inference (Minschew, Goldstein, & Siegel, 1995; 1997) and emotion (Happé, 1994).

Oral narratives. The oral narrative abilities of children with typical development also have been found to be associated with later reading ability. Griffin, Hemphill, Camp, and Wolf (2004) documented that oral narrative skills (e.g., grammar, language to describe the mental state of the narrator), measured in children at 5 years of age with typical development, accounted for 39% of the variation in these children's reading comprehension skills measured at 8 years of age. The extant research available regarding the oral narrative abilities of children with ASD suggests that this skill is a relative weakness in terms of form and content. With regard to form, Tager-Flusberg (1995) found that the children and adolescents with an ASD were less likely than children with typical development, matched on verbal IQ, to provide a resolution in their pretend readings of Mercer Mayer's book, Frog, Where Are You? Children and adolescents with ASD, including those with high-functioning autism and Asperger syndrome, also have been observed to produce shorter narratives

(measured by the number of propositions) than individuals with typical development (Capps, Losh, & Thuber, 2000; Tager-Flusberg, 1995; Klin, 2000). Whether their narratives are shorter than children with cognitive impairments is equivocal. The need for prompting has further been identified as an area of weakness for individuals with ASD. Losh and Capps (2003) reported that children and adolescents with ASD, including those with high-functioning autism and Asperger syndrome, required more prompting for both elaboration and clarification when telling narratives than peers matched on chronological age and verbal IQ with typical development.

With regard to content, children and adolescents with ASD have been found to use bizarre, idiosyncratic, or irrelevant language in their oral narratives when compared to peers with typical development (Klin, 2000), including those matched on chronological age and verbal IQ (Losh & Capps, 2003), and even peers with cognitive impairments (Loveland, McEvoy, Tunali, & Kelley, 1990). The use of, and explanation of, mental state words also has found to be discrepant. Individuals with ASD have been observed to use less affective and/or mental state words in their narratives than peers with typical development (Baron-Cohen, Leslie, & Frith, 1986; Klin, 2000) and Down syndrome (Baron-Cohen et al., 1986). Children and adolescents with ASD, including those with high-functioning autism and Asperger syndrome, also have been described as being less inclined to provide a causal explanation for an affective and/or mental state word in their oral narratives than peers with typical development (Capps et al., 2000; Losh & Capps, 2003). These findings reflect the significant difficulty individuals with ASD experience with regards to spoken narratives. Although the specific association between these

narrative-related abilities and reading achievement has not been studied with students with ASD, but it is reasonable to expect that their impaired narrative abilities would have a similarly negative impact on reading.

Vocabulary. Vocabulary knowledge has been measured in different ways, with receptive vocabulary being perhaps the most common method. Measured in children with typical development, receptive vocabulary knowledge has consistently been found by researchers to be related to reading achievements. For example, a longitudinal study by the NICHD (2005) reported that the receptive vocabulary of preschool age children with typical development predicted reading comprehension in the third grade. A meta-analysis conducted by Scarborough (1998) similarly reported that for kindergarten children with typical development, receptive vocabulary was moderately associated with reading abilities measured one to three years later ( $r = .33$ ). Results from a meta-analysis conducted by the NELP (2007) documented similar associations between receptive vocabulary and later decoding abilities for young children with typical development ( $r = .34$ ), but a weaker association between receptive vocabulary and later reading comprehension ( $r = .25$ ). In addition to receptive vocabulary knowledge, some researchers have examined children's knowledge of expressive vocabulary, The NELP (2007) measured definitional vocabulary and reported that for children with typical development, definitional vocabulary was moderately associated with the children's decoding ( $r = .38$ ) and reading comprehension ( $r = .45$ ). Scarborough (1998) also conducted a meta-analysis examining the association between expressive vocabulary, in terms of confrontation naming, measured in kindergarten children with typical development and their

reading ability measured one to three years later. He observed moderate associations between vocabulary and literacy achievement ( $r = .45$ ). These findings collectively highlight that vocabulary knowledge, regardless of the way it is measured, is critical to literacy achievements for children with typical development.

For children with ASD, the way that vocabulary abilities are measured may impact the outcome. A large scale study of preschool children receiving public school special education services found that children with ASD scored equal to, if not higher than, children with mental retardation and developmental delay on a measure of receptive vocabulary – but lower than children with speech-language impairment (Markowitz et al., 2006). This finding suggest that in children with autism, receptive vocabulary may be delayed when compared to peers with typical development or speech-language impairment, but reflect a relative strength when compared to children with intellectual disabilities. As such, receptive vocabulary may not be the most sensitive indicator of communication competence among children with autism when compared to children with other intellectual disabilities. Considering the expressive language difficulties generally observed in the population affected by ASD, definitional vocabulary or other forms of expressive vocabulary may reveal more communicative difficulties than receptive vocabulary assessments.

Grammar. A meta-analysis conducted by the NELP (2007) reported that grammatical skills in children with typical development were moderately and strongly associated with their decoding ( $r = .47$ ) and reading comprehension ( $r = .64$ ) abilities. A meta-analysis conducted by Scarborough (1998) also documented that grammatical skills, measured in kindergarten age children with typical development were

moderately associated with their reading achievements measured one to three years later. Specifically, receptive language measures were those “emphasizing the understanding of complex syntactic and morphological forms” ( $r \geq .38$ ) and expressive measures of grammar were those such as mean length of utterance, sentence completion, and morphological cloze tasks ( $r = .32-.37$ ) (p. 89). This helps explain why children with language impairments who have grammatical difficulties also have been observed to have reading difficulties (Catts, Adlof, & Ellis Weismer, 2006) and why many young children who struggle to acquire expressive language skills early in childhood may have later reading difficulties (Scarborough, 1990). Many children with high-functioning autism and Asperger syndrome have grammatical skills that are comparable to children with typical development (Watson & Ozonoff, 2000); therefore, this relative strength in language form in the population affected by ASD will be important to explore in understanding emergent language and literacy in this population.

### Print Concepts

“Print concepts” is a broad term used to capture various subskills. Variations of subskills subsumed within this skill set have been referred to as “written language awareness” (Justice et al., 2002), “print understanding” (Dickinson & Chaney, 1997), “conventions of print” (Whitehurst & Lonigan, 1998), and “print awareness” (Goodman, 1986). As a skill set, print concepts have been assessed in children with typical development who cannot read, and those who can. Subskills assessed in children with typical development who cannot read have included environmental print recognition, knowledge of print forms and conventions, and knowledge of

print's function. These print concept skills are the focus of this study. Subskills that were originally designed to assess children with typical development who can read have included the ability to identify specific language units by name (e.g., show me a "word") and punctuation markers (e.g., Clay, 1979). As these subskills are often too difficult for children who cannot read (Justice, Bowles, & Skibbe, 2006), and generally achieved by children with typical development at ages 6 years and beyond (Clay, 1979), these later developing print concept subskills have been excluded from this review. The following sections elaborate upon print concepts as an overall skill as well as specifically describing the subskills of print concepts that have been measured in children with typical development who cannot read. These include environmental print recognition and knowledge of print forms, conventions, and function.

Overall print concepts. In terms of print concepts as an overall ability, a meta-analysis conducted by Scarborough (1998) found that for kindergarten children with typical development, performance on functional measures of print concepts, such as familiarity with the mechanics and purposes of book reading, was moderately associated with reading achievement measured one to three years later ( $r = .46$ ). Such strong results have not always been observed. Sénéchal, LeFevre, Smith-Chant, and Colton (2001) reported that, for children with typical development, print concept knowledge such as finding the front of a book and pointing to where to begin reading did not predict reading ability. Limited knowledge of print concepts has been observed in children with language impairments in the absence of ASD (Boudreau & Hedberg, 1999).



Environmental print recognition. Children with typical development acquire environmental print recognition before they are conventional readers (Goodman, 1986). Empirical support relating this skill to literacy achievement has been moderate. A meta-analysis conducted by the NELP (2007) revealed that, for children with typical development, environmental print was strongly related to decoding ( $r = .52$ ), and not significantly associated with reading comprehension abilities.

Goodman (1986) reported that children with typical development begin to recognize environmental print in context around 3 years of age. The first word a child can read often is his or her own name (Bloodgood, 1999). By the ages of 4 or 5 years, the majority of children with typical development can recognize some forms of environmental print in context but accuracy wanes as context cues diminish (Goodman, 1986). Goodman found that approximately half of children in this age range who were typically developing could read environmental print in partial context. These findings suggest that young children with typical development develop their knowledge of environmental print during the preschool and kindergarten age range. This is consistent with the NC-SOL (2008) expectation that children exiting kindergarten will be able to recognize their own name and environmental print such as signs, labels, and trademarks.

Limited research suggests that children with ASD have a relative strength in this area. Koppenhaver and Erickson (2003) studied three preschool age children with ASD and found they were able to identify words, logos, and other forms of environmental print before the end of the intervention, suggesting learning as a response to maturation and/or instruction. Similarly, IEP chart reviews by Church,

Alisanski, and Amanullah (2000) found that many preschoolers identified as having Asperger syndrome were early readers, suggesting they could identify words by sight or through decoding skills or both. Moreover, while Watson, Andrews, and Orovitz (1996) found that the parents of preschool age children with ASD were less likely to report that their children could identify their printed name than parents of preschool children with typical development, they were as likely to report their children identified other printed words and logos as the parents of children with typical development in the same age range.

Print forms, conventions, and functions. Print forms, conventions, and functions are often measured within broader assessments of print concepts, making the unique predictive value of each subskill difficult to determine. Goodman (1986) reported that for children with typical development, various print forms and conventions are acquired between the ages of 4 through 6 years. Clay (1979) similarly reported that the average age for New Zealand children with typical development to successfully answer varied questions regarding print form and conventions was 5 years, 6 months. Goodman (1986) found that children with typical development learn that the print, not the pictures, carries the message between the ages of 3 and 5 years. Clay (1979) similarly found that the average age for New Zealand children with typical development to successfully point out that we read words and not pictures was 5 years, 0 months. These findings suggest that these skills develop in children with typical development during the preschool and kindergarten years. This is consistent with the NC-SOL (2008) expectations that exiting kindergarten children will be able

to understand print's directionality (i.e., we read and write from left to right and top to bottom) and match print with words when listening to familiar texts.

Little is known about the knowledge young children with ASD possess with regard to print forms, conventions, and functions. Watson et al. (1996) found that preschool age children with ASD were reported by their parents to perform rudimentary print convention skills such as holding a book right-side up (i.e., book orientation) and that this performance was comparable to reports from parents of preschool children with typical development. Koppenhaver and Erickson (2003) similarly found that three preschool children with ASD learned to write their names without any explicit instruction in print forms and conventions. Due to the limited literature available on this topic, print concept knowledge was assessed both directly and indirectly in this study.

### Alphabet Knowledge

Alphabet knowledge encompasses children's knowledge of both letter names and sounds (Whitehurst & Lonigan, 1988). Letter name knowledge refers to children's knowledge of individual letter names (Justice et al., 2002). Letter sound knowledge refers to children's understanding of sound-symbol relationships or grapheme-phoneme correspondences. Grapheme-phoneme correspondence refers to children's knowledge of the relationship between letters or graphemes and their sounds or phonemes as measured by their ability to accurately represent the sound or phoneme of letters (Justice et al., 2002). Letter name and letter sound knowledge have been measured independently, as well as collectively. Independently, a meta-analysis conducted by Scarborough (1998) found that for kindergarten children with typical

development, performance on letter identification was strongly associated with reading achievement measured one to three years later ( $r = .53$ ). Collectively, alphabet knowledge has been shown to be highly predictive of later literacy success according to a meta-analysis conducted by the NELP (2007). In that study, alphabet knowledge was moderately associated with decoding ( $r = .46$ ) and reading comprehension, ( $r = .45$ ) for children with typical development. The following details more of what we know about letter name knowledge and letter sound knowledge.

Letter name knowledge. Most preschool children with typical development can identify at least a handful of letter names, often those meaningful to them, such as the ones in their names (Bloodgood, 1999). Normative data from the *Phonological Awareness Literacy Screening PreK* (PALS-PreK; Invernizzi, Sullivan, Meir, & Swank, 2004) indicated that by the end of preschool, most children with typical development can identify between 12-21 upper-case alphabet letters and 9-17 lower case letters. These findings suggest that letter name knowledge develops in the preschool years and continues to develop. The NC-SOL (2008) expectation is that for children with typical development, preschool children learn some of the letter names, such as the names of the letters in their name; with instruction, exiting kindergarten children will be able to recognize all upper and lower case letters of the alphabet.

Letter name identification was observed to be within normal limits, using a standardized assessment tool, for preschoolers receiving public school educational services who were categorized as having autism (Markowitz et al., 2006). This study also found that their scores on this measure were significantly higher than children identified as having developmental delays, learning disabilities, or other health

impairments (Markowitz et al., 2006). IEP chart reviews by Church et al. (2000) similarly reported that many preschoolers identified as having Asperger syndrome had strengths in letter name identification.

Letter sound knowledge. Normative data from the PALS-PreK (Invernizzi et al., 2004) indicates that by the end of preschool, 4-year-old children with typical development can identify between 4-8 letter sounds. The normative data from the *Pre-Reading Inventory of Phonological Awareness* (PiPA; Dodd, Crosbie, McIntosh, Teitzel, & Ozanne, 2003) indicates that children with typical development can generally identify one to several letter sounds between the ages of 4 and 5. Children with typical development can identify about half of the letter sounds between the ages of 5 and a half and 6 years, and children with typical development over 6 years of age can identify nearly all letter sounds. These findings suggest that letter sound knowledge emerges in the preschool years and is further developed in the kindergarten and first grades. The NC-SOL (2008) expectation is that for children with typical development, preschool children should begin to recognize that letters represent sound. Exiting kindergarten children are expected to have knowledge of some sound-letter relationships. By the end of first grade, it is expected that children with typical development will know all of the letter sounds. Letter sound knowledge is less well understood than letter name knowledge in children with ASD. The research on word reading abilities, however, suggests that individuals with ASD who are able to read words generally utilize decoding skills, which suggests that they have knowledge of letter sounds (Bishop et al., 2004).

#### Name Writing and Other Forms of Emergent Writing

Name writing refers to young children's ability to independently write their own name (Bloodgood, 1999). Other forms of emergent writing refer to children's increasing abilities to print or write words (CELL, 2007). In terms of name writing ability, a meta-analysis conducted by the NELP (2007) reported that for young children with typical development, name writing is associated with decoding ( $r = .50$ ) and reading comprehension ( $r = .31$ ). Name writing abilities also have been found to be delayed in preschool children with oral language impairments who do not have ASD, compared to children with typical development (Cabell, Justice, Zucker, & McGinty, 2009). Thus, the acquisition of name writing may be associated with children's oral language and/or cognitive abilities. Mayes and Calhoun (2003) found that young children with ASD (ages 3 – 6 years) earned comparable standardized scores on formal measures of IQ and graphomotor abilities. They also found that this was the case for older children with ASD with IQs less than 80 (i.e., comparable scores on both formal measures). They found that older children with IQs equal to or greater than 80 earned scores on a formal measure of graphomotor ability that were significantly lower than the IQ scores.

Developmentally, Invernizzi et al. (2004) observed that children with typical development progress in name writing in the following order. First, the child produces unrecognizable scribble. Second, the child's name writing consists of random or correct letters that are in their name and may possibly include symbols, such as images that have a similar look of a conventional letter. Third, the child's name writing consists of many correct letters with no filler letters or symbols. Fourth, the child's name writing is correct but letters may be written backward or in mirror

image. Lastly, the child's name is written correctly with no backward letters or mirror image writing. A child's ability to write his or her name depends on many skills, including sufficient motor control and coordination to produce the letters (Bloodgood, 1999) as well as opportunities and experiences with writing.

For children with typical development, name writing begins as early as 3 years of age (Bloodgood, 1999). Goodman (1986) found that 50% of 3-year-old children with typical development could write their names with at least some letters or letter approximations. Normative data from the PALS-PreK (Invernizzi et al., 2004) indicates that by the end of preschool, 4-year-old children with typical development can write their name with many to all correct letters. At this stage, all letters may not be present, letters may be reversed or symbols may be interspersed with the letters, but the production is recognizable as the child's name. By the end of kindergarten, most children with typical development can write their own names correctly (Bloodgood, 1999). The NC-SOL (2008) is that for children with typical development, preschool children should begin to use letter-like forms to produce letters, such as the ones in their name. With instruction, exiting kindergarten children are expected to be able to write most letters in the alphabet and recognize their own name.

Little is known about the name writing and other forms of emergent writing abilities in children with ASD. Koppenhaver and Erickson (2003) found that three preschool children with ASD learned to write their names during the preschool period, which is consistent with findings of children with typical development (Goodman, 1986). In terms of other forms of emergent writing, Watson et al. (1996)

found that preschool age children with ASD were reported by their parents to less frequently scribble or write notes for others, as compared to parent reports from preschoolers with typical development. This study also found that the parents of the children with ASD were more likely to use physical (i.e., hand-over-hand) assistance to help their children write conventionally, as compared to the parents of children developing typically. Due to the limited literature available on this topic, name writing and other forms of emergent writing were assessed both directly and indirectly in this study.

### Phonological Awareness

Phonological awareness refers to the ability to attend to the sound structure of language as distinct from its meaning. Components of phonological awareness include phonemic awareness (awareness of phoneme sequences that make up syllables and words, as evidenced in the ability to segment, blend, delete, or reorder phonemes), as well as awareness of the phonological structure of rhymes, syllables, words, and sentences. A meta-analysis conducted by the NELP (2007) found that phonological awareness skills are moderately associated with later decoding ( $r = .45$ ) and reading comprehension ( $r = .42$ ) abilities in children with typical development. This is consistent with findings from a meta-analysis by Scarborough (1998) who reported that phonological awareness measured in kindergarten children with typical development was moderately associated with their reading achievement measured one to three years later ( $r = .46$ ). It is believed by most researchers that children who struggle to acquire word reading skills have weaknesses in phonological awareness.



Phonological awareness has been measured as an overall skill, and by separate subskills. Phonological awareness develops gradually and on a continuum, with early skills being the *recognition* (as opposed to production) of rhyme and alliteration at the whole-word level, moving to the identification of discrete phonemic segments in written words. Although not viewed as the most predictive measure of phonological awareness crucial for reading acquisition (e.g., Duncan, Seymour, & Hill, 1997), there is empirical support that rhyme knowledge is an important and predictive skill (e.g., Bryant, MacLean, Bradley, & Crossland, 1990) in children's development of reading. Moreover, children with language impairments who do not have ASD have diminished rhyme production ability when compared to children with typical development (Boudreau & Hedberg, 1999).

Most preschool age children with typical development can recognize and produce *familiar* rhymes. Normative data from the PALS-PreK (Invernizzi et al., 2004) indicates that by the end of preschool, most 4 year old children with typical development can produce nursery rhymes in cloze tasks (e.g., went up the \_\_\_ ) and identify words that rhyme (i.e., sound the same). This is consistent with normative data from the PiPA (Dodd et al., 2003) and empirical research (Boudreau & Hedburg, 1999), which indicate that most children with typical development have some ability to identify and produce rhyming words between the ages of 4 and 5 years. The NC-SOL (2008) is that for children with typical development, preschool children begin to evidence their knowledge of phonological awareness through syllable identification (e.g., clapping to denote the number of syllables in a word), recognizing rhyming patterns in familiar narratives and songs, and begin to recognize first sounds in words.

Exiting kindergarten children are expected to be able to identify rhyming words; however, it is not specified if this must be expressed by production. Receptive identification of rhyme should not be confused with production of rhyme.

Little is known about the phonological awareness abilities of young children with ASD. Rhyme production and children's abilities to read novel words were, thus, informally evaluated in this study. As far as what is known about phonological awareness skills in children with ASD, Mayes and Calhoun (2003) found that young children with ASD (ages 3 to 6 years) who had cognitive impairments were not able to complete literacy tasks in a formal test of academic achievement. For the children without cognitive impairments, the IQ and literacy achievement association was not significant. They found that some older children (6 years and older) who were capable of achieving basal levels on a formal IQ measure showed significantly higher scores on a standardized measure of word reading ability. In older participants (mean age 10 years), Bishop et al. (2004) found that while individuals with ASD performed more poorly than controls with typical development on a measure of word reading, the subset of individuals with ASD who had normal verbal abilities did not have disproportionate difficulties in this task. This finding is consistent with studies that demonstrate sufficient word reading skills in high-functioning adolescents and adults affected by ASD (Minshew et al., 1995; 1997).

### Pretend Reading

Pretend reading, which also has been referred to as "emergent reading," refers to children's "unconventional reading of a familiar storybook" (Kaderavek & Justice, 2004, p. 218). Pretend reading has been described in qualitative studies (e.g., Sulzby,

1985) as a *precursor* to conventional reading. As children become more independent in their word reading ability, they are no longer expected to engage in pretend reading. Pretend reading was assessed via parent interview in this study to provide a more complete picture of this emergent literacy behavior in children with ASD. Watson et al. (1996) found that preschool age children with ASD were reported by their parents to engage in pretend reading less frequently than was the case for preschool age children with typical development.

### Nonverbal Cognition

Nonverbal cognition has not been found to be strongly associated with early reading development in children with typical development. In a meta-analysis by Scarborough (1998), nonverbal IQ measured in children with typical development between approximately 4.5 to 6 years was found to be minimally related to these children's reading ability measured one to three years later ( $r = .26$ ). A meta-analysis by the NELP (2007) similarly reported no association between nonverbal IQ and decoding ability ( $r = -.02$ ), among children with typical development, and a moderate association between nonverbal IQ and reading comprehension ( $r = .35$ ). It is not known, however, how the nonverbal cognitive skills of children with ASD shape their literacy development. As such, this skill was formally measured in this study.

The majority of children with autistic disorder have cognitive impairment, meaning their IQ is less than 70 (Watson & Ozonoff, 2000). Mean nonverbal or performance IQ has been shown to be significantly higher than verbal IQ for young children with ASD (ages 3 – 6 years) with both high and low IQs (Mayes & Calhoun, 2003); however, the discrepancy between nonverbal and verbal IQ may disappear as

children become older and more verbal. Adolescent and adult study participants with full scale IQs that do not reflect cognitive impairments have attained comparable nonverbal and verbal IQ subtest scores (Minshew et al., 1995; 1997). More research is needed to fully understand if there exists a difference in these IQ components for older children with cognitive impairments (Mayes & Calhoun, 2003). This question is not addressed in this study; this study only evaluated the children's nonverbal cognitive abilities.

#### Children's Literacy Motivation

According to Justice et al. (2002), "literacy motivation describes children's interest in or orientation toward early literacy experiences" (p. 89). This also has been referred to as "print motivation" (Whitehurst & Lonigan, 1988). Researchers have found children's interest and motivation to participate in literacy-related activities is associated with their literacy accomplishments (Durkin, 1966; Frijeters et al., 2000), and children with oral language impairments who do not have ASD show low levels of literacy motivation (Kaderavek & Sulzby, 1998). Watson et al. (1996) found that the parents of preschool age children with ASD reported that their children enjoyed looking at books and print independently, but enjoyed shared book reading less than preschool-aged children with typical development. The parents of the preschool age children with ASD also reported that their children showed less enjoyment of writing activities than reported by the parents of preschool age children with typical development.

#### Children's Literacy-Rich Experiences and Instructional Practices

The CELL (2006) framework reports that children's access to literacy-rich experiences and instructional practices shapes their literacy development. The current study explores these factors in terms of the children's home literacy practices by exploring the parent's use of behaviors that promote literacy learning. These behaviors include: (a) the provision of literacy materials, (b) informal literacy activities in the home, and (c) formal literacy activities in the home (Christian et al., 1998; Frijeters et al., 2000; Petrill et al., 2005; Sénéchal & LeFevre, 2002). These are detailed separately below.

#### Provision of Literacy Materials

It is a reasonable assumption that home-based literacy experiences are more likely to occur in homes with abundant literacy materials. There is research support for this assumption. The amount of reading materials available to children in their homes has been moderately correlated with later literacy achievements ( $r = .30$ ) (Walberg & Tsai, 1985). More recent research suggests, however, that comparable numbers of books have been reported in the homes of children with typical development who have both more and less advanced literacy abilities (Weigel et al., 2006). Such findings have led to the idea that although the provision of literacy materials is necessary for specific activities (e.g., books are needed for parent-child reading), it is the interaction between the parent and child that is of utmost importance. This interaction has often been measured in terms of shared reading activities. It has been suggested that parents who read frequently are also more likely to read to their children, and that this reading activity may be related to having more books available to themselves and their children in the home (Scarborough &

Dobrich, 1994). The number of literacy materials in the home also may be mediated by the parents' educational level and intelligence (Petrill et al., 2005). As for children with ASD, Watson et al. (1996) found that preschool age children with ASD were reported by their parents to have abundant reading materials in the home, comparable to parental reports from parents of preschool age children with typical development.

### Informal Literacy Activities

Sénéchal, LeFerve, Thomas and Daley (1998) define informal literacy activities as those that teach literacy skills incidentally, such as when a parent reads a bedtime story to a child. This type of behavior, referred to commonly as “shared” or “joint book reading,” is perhaps the most researched parental behavior that has been found to be predictive of language and literacy development in children with typical development. Research suggests that increased frequency of parent-child reading directly or indirectly supports both language and literacy development for children with typical development (Bus, van IJzendoorn, & Pellegrini, 1995; Purcell-Gates, 1988; Sénéchal & LeFevre, 2002). This also has been found for children with ASD in terms of teacher-child shared reading (Bellon, Ogletree, & Harn, 2000; Colascent & Griffith, 1998; Wolfberg, 1999).

Research suggests that the parents of children with ASD do read to their children. Watson et al. (1996) found that the parents of preschool age children with ASD reported reading to their children as frequently as the parents of preschool age children with typical development, but the duration of reading time was shorter per reading. As noted earlier, parents of preschoolers with ASD in the Watson et al. study were less likely to report that their children liked shared book reading than were

parents of preschoolers with typical development, which may have led to shorter lengths of dyadic engagement in such activity.

Most research on the influence of shared reading on literacy development in young children with typical development has focused on the frequency with which parents read to children. It also is important, however, to examine the quality of the interaction as well as the quantity, and consider the quality of the interaction within the context of the child's skills and abilities. For children with typical development, a reading style whereby the parent allows the child to become the storyteller and asks open-ended questions of increasing sophistication (e.g., relations between the book and the child's life versus identification) has been found to be facilitative of vocabulary and early literacy development (Whitehurst et al., 1994). For example, Richards and Anderson (2003) found that young children with typical development improved their ability to infer causal and relational inferences in a book reading intervention when their teacher asked higher-level comprehension questions. In this intervention, the teacher made periodic pauses while reading and asked the students what they thought was going to happen and why they felt something was going to happen, and provided a verbal model when appropriate.

There exists no research that has examined the question-answer style during shared reading in parent-child dyads for children with ASD. Children and adults with ASD, including those with high-functioning autism and Asperger syndrome, have been observed to have difficulty with comprehension of interpretive or ambiguous language (Church et al., 2000; Dickerson & Calhoun, 2003; Diehl, Ford, & Federico, 2005; Nation, Clarke, Wright, & Williams, 2006; Minshew et al., 1995, 1997; Smith-

Myles et al., 2002; Wahlberg & Magliano, 2004). Parents possibly could be facilitating language development during shared reading by asking questions beyond identification, to include higher level questions such as prediction, emotional inference, and relating the characters of events in the story to their personal life. It is not known, however, whether this strategy would improve language outcomes for children with ASD or how the quality of the interaction might depend upon the child's preexisting skills and abilities. For instance, if higher level questions were too far above the child's current language comprehension abilities, such questioning by a parent during literacy interactions might have an adverse effect on the child's motivation to participate in shared literacy experiences, or on his or her language development, or both. Currently, no empirical data are available to provide guidance for parents of children with ASD in the emergent literacy stage in this regard.

#### Formal Literacy Activities

Sénéchal et al. (1998) define formal literacy activities as those in which the parent acts as teacher and explicitly focuses on literacy skills. Parental teaching has been found to be related to literacy skills (e.g., letter name identification) in children with typical development (Hood, Conlon, & Andrews, 2008; Sénéchal & LeFevre, 2002). There is minimal research that has examined the formal literacy activities of the parents of children with ASD. Watson et al. (1996) found that the parents of preschool age children with ASD reported teaching their children to write with physical assistance more frequently than parents of preschool age children with typical development, but they did not explore other forms of parental teaching. More



research is needed to better understand what formal and informal literacy activities are utilized by parents of children with ASD.

### Parents' Personal Literacy Abilities and Beliefs and Attitudes

In addition to exploring the provision of literacy-rich experiences and instructional practices to children with ASD in terms of their home literacy practices, this study further explored the parents' personal literacy abilities and beliefs and attitudes about their child's education. The following provides more detailed information about these aspects of children's home literacy practices.

Several researchers have found that maternal education and the parents' literacy abilities are related to language and literacy development for children with typical development (Christian et al., 1998; Gilger et al., 1991; Heath, 1982). The parents' educational level is believed to be related to the parents' personal literacy abilities. Mothers of children with typical development who have higher education levels have been found to enjoy reading more, model writing to their children more often, read to their children more often, and more regularly engage in drawing pictures, singing songs, and telling stories with their children (Weigel, Martin, & Bennett, 2006). To date, it is not known how the personal literacy abilities of parents of children with ASD relate to their children's language and early literacy skills.

There is research to suggest that children with typical development have higher literacy abilities if their parents are proactive about the children's education and take an active role in their literacy development (Weigel et al., 2006). Such parents are differentiated from parents who believe the schools, rather than the parents, should be the predominant literacy teacher to their children. Since it is not

well understood how parents of children with ASD feel about teaching their children literacy skills or whose responsibility they feel it is to teach their children literacy skills, this topic was explored in this study.

### Development of Conventional Literacy Skills

It is important for speech-language pathologists and teachers to understand how literacy skills develop. This section, thus, provides a summary of the progression from emergent to conventional literacy for children with typical development. This development for children with ASD is discussed in the next section.

The path from emergent to conventional reading occurs over time with various phases. Ehri (1995) describes the emergent literacy period as having three phases, the pre-alphabetic, partial alphabetic and consolidated alphabetic phases. In the pre-alphabetic phase, children with typical development who identify words do so based on their visual features, rather than by connecting words, letters, or graphemes to their corresponding phonemes (Ehri & McCormick, 1998). Children in the pre-alphabetic stage may read words found in their environments (Goodman, 1986). Some authors refer to this type of reading as “sight” word reading because it occurs in the absence of decoding or the application of letter-sound knowledge (Mirenda, 2003). Decoding refers to a child’s ability to look at the letters in a word and turn them into their sounds (McCormick, 2003). The type of “sight” word reading described in this phase is not the same as the “sight” word reading ability of conventional readers, who initially read words by decoding them and applying letter-sound knowledge but eventually develop automaticity in word recognition that allows them to recognize words quickly or by “sight” (Ehri, 1995). Students developing

typically who are in preschool and kindergarten may focus on reading words found in their environments; students with special needs may be in higher grades (Ehri & McCormick, 1998). The NC-SOL (2008) expectation is that children exiting kindergarten be able to identify environment print and recognize the letters of the alphabet.

In the partial alphabetic phase, children developing typically are beginning to read words by connecting some, but not all, of the graphemes in words to their phonemes (Ehri, 1995). Making these graphophonemic connections is referred to as the “alphabetic principle” (Scarborough, 2003), a necessary skill for decoding. Skills related to alphabet knowledge are critical for children to acquire the alphabetic principal. Accordingly, the NC-SOL (2008) expectation is that children exiting first grade children will be able to apply their knowledge of sound-letter relationships to decode words. Children with special needs may be in higher grades when they are focusing on these goals.

In the consolidated alphabetic phase, words that were read frequently by linking graphemes to phonemes become recognizable by “sight” (Ehri, 1995). Children developing typically in this stage are able to identify frequently reoccurring letter patterns such as morphemes, syllables, or sub-syllabic units such as onsets and rimes (Ehri, 1995). Onsets are the consonants that precede the vowel in single syllable words. Rimes are the word ending comprised of everything from the first vowel through the final letter in a single syllable word (Ruddell, 2002). Children in this phase can read by analogy, the process of using known words to read new words based on shared spelling patterns (e.g. using knowledge of “beak” to read “peak”)

(Ehri & McCormick, 1998). Second grade is when many children developing typically begin to consolidate frequently reoccurring letter patterns (Ehri, 1995). The NC-SOL (2008) expectation is that children exiting second grade children will be able to decode all words. As children move from reading word-by-word and their reading fluency increases, their attention frees for comprehension (McCormick, 2003). Thus, as children with typical development become more proficient at decoding and reading with fluency, their understanding of written language improves.

#### Development of Conventional Literacy Skills in Children with ASD

Research suggests that of those children with ASD who are able to decode words and read with fluency, many still do not meet the definitional criteria for conventional literacy because they do not understand what they are reading. For children developing typically, word reading ability generally develops parallel to their ability to construct meaning from texts (Nation, 1999). Extant research on individuals with ASD, however, suggests that word reading skills are often developed in the absence of parallel comprehension. Many children and adults with ASD are able to decode words and read with fluency, but do not have comparable reading comprehension of inferential material (Church et al., 2000; Diehl et al., 2005; Nation et al., 2006; Minshew et al., 1995, 1997; Smith-Myles et al., 2002; Wahlberg & Magliano, 2004). Studies of reading in ASD frequently have focused on children and adults with high-functioning autism and Asperger syndrome. The decoding and fluency skills of less able children with ASD are less well understood. It is known, however, that decoding skills are not always a relative strength for these children, as some children with ASD have been found to have limited decoding abilities (Nation

et al, 2006). These findings are consistent with pilot data from Watson et al. (1996) who found that more parents of preschool and kindergarten age children with ASD (ages 2 to 5 years) reported viewing their children's reading skills as below children developing typically than those who viewed their child's reading skills as above children developing typically.

Hyperlexia is a term that has often been used to describe precocious word reading abilities. The incidence has been found to be elevated among those with ASD compared to individuals with other developmental disorders (Grigorenko et al., 2002). Although the research community has not reached consensus on an operational definition or assessment protocol for hyperlexia (Grigorenko et al., 2002; Nation, 1999), Nation (1999) argues that the term hyperlexia should be applied when children's comprehension skills are well below what would be expected from their word reading abilities and chronological age. Reviews of the literature by Grigorenko et al. (2003) and Nation (1999) reported that characteristics of hyperlexia include an early onset of precocious word reading without parallel comprehension, variable intellectual quotients, speech and language impairments, and the ability to read nonwords. The ability to read nonwords among children with hyperlexia is counter-evidence to the notion that hyperlexia may be over-learned sight word learning. Aram (1997) posits that language impairment underlies the reading comprehension difficulty found in persons with hyperlexia. This may help explain why hyperlexia has been found to adversely affect individuals with ASD (Grigorenko et al., 2002).

## Summary

This research explored how component skills and characteristics, as well as home literacy practices contribute to literacy accomplishments for children with ASD. This research was important because there does not exist an established understanding of literacy skill development in this population. Best practice for teaching is that educators, such as speech-language pathologists and teachers, understand the abilities in their students (Division of Early Childhood [DEC], 2003). The next chapter, Method, explains how this study was carried out.

## CHAPTER 3

### Method

This chapter begins with the research questions for this study. It then describes the participants in terms of sample size, recruitment, and criteria, as well as the procedures, data collection measures and instruments, and research design.

#### Research Questions

The purpose of this investigation was to answer the following questions:

(1) What emergent literacy skills and understandings do young children with ASD possess with regard to oral language, print concepts, alphabet knowledge, name and other forms of emergent writing, phonological awareness, pretend reading, and literacy motivation?

(2) How does the performance of young children with ASD on measures of emergent literacy compare to emergent literacy expectations for children with typical development, based on the extant research literature and the grade level expectations of the North Carolina Department of Public Instruction Standards of Learning?

(3) What are the associations of age, oral language, and nonverbal cognitive skills and abilities of children with ASD with their early literacy skills and abilities?

(4) In families that include a young child with an ASD, what are the primary caregivers' use of behaviors that promote literacy learning, personal literacy abilities, and beliefs and attitudes about their child's education?

(5) How are the oral language and early literacy abilities of children with ASD associated with primary caregivers' behaviors that may promote literacy learning and caregivers' beliefs and attitudes about their child's education?

### Participants

#### Sample Size

Forty-five children diagnosed with an ASD, between the ages of 4 years, 0 months and 7 years, 11 months, and one of their primary caregivers were recruited for participation in this study. Four of these participants were excluded from the study. Two children did not meet criteria and two did not complete the assessment battery, resulting in 41 enrolled child participants. Of the 41 child participants, 35 of their parents participated in the structured interview using the *Home Early Literacy Profile for Children with Autism Spectrum Disorders* (HELPA, Lanter, 2008). The majority of child participants, approximately 83% (34/41), were boys.

#### Recruitment

This study recruited young children with ASD and their parents through the following strategies. One, the principal investigator informed (via email and/or telephone) administrative personnel at various private and public schools in NC (i.e., the Mariposa School for Children with Autism in Raleigh, the Sandhills Children's Center in Southern Pines, Wake and Durham County Public Schools) and a private practice (Let's Talk Speech and Language Services in Raleigh) about the study. Two, information about the study was shared with the Autism Society of North Carolina and their personnel informed the Society's Durham, Wake, and Orange County



chapters. Three, an email was sent to a University of North Carolina at Chapel Hill (UNC-CH) list serve regarding the study.

Participants came from 12 different counties in NC. These included: Durham, Wake, Guilford, Gaston, Davidson, Person, Johnson, Chatham, Orange, Buncombe, Randolph, and Yadkin. Most of the participants, approximately 73% (30/41) were from areas within or surrounding (within approximately 1 hour driving) the cities of Raleigh, Durham, or Chapel Hill. This includes participants from Durham, Wake, Johnston, Chatham, Orange and Person counties. The second largest group of participants, 17% (7/41), were from areas within or surrounding (again within approximately 1 hour driving) the cities of High Point and Greensboro. This group includes participants from Guilford, Davidson, and Yadkin counties. A smaller percentage of participants, roughly 10% (4/41) were from Buncombe, Randolph, and Gaston counties.

### Criteria

Inclusion criteria for the child participants are detailed below. All children who met these criteria were considered for this study, regardless of their gender, race, or ethnicity. Table 1 shows the child participants' races. The only criterion for the adult participants was that they were the primary caregiver for one of the children recruited with an ASD. Table 2 shows the relationship of the parental respondent on the HELPA to the child participant.

Criterion one. The children needed a diagnosis of an ASD (i.e., autism, Asperger syndrome, or PDD-NOS) to qualify for participation in the study. For 21 of 41 participants, the diagnostic documentation of ASD came from NC public school

eligibility determination forms, referred to as Division of Exceptional Children-3 (DEC 3) forms. These specifically stated the child qualified for special education services under the category of autism. Documentation from individual school psychologists accounted for 4 of the children. Documentation also came from psychologists with Ph.D. credentials for 7 children, and from other professionals outside of the school, such as medical doctors, for 9 children.

In public schools in NC, children suspected of having exceptionalities are evaluated by a multidisciplinary team of educational professionals (e.g., teacher, speech-language pathologist, school psychologist), who determine if the child meets the requirements for special education services. Eligibility is formally documented on a NC DEC3 eligibility determination form that also denotes which disability category best describes the disability under which the child qualified. The DEC3 forms obtained for the child participants in this study all specifically stated that the child qualified for special education services under the IDEA (2004) diagnostic category of autism. All of the children except two had either a DEC diagnosis of autism or a written diagnosis of autism by a diagnostic provider. Of the two who did not, one had documentation of an Asperger syndrome diagnosis from a Ph.D. level psychologist, and one had documentation of a PDD-NOS diagnosis from a medical doctor.

In addition to documentation of a diagnosis of ASD, the child participant needed to meet the cutoff score for autism on at least one of two formal instruments administered in this study. The first of these is a parent questionnaire, the *Social Communication Questionnaire* (SCQ; Rutter, Bailey, & Lord, 2003), which required the caregivers to privately respond to written questions probing their child's social

interaction skills that related to an ASD diagnosis. The second was the *Childhood Autism Rating Scale* (CARS; Schopler, Reichler, & Rochen Renner, 2004) which was completed by the principal investigator. The CARS is a standardized tool used to rate children on specific behaviors associated with a diagnosis of autism. It is a screening tool for spectrum diagnoses and not intended to provide a complete diagnosis. One child was excluded from this study because he did not meet the cutoff scores on either the SCQ or CARS measures.

On the SCQ assessment, 24 of 41 of the participants' parents scored their children at or above the cutoff score of 15 given in the SCQ manual as supporting an autism spectrum diagnosis (Rutter et al., 2003). A smaller number, 17 of 41 of the parents, scored their children lower than the cutoff. Recently, Corsello et al. (2007) reported that using a cutoff score of 11 or above for children below eight years of age improves the sensitivity of the SCQ. This is pertinent to the current study because all the children were younger than eight years old. Thus, the cutoff of 11 or above recommended by Corsello et al. was considered supportive of an ASD diagnosis for the purposes of the present study. Approximately 88% (36/41) of the child participants were scored by their parents with a score of 11 or above on the SCQ assessment. Only five of the children had SCQ scores lower than 11; however, all of the children selected for participation in the study met the diagnostic criteria on the CARS (Schopler et al., 2004).

Criterion two. The children needed to be between the ages of 4 years, 0 months and 7 years, 11 months old. This age range was chosen because it represented a period when many children are focusing on early literacy skills. The mean age was

68.95 months, with a standard deviation of 14.87 months. A Kolmogorov-Smirnov Test of Normality concluded the children's ages in this study were normally distributed,  $D(41) = 0.119, p > .05$ .

Criterion three. The child participants' parents or teachers must have reported that the child was not conventionally literate. This was to ensure that early literacy skills were the focus of the investigation. Since conventional literacy skills were not directly assessed, this criterion was dependent on report.

Criterion four. The child participants had to have receptive language ages of at least 18 months based upon formal evaluation using the *Test of Early Language Development* (TELD; Hresko, Reid, & Hammill, 1999). The requirement that the children have this level of receptive language ability ensured that they were capable of understanding enough spoken language to participate in at least some of the emergent literacy assessment tasks. One child was excluded from this study because the child did not meet this criterion.

Criterion five. The child participants had to be able to speak English. Three children enrolled in this study were from homes where the child was exposed to more than one language. In all of these cases, the child was enrolled in a public school where instruction occurred in English, and the parents were able to speak and communicate in English.

### Procedures

Parents interested in participating in the study directly contacted the principal investigator or informed their child's classroom teacher that they would be willing to participate. Prior to testing any child or interviewing their parents, written parental

consent was obtained. The child participants were given a counter-balanced assessment battery consisting of the three content areas using the formal measures that are described in the Data Collection Measures and Instruments section of this chapter. Based on parent preference, some of the child participants recruited from the Durham Public Schools were assessed in their classrooms, during school hours. All other child participants were assessed in their homes or a private room at the University of North Carolina at Chapel Hill (UNC-CH) in the Division of Speech and Hearing Sciences, depending on the parents' preference. All assessments were conducted in quiet locations. All of the child participants' parents were required to fill out the SCQ. The parents who agreed additionally participated in the structured interview with the principal investigator, which utilized the *Home Emergent Literacy Profile for Children with Autism Spectrum Disorders* (HELPA, Lanter, 2008). Six parents declined to be interviewed using the HELPA. Interviews were conducted in person or over the telephone, depending on the parent's preference.

The children who participated in this study were allowed to select a free book, provided by the principal investigator of this study, upon completion of their testing. The child participants' parents received a brief summary report of the child's performance from the principal investigator. For the children tested on Durham Public School premises, the school administrator was provided with a copy of this report. This provision was included in the written consent form.

#### Data Collection Measures and Instruments

The following measures were used in this study:

##### Oral Language

Oral language skills in the child participants were assessed using the *Test of Early Language Development* (TELD; Hresko et al., 1999). On this standardized measure, normative data are available for children ages 2 years, 0 months to 7 years, 11 months, but age-equivalent scores are provided for children of younger chronological ages. This assessment yields an overall language score composite in addition to expressive and receptive composites. The test manual reports that the TELD is strongly correlated with other assessments of cognition and academic achievement. In two cases, the TELD was re-administered due to testing difficulties. According to Hresko et al., test-retest reliability on the TELD is over .90 for all of the age groups evaluated in this study.

Text comprehension was informally assessed using the HELPA. Parents were asked if, when reading to their child, they ask their child to identify certain things on the page, such as identification of a character or an object, or color; what may happen next (i.e., prediction); about the character's feelings; or how their child can relate to the character or events in the story. Following this question, they were asked which type of question their child was most able to answer.

### Nonverbal Cognition

Nonverbal cognitive skills in the child participants were assessed using the *Kaufman Brief Intelligence Test* (K-BIT; Kaufman & Kaufman, 1997). On this standardized measure, normative data are available for individuals from ages 4 years, 0 months to 90 years. Although this assessment measures verbal and nonverbal intelligence, only the nonverbal portion was administered. This portion measures fluid intelligence. In this subtest, the examinee is shown a picture and asked to

identify which picture, from a field of five, “goes with” the picture. According to the authors, on the nonverbal subtest “the examinee needs to perceive the pictures’ various attributes, generate hypotheses about how the pictures go together, and test out the hypotheses to arrive at a solution” (p. 30). The K-BIT nonverbal subtest is correlated with other standardized assessments, e.g., the *Weschler Intelligence Scale for Children – Fourth Edition* (Wechsler, 2003) Perceptual Reasoning Index (.56). All forty-one of the child participants in this study were assessed using the K-BIT; however, scores for 12 of these child participants were excluded due to a testing administration error that invalidated their scores. As a result, 29 of 41 K-BIT scores were included in the analyses of this study. Of the 29 cases that were included in the analyses, nine of these cases (9/29) reflect scores from a re-administration of the test. The remaining (20/29) cases reflect scores from a single administration of the test. The 9 cases where the assessment was re-administered were not omitted from the analyses because test-retest reliability on the K-BIT, for the nonverbal subtest, ranges from .76 to .89.

#### Formal Early Literacy Measure

Early literacy skills were assessed both formally and informally in the child participants. They were formally measured using the *Emergent Literacy Profile* (Dickinson & Chaney, 1997). The ELP does not have published normative data but it has been used in several published studies with young children (e.g., Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003; Dickinson, McCabe, Clark-Chiarelli, & Wolf, 2004). The ELP includes subtest scores for environmental print recognition, print form (which they term “understanding print”), alphabet

knowledge (which they term “letter identification”), and name writing (which they term “early writing”). A description of the ELP subtests follows.

The *environmental print recognition subtest* asked children to identify the names of pictures with words printed on them. The child was shown five plates. Each plate showed a picture with a word identifying the picture, printed within the picture. The pictures include: a stop sign, McDonalds, eggs, popcorn, and bread. Consistent with the directions for the ELP, full credit was given for answers reflecting the target, and partial credit were given for answers reflecting semantic similarities (e.g., hamburger for McDonalds). The children’s scores were summed and grouped to reflect their performance. The *print form subtest* asked the children to identify words from pictures and nonword choices. The examinee was shown four plates. In each plate, the child was asked to identify, from a field of three choices, which representation was a word. Choices include the real word, pictures of objects (line drawings), and strings of letters and nonletters. In question one the child was asked to identify the word from the following choices: BABY, picture of a baby, picture of a toy. In question two, the child was asked to identify the word from the following choices: NNNT, W3#NJ, MILK. In question three, the child was asked to identify the word from the following: mommy (presented in cursive), qfby[, W!?!a\$. In question four, the child was asked to identify the word from the following: ALPHABETICAL, BIG, picture of a tall tree. For the first three questions, the directions instruct the examiner to ask the child to identify which choice looks like a word. For the fourth question, the directions instruct the examiner to ask the child to point to the word that says the target (“big”). In this study the children were asked to identify which picture



said each of the targeted words, the more challenging direction consistent with the final question. This modification was made to more accurately reflect the children's abilities to perform a skill more consistent with the expectations for children in kindergarten, first, and second grades. The children's scores were summed and grouped to reflect their performances. The *alphabet knowledge subtest* asked the children to identify letter names and sounds. The children were shown three plates. The first plate had the letters A, D, T, C. The second plate had the letters E, R, P, H. The third plate had the letters a, d, t, f. In this subtest, examinees are asked to identify the name *or* sound of each letter. To more fully determine the child participants' abilities, the children were asked to identify each letter on this assessment, and then the letter sounds. The children's scores were summed and grouped to reflect their performances.

The *name writing subtest* asked the children to write their name and then tell the examiner what they wrote. In this study, the children were only asked to write their name. Name writing scores were evaluated using the ELP but scored according to criteria on the *Phonological Awareness Literacy Screening PreK* (PALS-PreK; Invernizzi, Sullivan, Meir, & Swank, 2004). Because the PALS-PreK provides normative data, this scoring strategy allowed for comparison to those norms. On the PALS-PreK, the name writing scores range from 2-7. A score of a 2 reflects unrecognizable scribble, whereas a score of a 7 reflects a name that has all of the correct letters, is not backwards, and does not have any mirror image.

#### Informal Early Literacy Measure

The HELPA was used to assess informally the children's early literacy skills and home literacy practices. With regard to early literacy skills, the parents of the child participants were asked questions related to their children's knowledge of: (a) print concepts, (b) alphabet knowledge, (c) phonological awareness, (d) name and other forms of emergent writing, (e) pretend reading, and (f) literacy motivation. Specific questions exploring these aspects are detailed below.

The *print concepts questions* included asking the parents about their child's knowledge of environmental print and print forms, conventions, and function. Environmental print knowledge questions included asking the parents if their child could identify words in the environment and his/her own name. Print forms, conventions, and functions questions included asking the parents if their child (a) could orient a book correctly while reading, (b) could turn the pages one at a time, (c) had ever pointed to words to get someone to read them, and (d) had ever been observed to move his or her finger along words from left to right during shared reading. In addition, parents were asked if they felt their child knew that someone was reading words in a book versus telling a story, and if they thought their child understood why people read and write.

The *alphabet knowledge questions* included asking the parents if their child could identify any letters and identify any letter sounds. The *phonological awareness questions* included asking the parents if their child could spontaneously produce rhymes and if their child could read novel words by sounding them out or somehow figuring them out. Since the child's proficiency in this latter task was not specified, responses could have included a range of word reading abilities, from environmental

print to using the alphabetic principal. The *name and other forms of emergent writing questions* included asking the parents if their child could (a) write any letters by copying them, (b) write any letters from memory, (c) write any words by copying them, and (d) write any words from memory. The *pretend reading questions* included asking the parents if they *had ever* seen their child engage in pretend reading, and if so, how often. Lastly, the *literacy motivation questions* included asking the parents how often they had observed their child looking at books independently, their impression of how their child feels about being read to, their impression of how their child would feel about getting a book as a gift, how often their child requests (verbally or nonverbally) for someone to read to him or her, how often the child is observed to write or scribble independently, how often they observe their child to be playing with or intrigued by letters, if their child has ever had a favorite book, and if their child has a preference for a certain genre of book.

### Home Literacy Practices

The HELPA also was used to assess factors associated with home literacy practices. These included the parents' (a) behaviors that promote literacy learning, (b) self-assessment of their personal literacy abilities, and (c) beliefs and attitudes about their child's education. Specific questions from the HELPA exploring these aspects are detailed below.

*Behaviors that promote literacy learning* were explored by asking the parents questions pertaining to their provision of literacy materials, informal literacy activities in the home, and formal literacy activities in the home. Assessing the provision of literacy materials included asking parents if they had specific types of

books, writing materials, and toys focusing on educational skill in their home and tallying up the number of different items they had. Types of books included magazines, newspapers, comics, catalogs, “how to” books (e.g., cook books), telephone books, a dictionary or other type of reference book, or some other form of book the parent identified as being in their home. Types of writing materials included magnetic letters or numbers, paper, pens and pencils, blackboard and chalk, crayons, colored markers, paints, or some other form of writing material the parent identified in their home. Types of toy related materials included instructional videos, instructional hand held computer games (e.g., *LeapPad*), instructional video games played on the television, instructional games played on the computer, alphabet blocks, letters for the bathtub, alphabet puzzles, or some other form of toy related to literacy. The parents were also asked how many books their child had access to. These could be books owned by the family, taken out from a library, or otherwise obtained.

Questions about informal literacy activities included asking the parents how often someone read to their child, when they began reading to their child, what types of questions they asked their child during shared reading, and what types of questions their child was most likely to respond to during shared readings. This latter part is discussed with the children’s oral language abilities. Questions about formal literacy activities included asking the parents how often they pointed out to their child why someone would read, how often they taught their child to read outside of shared readings, and how often they tried to teach their child to write.

*Self-assessment of personal literacy abilities* was explored by asking the parents to provide the mother’s highest educational level, and to rate their own

confidence with regard to their personal reading and writing abilities. Lastly, *parental beliefs and attitudes about their child's education* were explored by asking the parents to describe how important literacy learning skills were for their child, how confident they felt about their ability to teach their child literacy skills, if they felt their child's reading skills were a relative strength, if they felt their child's writing skills were a relative strength, whose responsibility they felt it was to teach their child literacy skills (i.e., school or family), and how much of their child's literacy development they felt reflected their efforts, versus educational efforts outside the home.

#### Confirming Diagnosis of Autism

As part of the previously mentioned criteria for the child participants in this study, the child participants were observed by the principal investigator to validate an ASD diagnosis using the CARS (Schopler et al., 2004) and the parents of the child participants were asked to complete the SCQ (Rutter et al., 2003).

#### Design

This study was designed to be descriptive and correlational. A within-group design was used. According to Power and Precision (Weisen, personal communication, January 7, 2009) and Cohen (1998), this study was able to identify moderate correlations (.4), using two-tailed tests and an alpha of .05 with 70% power. Consistent with the National Early Literacy Panel (NELP, 2008) and research in the behavioral sciences (Green & Salkind, 2003), associations that were .50 or greater were considered to reflect strong relationships, correlations between .30 and .50 were

considered to reflect moderate relationships, and correlations lower than .30 were considered to reflect small relationships.

## CHAPTER 4

### Results

The purpose of this study was to answer the following questions:

(1) What emergent literacy skills and understandings do young children with ASD possess with regard to oral language, print concepts, alphabet knowledge, name and other forms of emergent writing, phonological awareness, pretend reading, and literacy motivation?

(2) How does the performance of young children with ASD on measures of emergent literacy compare to emergent literacy expectations for children with typical development, based on the extant research literature and the grade level expectations of the North Carolina Department of Public Instruction Standards of Learning?

(3) What are the associations of age, oral language, and nonverbal cognitive skills and abilities of children with ASD with their early literacy skills and abilities?

(4) In families that include a young child with an ASD, what are the primary caregivers' use of behaviors that promote literacy learning, personal literacy abilities, and beliefs and attitudes about their child's education?

(5) How are the oral language and early literacy abilities of children with ASD associated with primary caregivers' behaviors that may promote literacy learning and caregivers' beliefs and attitudes about their child's education?

In this chapter, descriptive statistics are provided followed by the results addressing each of these five research questions. Descriptively, the children's performance across the formal measures and the results from the *Home Emergent Literacy Profile for Children with Autism Spectrum Disorders* (HELPA, Lanter, 2008) are reported. The scores from the formal oral language assessment, the *Test of Early Language Development* (TELD; Hresko, Reid, & Hammill, 1999) and the scores from the formal assessment of nonverbal cognition, the *Kaufman Brief Intelligence Test* (K-BIT; Kaufman & Kaufman, 1997) were presented in terms of means, standard deviations and also grouped in terms of the descriptive categories to improve interpretation of the children's performance. The scores on these two measures, the TELD and K-BIT, were grouped using the normal curve model. According to Schiavetti and Metz (2002), in this model, a score of 100 is the mean. Scores of 85–115 are considered average and fall within one standard deviation of the mean. Low average scores fall within 85-99 and high average scores fall within 100-115. Scores of 70–84 are considered below average and fall between one and two standard deviations below the mean. Scores below 70 ( $\leq 69$ ) are considered at the lower extreme and fall lower than two standard deviations from the mean. This range of performance was sectioned into scores falling between 50-69, and those of 49 and below, to distinguish children who performed at floor levels on the formal assessment of oral language, the TELD. The formal assessment of nonverbal cognition, the K-BIT, did not have a specific number across age ranges to reflect a floor level; floor levels varied by the age of the child and may have gone below a score of 49. At the higher end, scores of 116-130 are considered above average and fall between one and



two standard deviations above the mean. Scores of 131 or higher, not achieved by any of the child participants in this study, are considered the upper extreme and fall higher than two standard deviations from the mean. Inferentially, nonparametric analyses were used to explore relationships among various variables.

### Preliminary Analyses

Preliminary analyses examined the distribution of scores for observational measures of oral language (TELD), nonverbal cognition (K-BIT), and emergent literacy (ELP). Results for tests for normality of these distributions are provided in this section.

#### Oral Language

Table 3 shows the child participants' performance on the TELD in term of grouped scores as well as means and standard deviations. The distribution of scores for the receptive,  $D(41) = 0.13, p > .05$ , and composite portions,  $D(41) = 0.13, p > .05$ , reflected normal distributions of scores according to the Kolmogorov-Smirnov Test of Normality. Conversely, the distribution of the expressive language scores was found to be significantly non-normal,  $D(41) = 0.15, p < .05$ .

#### Nonverbal Cognition

Table 4 shows the child participants' performance on the K-BIT in terms of grouped scores as well as means and standard deviations. These scores reflected a non-normal distribution according to the Kolmogorov-Smirnov Test of Normality,  $D(29) = 0.21, p < .05$ .

#### Formal Early Literacy Measure

Early literacy skills were assessed formally with the *Emergent Literacy Profile* (ELP; Dickinson & Chaney, 1997). Table 5 shows the child participants' performance in terms of means and standard deviations on the formal early literacy measures of environmental print, print forms, letter name identification, and letter sound identification, as determined by their percentage correct on the ELP. Table 6 shows these scores in a grouped format.

All of the formal early literacy measures showed non-normal distributions of scores according to the Kolmogorov-Smirnov Test of Normality. The ELP environmental print scores reflected a non-normal distribution,  $D(41) = 0.25, p < .05$ ; as did the ELP print forms scores,  $D(41) = 0.21, p < .05$ . The ELP letter name identification scores,  $D(40) = 0.25, p < .05$  and the ELP letter sound identification scores,  $D(40) = 0.27, p < .05$  also had non-normal distributions. In these two subtests, the responses of one child participant were not included in this analysis because the child exclusively used manual communication rather than verbal communication.

Name writing scores were evaluated using the ELP but scored according to criteria on the *Phonological Awareness Literacy Screening PreK* (PALS-PreK; Invernizzi, Sullivan, Meir, & Swank, 2004). Because the PALS-PreK provides normative data, this scoring strategy allowed for comparison to those norms. The name writing scores reflected a non-normal distribution according to the Kolmogorov-Smirnov Test of Normality,  $D(41) = 0.29, p < .05$ .

#### Implications of Preliminary Analyses for Further Statistical Tests

Due to the large number of scores which were non-normally distributed, nonparametric statistics were computed to address the research questions posed in this study (Field, 2005).

### Analyses of Research Questions

(1) What emergent literacy skills and understandings do young children with ASD possess with regard to oral language, print concepts, alphabet knowledge, name and other forms of emergent writing, phonological awareness, pretend reading, and literacy motivation?

The following provides an overview of how the child participants performed collectively in this study. For each component area or characteristic, overall performance for the group is discussed in terms of relative strength, relative weakness, or variable performance. An examination of how the children performed according to their grade level expectations is discussed in question two.

Oral language. The majority of the children in this study had oral language difficulties. Table 3 shows that approximately 66% (27/41) had standardized receptive language scores < 70, approximately 76% (31/45) had standardized expressive language scores < 70, and approximately 76% (31/41) had standardized composite language scores < 70. Table 7 shows that most of the children in this study, approximately 83% (29/35), were most likely to answer “identification” types of questions during shared readings with their parents.

Print concepts. Environmental print and print forms, conventions, and function were assessed. Table 6 shows that the children’s scores on environmental print subtest of the ELP clustered disproportionately in the two highest score

categories (70-89% and 90-100%). It can further be seen that over half of the child participants (26/41) were able to answer more than half of the environmental print questions. As such, performance was variable. This finding was lower than the results from the HELPA. Table 8 documents that 85% of the parents reported their child were able to identify environmental print. A greater percentage of children may have been reported as having these skills on the HELPA as opposed to those observed to demonstrate the skills during the ELP because the photographs on the ELP lacked context, and because parents have many more opportunities to observe their children's emergent literacy behaviors than were available to the principal investigator during a single testing session. The majority, 88%, of parents also reported that their child was able to identify his or her name in print.

Mechanical aspects of print concepts appeared to be a relative strength for the child participants in this study. Results from the HELPA, reported in Table 8, suggested that the vast majority of the child participants, 94%, were reported by their parents to be able to hold a book upright while reading and 97% were reported by their parents to be able to individually turn pages. Other aspects of print concepts were not as strong. Table 6 shows that on the print forms subtest of the ELP, where the child is asked to identify a word from nonwords, only 14% of the child participants answered all of the questions correctly. This question, however, was presented in a way that would be challenging for many preschool age children with typical development. The children's overall performance on the print forms subtest was variable. Table 8 shows that 77% of the children's parents reported on the HELPA that they have observed their child point to words to get an adult to read

them, 60% have observed their child move his or her finger along words while someone is reading, and 71% reported that they felt their child understands that the words rather than the pictures carry the message in books. The most challenging print concept skill, based on parent report, related to the children's ability to understand why people read and write. Only 31% of the children's parents reported that they felt their child understood why people read and write.

Alphabet knowledge. Letter name identification appeared to be a relative strength for many of the children in this study. Table 6 shows that on the ELP, more than half of the children scored in the highest score category of 90-100% correct, and 75% of the children were able to answer over 70% of the questions correctly. This meant that of the twelve letters presented, they were able to correctly identify at least 9 of these letters. These results from the ELP were verified with the parents' reports related to their children's alphabet knowledge on the HELPA, reported in Table 8, where 97% reported that their children could identify at least some letters. As many of the child participants were preschool age children, their knowledge of lower case letters would not be expected to be fully developed, based on research with children with typical development (Dodd, Crosbie, McIntosh, Teitzel, & Ozanne, 2003).

Letter sound knowledge was not as developed in the children as their alphabet knowledge. This also is the case for children with typical development (Bloodgood, 1999; Lonigan, Burgess, Anthony, & Baker, 1998). Letter sound knowledge also appeared to be highly variable on the ELP. Table 6 shows the bimodal nature of the distribution, with a large clustering of children in the lowest score category (0-9% correct), a second large clustering in the highest score category (90-100% correct),

and very few children with intermediate scores. Some 50% of the child participants were able to get over 70% of these items correct. These results also were verified with the parents' reports on the HELPA, reported in Table 8, where 82% reported that their child knew the sound of at least some letters. Letter sound knowledge is not expected of children with typical development in preschool, but it is for children exiting kindergarten, first, and second grades according the NC-SOL (2008).

Name and other forms of emergent writing. The name writing score distribution revealed variability in performance among the children in this study. Using PALS-PreK criteria, with a range of 2-7, the overall mean score was a 2.6 with a standard deviation of a 1.7. A score of 2 was obtained by approximately 24% (10/41) of the child participants. This score reflects unrecognizable scribble. A score of 3-4, was obtained by approximately 12% (5/41) of the child participants. These scores reflect a name that has been written with letters, but does not include all of the correct letters in the child's name and possibly includes some symbols that are not conventional letters. A score of 5 was not obtained by any of the child participants in this study. This score reflects a name that includes mostly correct letters and has no letters that are not in the child's name, and does not include symbols. A score of 6 was obtained by approximately 24% (10/41) of the child participants. This score reflects a name that has all of the correct letters but letters that may be written backwards or in mirror image. This score is consistent with the expectations of children with typical development in preschool and exiting kindergarten according to the NC-SOL (2008). A score of 7 was obtained by 39% (16/41) of the child participants in this study. This score reflects a name that has all of the correct letters,

is not backwards, and does not have any mirror image. This score is consistent with the expectations of children with typical development exiting first grade according to the NC-SOL (2008). In terms of the HELPA, reported in Table 8, approximately 63% of the child participants' parents reported that their child could spontaneously write words from memory. More children, approximately 74%, were reportedly able to independently write letters according to their parents. A majority of the child participants were reportedly able to copy letters and words. Approximately 77% of parents reported that their child could copy letters and 71% of parents reported their child could copy words. The expectations for children with typical development to perform these skills vary by grade.

Phonological awareness. Phonological awareness was not directly assessed in this study. According to the HELPA, presented in Table 8, 40% of the child participants' parents reported that their child could spontaneously produce rhymes. The ability to produce rhymes appears in children with typical development when they are in preschool and is expected as they mature. Based on parental report from the HELPA, variable performance was reported with regard to the children in this study being able to produce rhymes. The HELPA also revealed that approximately 51% of the child participants' parents reported that their child could read novel words by sounding them out or somehow figuring them out (Table 8). As with rhyme production, children's ability to read novel words varies with age. Overall, the performance was variable.

Pretend reading. Pretend reading was assessed via parent report on the HELPA. As reported in Table 8, only 40% of the children's parents reported that their

child engaged in pretend reading. Of the children who were reported to engage in pretend reading, there was varied frequency, with no children engaging in pretend reading three or more times a week. Most of the children, approximately 29% (4/14) engaged in pretend reading either one to three times a month or one to three times a week; approximately 21% (3/14) engaged in pretend reading less than monthly or between four to five times a month. Interestingly, of the 40% (14/35) of children reported by their parents to engage in pretend reading, 11/14 also were reported by their parents to be able to somehow sound out or figure out how to read words. This may reflect the child's ability to read, versus pretend read. Another reason more of the children in this study may not have been reported to have engaged in pretend reading may be related to their expressive language abilities. Over half of the children in this study had expressive language age-equivalents less than 36 months of age according to the TELD. Their difficulty with verbal expression may have hindered their ability to engage in or reflect pretend reading behaviors.

Literacy motivation. As shown in Table 9, parents reported on the HELPA that all of the child participants in this study looked at books three or more times a week. However, only approximately 66% asked or gestured for someone to read them a book three or more times a week. The majority, approximately 86%, of the children in this study also were reported by their parents to play with or be intrigued with letters three or more times a week; however, only approximately 54% of the child participants' parents reported that their child independently engaged in writing activities three or more times a week.



Table 10 shows the majority of parents (60%) reported that their child enjoyed shared reading “very much.” Approximately 31% of parents reported that their child “enjoys it somewhat.” Less than 10% of parents reported that their child “does not enjoy” shared reading or “tolerates” shared reading. This suggests that shared reading is widely enjoyed by the children with ASD in this study. Similarly, over half of the parents, approximately 54%, reported that their child would “love” getting a book as a gift and approximately 31% reported that their child would like getting a book as a gift. The minority of parents, approximately 14%, reported that their child would be “upset” or “indifferent” to getting a book as a gift.

The majority of children, approximately 77% (27/35) had a favorite book currently, or at one point in their lives. Children favored different genres of books. On the HELPA, the majority of the parents, 60% (21/35) reported that stories were their child’s most favored book genre. *Goodnight Moon* by Margaret Wise Brown was the most common favorite fiction book reported. Some parents also mentioned that their child enjoyed books that rhymed, for example, *The Foot Book* by Dr. Seuss, *Brown Bear* by Bill Martin, Jr. and Eric Carle, and books by Sandra Boynton. The second most popular type of book of the children was the expository genre. Approximately 26% (9/35), of parents reported that this was their child’s favorite type of book. Preferred expository book topics included dinosaurs, planets, and trains or trucks. Approximately 17% (6/35) of parents said that two-dimensional books were the favorite of their child. Approximately 14% (5/35) stated nontraditional reading material was their child’s favorite. Examples of nontraditional reading material enjoyed by the children included *Car and Driver* magazine and field guides. Parents

of less than 10% of the children in this study reported that activity (3/35) or comic (1/35) books were their children's favorites.

(2) How does the performance of young children with ASD on measures of emergent literacy compare to emergent literacy expectations for children with typical development, based on the extant research literature and the grade level expectations of the North Carolina Department of Public Instruction Standards of Learning?

Professionals who work in the public schools are encouraged to use evidence-based teaching practices and educate their students using standards of learning for their state. Since the children recruited for this study were from North Carolina (NC), the children's performance was compared to the NC Standards of Learning (NC-SOL, 2008). The NC Department of Instruction provides learning standards for children enrolled in preschool, as well as children enrolled in grades kindergarten through twelve. According to the NC Department of Instruction (2009), children who will turn 5 years old on or by August 31 in the calendar year are eligible to register for kindergarten, the initial point of entry into the general education system. This criterion was matched to the chronological ages of the children in this study to determine their grade levels. The following describes the child participants' performance according to their grade levels (as determined by their chronological age) and other literacy-related chronological age or grade level expectations documented in the literature. The children in this study reflected the chronological ages of preschoolers, kindergarteners, first graders, and second graders. The children were evaluated during the school year; thus grade level expectations need to be considered with that in mind. For example, a first grader in this study would be

expected to have skills at least as high as those of an exiting kindergartner, but not necessarily to have all the skills expected of an exiting first grader. This was because not all of the children tested were seen towards the end of an academic year.

Preschoolers. Twenty children (20/41) in this study were in the chronological age range of preschoolers. These children ranged in age from 49 to 67 months. Seventeen of these children's parents participated in the HELPA questionnaire. For this group of children, *oral language* skills were variable. Thirty percent (6/20) had receptive language scores below 70, 40% (8/20) had expressive language scores below 70, and 45% (9/20) had composite language scores below 70 on the TELD. Thus, many of the children were performing below the level of children with typical development in terms of their language abilities. Text comprehension questions concerning identification were most likely to be answered by the children during shared readings with their parents as approximately 88% (15/17) of the parents reported their child was most likely to answer this type of question. The NC-SOL (2008) expectation for children exiting preschool is that they can respond to prediction questions and "relate personal experiences to events described in familiar books" (p. 26). As this clearly goes beyond identification, many of these children may be at risk for meeting expectations in this area.

*Print concepts* skills varied. Only 25% (5/20) of these preschool age children with ASD achieved full credit on the environmental print subtest of the ELP. However, only one child in this age group was unable to answer any of these questions. This suggests that the majority of these children were able to demonstrate a developing knowledge of environmental print. These ELP findings were consistent

with parental reports. On the HELPA, approximately 88% (15/17) of the children were reported by their parents to be able to identify environmental print in context and identify their name. This is consistent with children with typical development (Goodman, 1986).

Approximately 75% (15/20) of these children were able to answer at least one question correctly on the print forms subtest of the ELP. Over half, approximately 60% (12/20) answered at least half of these questions correctly. Only 15% (3/20) answered all of the questions correctly. This suggests that most of the children demonstrated some knowledge of what words look like. Twenty-five percent (5/20) were not able to answer any of these questions. Although this question was presented in a form challenging for preschoolers, this may be concerning. The NC-SOL (2008) expects children exiting preschool to be able to recognize that print and simple symbols are used to organize classroom activities. According to parental reports from the HELPA, 100% (17/17) of these children could orient a book and turn the pages one at a time. Approximately 71% (12/17) would point to words and ask someone to read them and knew that words tell the story versus the pictures. Less than half, approximately 41% (7/17) moved their finger along words while reading. This is problematic because the NC-SOL (2008) expectation for children exiting preschool is that they occasionally run their finger on print when pretend reading. Only approximately 41% (7/17) understood the purpose of reading and writing. This again is inconsistent with the NC-SOL (2008) expectations where children exiting preschool should be able to recognize that print carries a message.

*Alphabet knowledge* was a relative strength. Over half of these preschool children, 55% (11/20) identified all or nearly all of the letters by name on the ELP. Ninety-five percent (19/20) of the children identified at least one letter on the ELP. Sixty percent (12/20) identified at least one letter sound correctly on the ELP. According to parental report on the HELPA, all (17/17) of these children were able to identify letters by name and most, approximately 88% (15/17), were able to identify some letter sounds. This development is consistent with children with typical development, in that these skills begin to appear in the preschool years (Dodd et al., 2003).

*Name writing and other forms of emergent writing skills* were variable among children with ASD in the preschool age range. Over half, 60% (12/20), of these children achieved a score comparable to children with typical development exiting preschool when their name writing performances were compared against to the PALS-PreK criteria (Invernizzi, et al., 2004). On this measure, children with typical development in preschool should earn a score within the range of 5-7. This means that these children could write their name generally correctly, but possibly with some letters written backwards or in mirror image. The 40% of preschoolers in this study who had name writing scores lower than 5 may be at risk for meeting the NC-SOL (2008) expectations. Exiting preschool children are expected to be able to use letters and letter approximations to write their own name. According to parental reports on the HELPA, the majority of these child participants, approximately 77% (13/17) could copy letters; approximately 71% (12/17) could copy words; approximately 71% (12/17) could independently write letters, and approximately 59% (10/17) could

independently write words. The NC-SOL (2008) expectation is that children exiting preschool be able to represent thoughts and ideas using letter-like forms. These findings suggest that a concerning percentage, approximately 25% or more of the children in this study, are not performing emergent writing skills consistent with educational expectations for their grade.

*Phonological awareness* skills were measured by asking the children's parents if their children could spontaneously produce rhymes and read novel words. With regard to rhyme production, reports from the HELPA revealed that approximately 41% (7/17) of these children could spontaneously produce rhyme sequences. The NC-SOL (2008) expectation is that children exiting preschool be able to repeat rhythmic patterns and associate words that begin with the same sound. Approximately 47% (8/17) of these children could read or somehow identify novel words. This is not to suggest, however, that this reflects decoding ability. The parents' responses may have reflected environmental print knowledge. It should again be noted that the parents were asked if their child could read novel words by sounding them out or somehow figuring them out. Since actual decoding skills were not formally assessed in this study, the parents' responses may have included their child's ability to identify novel environmental print or identify letter sounds in context.

*Pretend reading* was not a universal occurrence among this age group. According to parental reports on the HELPA, approximately 29% (5/17) of these child participants were observed by their parents to have ever engaged in pretend reading activities. The NC-SOL (2008) expectation is that children in preschool “pretend to read familiar books in ways that mimic adult reading” (p. 27). Pretend

reading is not listed as an educational expectation by the NC-SOL (2008) for children in grades kindergarten through second.

Kindergartners. Six children in this study had the chronological ages of children typically enrolled in kindergarten. These children ranged in age from 65 to 73 months. . All six of these children's parents participated in the HELPA questionnaire. As these children were evaluated during the academic year, the children's performances were used as indications of their progress toward the standards.

For this group of kindergarten age children, *oral language* skills were a relative weakness. All six children had receptive language, expressive language, and composite language scores below 70 on the TELD. Similar to the preschoolers with ASD, text comprehension questions concerning identification were most likely to be answered by most of these children (4/6) during shared readings with their parents. This is problematic because the NC-SOL (2008) expectation is that children exiting preschool be able to answer questions beyond the identification level and children exiting kindergarten should be able to answer higher-level comprehension questions from texts that are read, heard, and/or viewed. This includes connecting information in texts to their experiences and predicting possible events in texts.

*Print concepts* skills were varied. Only two of six kindergarten age participants achieved full credit on the environmental print subtest of the ELP. A comparable number of children achieved no credit in this subtest. Thus, four of six children demonstrated at least some knowledge of environmental print. The authors of the ELP report that on this task, by the end of preschool, children should be able to

identify the majority of the environmental print items (Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003). Only half of the children (3/6) in this study were able to answer the majority of these questions correctly. On the HELPA, four of six children were reported by their parents to be able to identify environmental print in context and identify their name. Expectations of the NC-SOL are that children exiting kindergarten should be able to recognize some words by sight including their own name and environmental print such as signs, labels, and trademarks. Findings from the ELP and parental report suggests that most of these kindergarten age children were meeting those standards to some degree; however, a concerning percentage were not. None (0/6) of the children in this age group achieved full credit on the print forms subtest on the ELP. The majority (4/6) did not correctly answer any of these questions.

According to parental report on the HELPA, most of these children (5/6) could orient a book and all (6/6) could turn the pages one at a time. Most (4/6) could move their finger along words while someone was reading, and point to words and ask someone to read them. Half (3/6) of these children's parents reported that they knew that words tell the story versus the pictures. These findings suggest that some of these children may be at risk for not achieving educational expectations in this area. Although not all of the children were evaluated at the end of an academic year, the performance suggests that several of the kindergarten age children in this study were at risk for failing to meeting educational SOL in the area of print concepts. According to the NC-SOL (2008), these children should understand print's directionality, and match print with words when listening to familiar texts by the time they exit



kindergarten. According to parental report on the HELPA, only one out of six of these kindergarten age children understood the purpose of reading and writing. Thus, although the majority of the children were reported to understand mechanical aspects of print conventions, fewer of the children were reported to understand print functions.

*Alphabet knowledge* was variable for the kindergarten age children in this study. Half (3/6) children identified all, or nearly all, of the letters (e.g., reporting d for b) and also identified all of these letters' sounds on the ELP. Only one child (1/6) was unable to identify any of the letters by name. Half (3/6) were unable to identify any of the letter sounds. According to the HELPA, nearly all (5/6) of these children could identify letters and most (4/6) knew some letters sounds. These findings suggest that grade level expectations may not be met by some of the children at this age. The NC-SOL (2008) expectation is that exiting kindergarten children will be able to recognize all upper and lower case letters of the alphabet and demonstrate an understanding of the sounds of letters.

The children's *name and other forms of emergent writing* skills also were variable for the kindergarten age children in this study, with half (3/6) of the children achieving a score comparable to preschoolers with typical development according to the PALS-PreK (Invernizzi, et al., 2004). This was a score within 5-7 which reflected a name production that was generally correct, but may have had some letters written backward or mirror image. According to the parents report on the HELPA, four of six children could copy letters and half (3/6) could independently write letters. Half (3/3) could independently write letters and their name. The expectation stated in the NC-

SOL (2008) is that exiting kindergarten children will be able to write most letters of the alphabet and some words when dictated. As such, some of these children were at risk for not meet grade level expectations in this area.

*Phonological awareness* skills were measured by asking the children's parents if their children could produce rhymes or read novel words. According to parental report on the HELPA, none of these children (0/6) were reported by their parents as being able to produce rhymes. This is concerning because the NC-SOL (2008) expectation is the exiting kindergarten children will be able to recognize that spoken language is comprised of speech sounds and identify words that begin and end alike (onsets and rimes). Moreover, according to the PALS-PreK (Invernizzi et al., 2004) by the end of preschool, most 4-year-old children with typical development can identify words that rhyme. Half (3/6) of the kindergarten age children could read, to an undefined extent, by sounding out words or somehow figuring them out. The ability to sound out words is consistent with expectations for kindergarten children with typical development (NC-SOL, 2008; Ehri, 1995); however, it should again be realized that the parents were asked if their child could read novel words by sounding them out or somehow figuring them out. Since actual decoding skills were not formally assessed in this study, the parents' responses may have included their child's ability to identify novel environmental print or identify letter sounds in context.

*Pretend reading* was reported to occur, or to have occurred, in none of these (0/6) kindergarten-age children. To date, it is not well understood at what ages children with typical development start and stop engaging in pretend reading activities. This skill also is not addressed by the NC-SOL (2008).

First Graders. Ten children in this study were in the chronological age range of first graders. These children ranged in age from 77 to 87 months of age. Nine of these first grade children's parents participated in the HELPA. As these children were evaluated during the academic year, their performances were compared to expectations for exiting kindergartners and exiting first graders.

*Oral language* skills were a relative weakness for about half of these first grade children. Half (5/10) of these children had receptive language scores below 70 and 60% (6/10) had expressive and composite language scores below 70 on the TELD. Text comprehension questions concerning identification were most likely to be answered by approximately 78% (7/9) of these children during shared readings with their parents. This is concerning because the NC-SOL (2008) expectation is that children exiting kindergarten and first grade should be able to comprehend text that is read, heard, and viewed as evidenced by their abilities to do such things as answer or predict what will happen and consider how information and events in texts connect to their own life experiences. Children exiting first grade are expected to be able to discuss and explain how, why, and what questions from texts.

*Print concepts* were variable. Only 40% (4/10) of these children achieved full credit on the environmental print subtest of the ELP. Three correctly (3/10) answered more than half of the ELP environmental print questions correctly. Only one child (1/10) was unable to answer any of the questions on this subtest. This suggests that the majority of these children were able to demonstrate at least some knowledge of environmental print, but not necessarily a comparable knowledge to children with typical development. On the HELPA, all (9/9) of these children were reported by

their parents to be able to identify environmental print in context and identify their name. The NC-SOL (2008) expectation is that children exiting kindergarten should be able to recognize environmental print such as signs, labels, and trademarks. Only 20% (2/10) of these children achieved full credit on the print forms subtest on the ELP. Half of these children, however (5/10), answered all but one of the questions in this subtest correct. Two (2/10) did not answer any of these questions correctly. This suggests that the majority of these children, 80% (8/10), evidenced at least some knowledge of what words look like. The NC-SOL (2008) expectation is that exiting first grade children be able to recognize many high frequency and/or common irregularly spelled words. The finding that only 20% of these children answered all of these questions correctly suggests that this first grade expectation may not be met for most of these children. According to parental report on the HELPA, 8/9 of these children could orient a book and all (9/9) could turn the pages one at a time. Most (8/9) could move their finger along words while reading, point to words and ask someone to read them, and knew that words tell the story versus the pictures. Conversely, only one-third of these children (3/9) were reported to have understood the purpose of reading and writing.

*Alphabet knowledge* was variable for the first grade children in this study. Most, 70% (7/10) of these child participants identified all of the letters on the ELP. The remaining three had variable performances with only one child being unable to identify at least one letter by name. Slightly over half, 60% (6/10) were able to identify all of the letter sounds on the ELP. Three (3/10) children were unable to identify more than one letter sound. According to parental reports on the HELPA, all

these children (9/9) were able to identify at least some letters and most (8/9) were able to identify at least some letter sounds. These findings suggest that more than half of the children may be meeting grade level expectations on these skills. The NC-SOL (2008) expectation is that children exiting kindergarten recognize upper and lower case letters of the alphabet and recognize most beginning consonant letter-sound associations; exiting first grade children should be able to use their knowledge of the alphabetic principle to sound out words. If the children do not know letter sounds by the end of the first grade, this task will be difficult.

*Name writing and other forms of emergent writing* skills were variable for the first grade children in this study. Sixty percent (6/10) were able to write their name with no backwards letters or mirror image writing, based on formal assessment using the PALS-PreK. This reflects a score of 7. According to the parents' report on the HELPA, the majority of these child participants (8/9) could copy and independently write letters and copy their name. Slightly less (7/9) could independently write their name. The NC-SOL (2008) expects exiting kindergarten children to be able to write most letters and some words when dictated, and exiting first grade children to write all upper and lower case letters using correct letter formation. Thus, the findings of this study suggest that more than half of the first graders in this study may be at risk for meeting grade level expectations in this area.

*Phonological awareness* skills were assessed by asking the children's parents if their children could produce rhymes or read novel words. According to parental report on the HELPA, just over half, approximately 56% (5/9), of these children could spontaneously produce rhymes. Most, approximately 67% (6/9), of the parents

reported that their child could read, to an undefined extent, by sounding out words or somehow figuring them out. These parent reports suggest that over 25% of these children may not be meeting grade level expectations for phonological awareness. The NC-SOL (2008) expectations are that exiting first grade children be able to create and state a series of rhyming words, decode one-syllable words when reading words, and change the beginning, middle, and ending sounds in words to produce new words.

*Pretend reading* was observed, or had been observed, in most of these children, approximately 89% (8/9).

Second Graders. Five children in this study reflected the chronological ages of second graders. These children ranged in age from 88 to 94 months. Three of these children's parents participated in the HELPA. For one of these children, their ELP alphabet knowledge scores were not included in the results because the child had limited expressive language ability and was unable to use speech or signed English to provide the letter names and sounds. This was the only child in the study who used manual (signed English) communication as his primary means of expressive communication. Three of these children's parents participated in the HELPA. As these children were evaluated during the academic year, their performances were compared to expectations for exiting first grade and second grade children. Oral language skills were a relative weakness. The majority, four of five of these children, had receptive language scores below 70, and all had expressive and composite language scores below 70. This finding may reflect the criteria for the study – that the children be not be conventionally literate. Text comprehension questions concerning

identification were most likely to be answered by all (3/3) of the children's parents who participated in the HELPA. This finding is concerning because the NC-SOL (2008) expectation is that children exiting second grade be able to make predictions and draw inferences from texts.

*Print concepts* skills were variable. Two of the five second grade children answered all of the environmental print questions correctly on the ELP. Two answered some but not all of the questions correctly. One did not answer any of the questions correctly. These results provide evidence that the majority of these children have some developing knowledge of environmental print, although not a commensurate knowledge to that of children with typical development. The authors of the ELP report that on this task, by the end of preschool, children who are typically developing should be able to identify the majority of the items (Dickinson et al., 2003). On the HELPA, two of three of the children were reported by their parents to be able to identify environmental print in context and all three were reportedly able to identify their name, skills expected of existing kindergartners, based on the NC-SOL (2008).

Only one of five second grade children answered all of the questions on the print forms subtest on the ELP correct. Two of the five did not answer any of the questions correctly on this subtest. This suggests that the majority did not have mastery of what a word looks like and/or had difficulty understanding the directions of the task. As such, the children were not performing at an acceptable level for their age. The NC-SOL (2008) expectation is that exiting first grade children be able to read some words by utilizing their knowledge of letter-sound relationships and

students exiting second grade children be able to “read most high frequency and many irregularly spelled words” in texts (p. 27). According to parental report on the HELPA, all (3/3) of the children could orient a book, and point to words and ask someone to read them; two of the three could turn the pages one at a time, knew that words tell the story versus the pictures, and could move their finger along words while reading; and none of the three understood the purpose of reading and writing.

*Alphabet knowledge* was not commensurate with grade level expectations. As mentioned above, four of these children were tested on alphabet knowledge on the ELP. Two of the children identified all or nearly all of the letters on the ELP; one was able to identify no more than one letter. Only one child identified all or nearly all the letter sounds on the ELP. Three were able to identify no more than one letter sound. These findings suggest that grade level expectations may not be achieved by these children. The NC-SOL (2008) expectation is that exiting kindergarten children will be able to recognize all upper and lower case letters of the alphabet.

*Name and other forms of emergent writing* skills were below grade level expectations for several children in this group. Only two of the second grade participants were able to write their name with no backwards letters or mirror image writing. This reflects a score of 7 according to the PALS-PreK criteria, the benchmark for children to achieve prior to the second grade level. The NC-SOL (2008) expectation is that exiting kindergarten children will be able to write most letters and some words when dictated, and exiting first grade children to write all upper and lower case letters using correct letter formation. Another two children were able to write their name with all of the correct letters but with some letters written



backwards or in mirror image, a score reflective of a score of 6 according to the PALS-PreK criteria. One child earned a score of 2 according to the PALS-PreK criteria. This reflects unrecognizable scribble. According to the parent report obtained on the HELPA for the three children at this grade level with parental reports, two of the children could copy and independently write letters and words.

*Phonological awareness* skills were measured by asking the children's parents if their child could produce rhymes or read novel words. According to the parents of the three children at this grade level with HELPA parental reports, none of the three children could spontaneously produce rhymes. One of the three children could, to an undefined extent, read novel words by sounding them out or somehow figuring them out. These findings suggest that grade level expectations for phonological awareness may not be met by the second graders with ASD included in this study. The NC-SOL (2008) expectations are that exiting first grade children be able to "create and state a series of rhyming words" and "decode regular one-syllable words when reading words and texts" (p. 22). The difficulty with rhyme may reflect the difficulties many of these children had with expressive language. All five second grade children in this study scored at least two standard deviations below the mean on the expressive language subtest of the TELD; this may have hindered their ability to produce rhymes.

*Pretend reading* was again not common in this group. According to parental report on the HELPA, only one of the three child participants was observed by their parents to engage, or have ever engaged in pretend reading activities.

(3) What are the associations of age, oral language, and nonverbal cognitive skills and abilities of children with ASD with their early literacy skills and abilities?

The following results examine the associations found among the ages, oral language and nonverbal cognitive skills of children with ASD, and their early literacy skills. Analyses were conducted with Spearman rho correlations, due to the non-normal distributions found, using SPSS version 16.0. Analyses were conducted using two-tailed tests. Correlations that were .50 or greater were considered to reflect strong relationships, correlations between .30 and .50 were considered to reflect moderate relationships, and correlations lower than .30 were considered to reflect small relationships (Green & Salkind, 2003). In instances where there were missing values (e.g., missing K-BIT score) the observations were deleted. In other words, correlations were conducted only when scores were available on all variables being assessed.

Age. For the child participants in this study, chronological age was not found to significantly be associated with the children's oral language standard scores or nonverbal cognitive standard scores. In addition, age was not significantly associated with any of the early literacy scores (which were not standardized).

Oral Language. Table 11 shows that strong associations were found between the children's TELD receptive and expressive language scores. Strong associations also were found among the children's TELD composite and receptive and expressive oral language scores. Table 11 further reveals that strong associations also were found between the children's K-BIT nonverbal cognitive scores and their TELD receptive, expressive, and composite oral language scores. This finding suggests

multicollinearity, or a close relationship, between the two constructs of language and nonverbal cognition (Field, 2005). The relatedness of the two constructs may be reflective of the limited subtests in the cognitive measure that was used. A measure with more subtests may have revealed different findings. Table 12 reports associations between the children's formally assessed early literacy skills and their formally assessed oral language and nonverbal cognitive abilities. The following summarizes associations among these scores.

Environmental print. Moderate associations were found between environmental print scores on the ELP and the children's TELD receptive and composite oral language scores. Environmental print scores were not found to be significantly associated with the children's K-BIT nonverbal cognitive scores.

Print Forms. Moderate associations were found between scores on the print forms subtest of the ELP and the children's TELD receptive, expressive, and composite oral language scores. Moderate associations also were found between this measure and the children's K-BIT nonverbal cognitive scores.

Alphabet knowledge. Letter name identification was not found to be associated with the children's oral language or nonverbal cognitive scores. Moderate associations were found between letter sound identification scores on the ELP and the children's TELD receptive, expressive, and composite oral language scores. This measure was not found to be significantly associated with the children's K-BIT nonverbal cognitive scores.

Name writing. Name writing scores using the PALS-PreK scoring criteria were moderately associated with the children's TELD receptive, expressive, and

composite language scores. Strong to moderate associations were observed between name writing scores and the children's K-BIT nonverbal cognitive scores.

The above correlations reflect how the sample of child participants did as a whole. It can be seen that the children's oral language skills were moderately associated with all of their early literacy skills, with the exception of letter name identification.

Intercorrelations of early literacy skills. Table 13 reveals that most of the early literacy skills measured on the ELP were either strongly or moderately correlated with one another. The environmental print scores were strongly associated with the letter name identification, letter sound identification, and name writing scores, and moderately associated with the print forms scores. The print form scores were strongly associated with the letter name identification, letter sound identification, and name writing scores. The letter name identification scores were strongly associated to the letter sound identification, and name writing scores. The letter sound identification scores were moderately associated to the name writing scores.

Associations between oral language and literacy skills. A deeper analysis of the data revealed that while stronger oral language skills generally were associated with higher literacy skills, many children with standardized language scores reflecting oral language abilities comparable to children less than three years of age demonstrated early literacy skills not usually observed in children with typical development under this age. More specifically, over 50% of the children in this study had a TELD expressive age-equivalent less than 36 months of age. Despite this, variability in performance was observed across all of the early literacy skills.

(4) In families that include a young child with an ASD, what are the primary caregivers' personal literacy abilities, use of behaviors that promote literacy learning, and beliefs and attitudes about their child's education?

The HELPA was used to assess factors associated with home literacy practices. These included the parents' (a) behaviors that promote literacy learning, (b) personal literacy abilities, and (c) beliefs and attitudes about their child's education. Results to these questions are discussed below.

Behaviors that promote literacy learning. The HELPA revealed that the vast majority of parents in this study lived in households with numerous reading and writing materials, as well as toys focusing on educational skills. Although only 35 of the children's parents took part in the full HELPA interview, answers to these questions were available for 37 of the children because three children lived within the same household. Table 14 reveals that approximately 78% of the parents reported having at least six different types of reading materials, approximately 95% had at least six different types of writing materials and approximately 68% had 6 or more toys focusing on educational skills. Parents reported providing access to toys focusing on educational skills including hand-held computers with letters, toy vehicles with letters, and playing games on the internet site *noggin.com*. Table 14 further shows that the vast majority of the children in this study, approximately 92%, had access to over 55 books. Collectively these results suggest that the children in this study lived in home environments rich with literacy artifacts.

Table 15 presents findings that approximately 100% of the parents of the children in this study began reading to their child before they were two years old.

Mothers were the primary caregivers to read to the child, with approximately 49% of the respondents reporting that the mother read the most frequently (Table 15). Table 16 shows that most of the parents, 80%, reported reading to their child three or more times a week. All but one of the parents reported reading to their child at least one to three times a week. In contrast, the majority, approximately 69%, reported that they point out to their child why someone would read less than monthly. This finding is similar to the finding that the majority of parents, approximately 31% (Table 8) reported that they felt their child lacks an understanding of the purpose of reading and writing. Conversely, parents may not have understood the question. They may have felt that there were specific ways to teach the purpose of reading and writing, rather than just point out the functionality. More parents, 61%, reported teaching their child to read, outside of shared reading situations, three or more times a week. Fewer parents, approximately 43%, reported teaching writing three or more times a week.

The parents in this study reported asking their child different types of questions during shared readings. They were asked if they ask their child to identify certain things on the page, such as the character or an object, or color; what may happen next (i.e., prediction); about the character's feelings; or how their child can relate to the character or events in the story. Almost all of the parents, approximately 97% (34/35) reported asking identification questions, approximately 89% (31/35) asking questions about the characters' feelings, approximately 91% asking questions about their child's ability to relate to the book, and approximately 71% asking their child prediction questions. This demonstrated their variable use of question forms with their children. When asked which type of question they ask most often,

identification was the most frequently reported; approximately 57% (20/35) of the parents reported asking these types of questions most often. The parents' usage of other types of questions (prediction, feelings, and relational) varied considerably by respondent. Seven of the parents (20%) reported relating the book to the child's life, most often, approximately 17% (6/35) asked about the characters' feelings the most often, and approximately 11% (4/35) asked their child to make prediction the most often. Informally some parents reported working on a specific question type because they knew it was challenging for their child. Others asked their child what they felt their child could best answer. Table 5 reveals that the most frequently asked questions by the parents, identification, was also the most likely to be answered by the child. The finding that most of the children in the study were most likely to answer identification questions speaks to the children's difficulty with oral language. It also is concerning for grade level expectations. The NC-SOL (2008) expectation is that children exiting kindergarten will be able to answer higher-level comprehension questions from texts.

Personal literacy abilities. The HELPA asked about the parents' educational level and their impression of their own reading and writing abilities. Although only 35 of the children's parents took part in the full HELPA interview, answers to these questions were available for 37 of the children's parents. Educationally, Table 17 reveals that the majority of the parents in this study, approximately 78%, had at least a Bachelor's Degree. The results of this study should thus be considered with the understanding that the parents in this study did not reflect a diversified group in terms of educational level. The parents in this study rated their reading and writing abilities

to be high. Table 17 further shows that approximately 95% of the parents reported having above average reading and 89% reported having above average writing. Taken together, these results reveal parents who are confident in their own literacy skills.

Beliefs and attitudes about their child's education. Table 18 reveals that the majority of parents in this study, approximately 86%, reported that they felt literacy learning was very or extremely important for their child. The majority, approximately 72%, also reported that they felt somewhat or very secure in their ability to teach their child literacy skills; only 20% reported feeling extremely secure. In terms of their perceptions of their child's literacy abilities, the majority of the parents, 80%, reported that they felt reading was a relative strength for their child. Conversely, only approximately 23% reported that they felt writing was a relative strength in their child. The majority of the parents, approximately 49%, felt it was equally the school's and family's responsibility to educate their children, whereas 31% reported feeling that it was primarily the educational system's duty. Some parents elaborated that they knew some parents were not equipped to teach their child, that some parents lacked resources, and that ultimately it is the school's responsibility. The parents in this study were equally split between the 46% who felt their child's literacy development was mostly due to the family's efforts, with the school as a secondary support and the 46% who felt the family and school had contributed equally to their child's literacy development. None of the parents expressed the opinion that their child's literacy development was primarily due to school instruction and only 3/35 expressed the opinion that their child's literacy growth was mostly because of school instruction.



(5) How are the oral language and early literacy abilities of children with ASD associated with primary caregivers' behaviors that may promote literacy learning and caregivers' beliefs and attitudes about their child's education?

Spearman rho correlations were conducted to determine if the children's oral language and early literacy abilities were associated with the parent's frequency of formally teaching their child to read, frequency of formally teaching their child to write, how important they feel literacy learning is for their child, and their confidence to teach their child literacy abilities. The children's grouped expressive, receptive, and composite TELD scores were used as an index of the children's language ability. Table 3 reports the children's performance on the TELD according to their grouped scores, means and standard deviations. The children's grouped environmental print, sense of printed language, letter name and sound, and name writing subtest scores from the ELP and PALS-PreK were used as an index of the children's early literacy abilities. Table 5 details the children's performance on the ELP subtests according to the means and standard deviations and Table 6 shows these scores in terms of grouped performance. The children's performance on the name writing subtest, as measured by the PALS-PreK, was addressed in question one. There was a mean score of a 2.6 with a standard deviation of a 1.7. Home literacy practice variables were available for 35 of the children, as this is how many of their parents participated in the HELPA questionnaire. The following correlations were conducted only when scores were available on all variables being assessed.

Observations from the HELPA revealed that the parental behavior of teaching their child to write was moderately associated with the children's composite oral

language, Spearman's  $\rho(33) = .37, p < .05$ , environmental print, Spearman  $\rho(33) = .44, p < .01$ , print forms, Spearman  $\rho(33) = .36, p < .01$ , letter name identification, Spearman  $\rho(33) = .37, p < .05$ , and name writing, Spearman  $\rho(33) = .45, p < .01$ , scores. Teaching writing was also found to be moderately associated with the parents' reported views on the importance of literacy learning for their child, Spearman  $\rho(33) = .38, p < .05$ . The parental behavior of teaching their child to read was only associated with the parental behavior of teaching their child to write, Spearman  $\rho(32) = .41, p < .05$ . The parents' confidence to teach their children literacy skills was moderately associated with their children's receptive oral language ability, Spearman  $\rho(33) = .38, p < .05$ .

#### Summary

The above findings presented a descriptive summary of those factors identified as being influential in literacy development for children with typical development, in children with ASD. Consistent with current emergent literacy theory (CELL, 2006) factors both within and outside of the child were evaluated. In the following chapter, Discussion, interpretation of these findings to practice is addressed.

## CHAPTER 5

### Discussion

An understanding of emergent literacy development in children includes the appreciation that several factors contribute to their reading development. The Center for Early Literacy (CELL, 2006) developed a framework that situated how children's abilities in component areas, such as oral language, print concepts, alphabet knowledge, name and other forms of emergent writing, and phonological awareness are influenced by the child's literacy motivation as well as factors outside of the child. Factors outside the child include the child's access to literacy-rich experiences and instructional practices. Literacy-rich experiences and instructional practices include those obtained in both the home and school environments. This study examined, for children with autism spectrum disorders (ASD), their performance among the component skills addressed by the CELL (2006), their literacy motivation and their access to literacy-rich experiences and instructional practices in terms of their home literacy practices. This study did not include an examination of the children's educational environments. As such, the CELL (2006) framework was used in this study as an initial means to examine emergent literacy in children with ASD. In addition to aspects mentioned in the CELL (2006) framework, this study further explored the children's pretend reading and nonverbal abilities, and other aspects of home literacy practices identified as being influential in literacy development for

children with typical development. This included an examination of the parents' personal literacy abilities (Christian, Morrison, & Bryant, 1998; Gilger, Pennington, & Defries, 1991) and beliefs and attitudes about their child's education (Petrill, Deater-Deckard, Schatschneider, & Davis, 2005).

Educational programs that have targeted children's component skills or home literacy practices that are associated with literacy have resulted in literacy gains for some children (Whitehurst et al., 1994; Vaughn, Linan-Thompson, & Hickman, 2003). Accordingly, educational professionals who are responsible for teaching children emergent literacy skills, such as speech-language pathologists and teachers, are encouraged to target not only the child's skills, but also their home literacy environments (National Research Council [NRC], 1998; Snow, Scarborough, & Burns, 1999). This research was especially important for children with ASD because reports from the U.S. Department of Education (2000-2001; 2007) have expressed concerns that public schools are struggling to respond to the educational needs of this fast growing group of children, and posited that educational professionals who are knowledgeable about autism are more likely to effectively teach these children. A tenet of best practice is that educators understand the abilities of their students (Division of Early Childhood [DEC], 2003). As such, the present research contributes to our knowledge of emergent literacy development in children with ASD and has implications for educational interventions for these children. In the following discussion, the research questions presented in this study are listed, followed by their implications.

## Research Question One

Question one attempted to provide an overview of how children with ASD may perform in terms of component skills and behaviors associated with emergent literacy. The following summarizes the child participants' performance in terms of oral language and the early literacy abilities assessed in this study: environmental print, print forms, conventions, and functions, alphabet knowledge, name and other forms of emergent writing abilities, phonological awareness, pretend reading, and literacy motivation and provides implications for those who are responsible for educating children with ASD. This includes speech-language pathologists and teachers.

### Oral Language

The majority of the children in this study had oral language impairments. Over 50% of the children in this study had a TELD expressive age-equivalent less than 36 months of age. This may help explain why it was found that during shared readings, questions concerning "identification" (versus prediction, inference of feelings, or relating the text to their life experiences) were most likely to have been asked by the parents in this study and answered by their children. The relatedness of oral language skills to written language skills found in this study stresses the importance of implementing early literacy curricula for this population that not only take into account the child's linguistic abilities, but also target early literacy skills in a broader linguistic framework – a cornerstone of the CELL (2006) framework.

### Print Concepts

The majority of the children's parents reported the children could identify environmental print in context (approximately 86%) and recognize their name (approximately 89%). This finding is consistent with findings from Koppenhaver and Erickson (2003) who found that young children with autism were able to learn to read their peers' names and environmental print when provided with proper opportunities. All of the children in this study attended school and were likely exposed to environmental print in their classrooms. This finding suggests that the strong sight word identification skills reported in children with Asperger syndrome (Church, Alisanski, & Amanullah, 2000) may begin with environmental print recognition. The relative strength some children with ASD may have with regards to environmental print recognition may be associated with a strength in visual associative skills (American Speech-Language-Hearing Association, 2006), but the association between print recognition and visual associative skills was not directly assessed in this study; thus, conclusions cannot be drawn without further examination. While most of the parents in this study reported that their child could identify environmental print in context, the children's performance on the ELP reveals overall variable performance in this area. Several of the children in this study who were the chronological ages of children in the first and second grade did not demonstrate mastery in this skill. This is concerning because environmental print recognition is an academic expectations of children in these grades. This finding encourages speech-language pathologists and teachers to provide children with ASD examples of environmental print in their educational settings and encourage them to recognize the functional purpose of environmental print.

Print forms, in terms of results from the ELP print forms subtest revealed variable performance among the children in this study, with many not demonstrating that they could reliably discriminate words from nonwords. Although the way in which this task was administered may have been challenging even for preschool and kindergarten children with typical development, the finding that 25% of the preschool age children in this study and approximately 67% of the kindergartner age children in this study could not correctly answer even one of the questions on this subtest is concerning. Moreover, this type of skill is expected in children with typical development by the end of first grade (NC-SOL, 2008). In this study, only 20% of the children with the chronological ages of children in first and second grades could answer all of these questions correctly.

Print conventions, with regard to mechanical skills (e.g., book orientation and page turning) were strengths for most of the child participants in this study. Parental report revealed the vast majority of the child participants were able to orient a book (approximately 94%) and turn the pages one at a time (approximately 97%) which likely results from the fact that parents reported that their children independently look through books three or more times a week. These findings support those of Watson, Andrews, and Orovitz (1996) who found that parents of preschool children with autism reported that their children were able to orient a book. Variable skills were observed in terms of the children's abilities to move their finger along words when an adult was reading. Sixty percent of the children's parents reported this behavior in this child. Most of the children in this study (approximately 71%) were reported by

their parents to have recognized that words carry the message in books (versus the picture).

Less than half of the child participants' parents, approximately 31%, reported that they felt their child understood why people read and write. Developing the awareness that print carries a communicative message is presumed to occur for children with typical development between the ages of 3 to 5 years (Goodman, 1986). The relative difficulty so many of the children in this study experienced in terms of understanding the purpose of reading and writing may speak to the pragmatic difficulties documented in children with ASD (Tager-Flusberg, 2004). Interestingly, the majority of the child participants' parents also reported that they did not often point out to their child why people read and write. Approximately 67% reported that they pointed this out to their children less than monthly. It is not understood why this could be the case. It could be that the parents of children with typical development are equally unlikely to point out to their children why people read and write. It could be that the parents were not likely to communicate topics to their children they feel the children were not likely to understand. It could be that the parents felt there were formal ways in which other people point out why people read and write and did not consider in their response informal teaching opportunities they may provide to their child in this regard. Yet another possibility is that many of the children may have had difficulty expressing their knowledge in this area due to expressive language difficulties, and thus parents have no basis for determining whether their children have such an understanding. Again, over half of the children in this study had an expressive age-equivalent of less than 36 months of age. While more research



exploring whether or not children with ASD understand the purpose of reading and writing is needed, these results suggest that literacy instruction for these children should not only focus on the components of print concept knowledge, but also link them together through meaningful literacy activities (NRC, 1998).

### Alphabet Knowledge

Letter name identification was a relative strength for most of the child participants in this study. This included the older and younger child participants. Interestingly, the majority of the parents also reported that their child played with or was intrigued with letters three or more times a week, indicating a high level of motivation among the children related to this aspect of early literacy. This finding is consistent with research from Markowitz et al. (2006) which found that letter identification skills were within normal limits for American preschoolers with autism receiving public school services. Letter sound knowledge was more variable for the child participants in this study, as compared to the children's letter name knowledge. In general, letter sound knowledge was not as developed in the child participants as their alphabet knowledge. This also has been observed in children with typical development (Bloodgood, 1999; Dodd, Crosbie, McIntosh, Teitzel, & Ozanne, 2003; Lonigan, Burgess, Anthony, & Baker, 1998). The discrepancy between these two types of knowledge may reflect expected developmental patterns or instructional practices. Informal observations revealed that several of the younger child participants identified letter sounds in carrier phrases, such as saying "b says buh," and that they were unable to speak about letter sounds in the absence of this type of carrier phrase. This suggests that for at least some of the child participants, their

knowledge of letter sounds may have been aided by either rote memorization or the inclusion of a carrier phrase. Children with expressive language impairments may have difficulty using their words; cloze tasks provide a level of scaffolding to help these children use their words. More research is needed to explore if the children's performance in this area is reflective of rote memorization. To minimize this possibility, children with ASD may benefit from being taught letter sounds in a way similar to what is recommended for children with typical development - in meaning based instruction, such as sounding out letters to read words for functional purposes (e.g., Whitehurst et al, 1994).

#### Name and Other Forms of Emergent Writing

Name writing was also a variable skill for the children in this study. Approximately half of the child participants in this study were able to independently produce their names in a way commensurate with age and grade level expectations. In previous studies, name writing ability was delayed for preschool children with oral language impairments who do not have ASD (Cabell, Justice, Zucker, & McGnity, 2009). Therefore, it may be the language delays and impairments experienced by the participants in this study and not their ASD that led to the observed delays in this area. In terms of other forms of emergent writing, the majority of the child participants were reportedly able to write letters and words from copying and memory; however, approximately 25% of the child participants had difficulty copying letters or words. Anecdotal findings revealed that it was not uncommon for parents to have reported that their child was struggling with writing, or was seeing an occupational therapist to help with writing ability. This finding is consistent with

Watson et al. (1996) who found that the parents of preschool children with autism were more likely to report having to physically assist their children with writing activities than parents of children developing typically. Difficulty in this area may be related to overall cognitive development. Children with ASD (ages three – six years) have been found to have graphomotor skills consistent with their age and IQ levels (Mayes & Calhoun, 2003).

To promote name and other forms of emergent writing, speech-language pathologists and teachers may want to incorporate the use of functional instructional practices. Koppenhaver and Erickson (2003) found that three preschool children with autism learned to write their names when provided with meaningful learning opportunities (e.g., signing into the classroom). Skill development and/or determinants of whether children with ASD are meeting grade-level expectations for emergent writing in this area, thus, may be influenced by not only the children's language and cognitive abilities, but also their access to quality instructional practices – another cornerstone of the CELL (2006) framework.

### Phonological Awareness

Phonological awareness was informally explored via asking the children's parents if their children could spontaneously create rhymes (e.g., identify rhyming words, repeating songs with rhymes and inserting novel words) and read novel words by sounding them out or somehow figuring them out. These skills revealed variable performance among the children in this study with less than half of the child participants' parents reporting that their child could spontaneously produce rhymes. This is lower than expected for the age of the children in this study (Boudreau &

Hedberg, 1999). This finding could again be a reflection of the expressive language difficulties many of the children in this study had. Preschool children with oral language impairment who do not have ASD have been found to have delayed rhyme production and recognition ability when compared to their peers with typical development (Boudreau & Hedberg, 1999).

Approximately half of the child participants' parents reported that their child could read novel words by sounding them out or somehow figuring them out. This finding is consistent with other research which suggests that decoding may be a relative strength for many children with ASD (Mayes & Calhoun, 2003). The reported ability of so many of the children in this study to sound out or somehow figure out how to read novel words, despite their oral language difficulties, may speak to the documented relative strengths individuals with ASD may have in at least some aspects of visual processing (American Speech-Language-Hearing Association, 2006). These results, however, should be taken with caution. Since actual decoding skills were not formally assessed in this study, the parents' responses may have included their child's ability to identify novel environmental print or identify letter sounds in context. This may explain why the percentage of parents who reported that their child could sound out words was higher than the percentage who reported that their child could spontaneously rhyme. Children with typical development are able to rhyme before they are able to identify the sounds of all letters (Dodd et al., 2003), and grapheme-phoneme correspondences are required for decoding. It also could also be that the children in this study indeed had phonological awareness skills that were not appropriately measured by asking the child's parents if the child could spontaneously

produce rhymes. The results of this study suggest that a single task tapping phonological awareness cannot be used as a proxy for the overall phonological awareness of a young child, and thus supports assessing phonological awareness using diverse tasks of both oral and written modalities (e.g., rhyme, invented spelling, decoding). The ability of children to produce rhyme also may not be the most predictive skill for children with ASD or for children in general. Some research has found that for children with typical development, the ability to produce rhymes is less predictive of their word reading ability than is their ability to employ their knowledge of the alphabetic principle (Duncan, Seymour, & Hill, 1997). Considering the variable oral language and nonverbal cognitive skills found among the child participants in this study, the reported ability of over half of the children in this study to at least attempt to identify words is promising. This finding suggests that developing word reading skills should be promoted for all children with ASD.

### Pretend Reading

One existing study (Watson et al., 1996) reported that children with ASD engage in pretend reading less frequently than children with typical development. In the current study, pretend reading was an infrequent activity for the majority of child participants. As reported by their parents, less than half of the children, 40% (14/35), engaged in, or had ever engaged in pretend reading; of those who did engage in pretend reading, approximately 79% (11/14 reportedly could sound out or otherwise figure out novel words. Pretend reading was, therefore, most likely to be noted when children were beginning to read words. Overall, pretend reading appeared to be a relatively uncommon activity for young children with ASD. It is not clear if the

pretend reading may have been the children trying to read in this study, if the pretend reading was a larger reflection of language difficulties, or if the limited pretend reading speaks to symbolic play in children with ASD. More research is needed to better understand how this skill develops in the population.

### Literacy Motivation

The majority of the child participants in this study sought out and routinely looked through books. The majority of the child participants in this study also were reported by their parents to like or love getting a book as a gift. Interestingly, although all of the children (100%) were reported by their parents to look at books three or more times a week, only 65% asked or gestured for someone to read them a book three or more times a week. Shared reading as a social activity was not as well received by the children in this study. Over half of the parents (60%) reported that their child enjoyed shared reading “very much.” A significant number of parents, however (slightly over 30%), reported that their child enjoyed shared reading “somewhat.” Taken together, these findings suggest that while the majority of the children in this study did enjoy shared reading activities with their families, not all of them did. This finding is similar to that of Watson et al. (1996). These authors found that parents of preschool children with autism reported that their children independently looked through books as often as the reports of parents with children who have typical development. The parents of the children with autism, however, reported that their children engaged in shared reading for less time than was reported by the parents of children with typical development. This may speak to the

communicative profile observed in children with autism which reveals decreased requesting of social routines (Wetherby & Prutting, 1984).

The majority of the child participants in this study were observed by their parents to play with or be intrigued with letters three or more times a week. The finding that the children in this study enjoyed looking at books independently, receiving books as gifts, and playing with letters may differ from children with oral language impairments in the absence of ASD. Children with oral language impairments in the absence of ASD have been reported to have low levels of literacy motivation (Kaderavek & Sulzby, 1998).

Anecdotal findings included that most of the children's parents reported that the genre of "stories" was their children's favorite type of book, and that stories with rhyme were the most popular. This may relate to the melodic nature of rhyme, but there is no research to support a preference for books with rhyming patterns in children with typical development or ASD.

The children in this study may have been somewhat less motivated by writing than reading activities. Slightly over half of the children's parents reported that their child independently engaged in writing activities three or more times a week. The findings relating to the children's emergent writing abilities also are consistent with findings related to their writing motivation. Most parents in this study reported that they felt their child's reading skills were more advanced than their writing abilities and that their child was much less likely to be observed independently writing than reading. Only a little more than half of the parents reported that they observed their child independently writing three or more times a week, whereas nearly all of the

parents reported that they observed their child independently reading three or more times a week. This finding is consistent with findings from Watson et al. (1996) who found that preschool age children with ASD were reported by the parents to less frequently scribble or write notes for others as compared to parental reports from children with typical development. It may not be the case that the children had less motivation to engage in writing activities, but less opportunity. While the parents in this study reported providing writing materials to their children, tasks involving these items may have required more supports from the parents (e.g., to prevent writing on the walls or eating paint). Without knowing more about the formal and informal emergent writing opportunities the children in this study were provided, interpretation of the children's performance should be interpreted with caution. It also may be that requesting engagement in an emergent writing task, as it also may be for requesting shared reading, may speak to the communicative profile observed in children with autism. Young children with autism have been found to use decreased requesting of social routines (Wetherby & Prutting, 1984).

### Research Question Two

Research question two was concerned with how the performance of young children with ASD on measures of emergent literacy compared to educational expectations for children with typical development. The majority of child participants in this study had oral language and cognitive impairments. Just under half of the preschool age children (45%) and over half of the children with the chronological ages of kindergarten, first, and second grade children had standardized, composite oral language scores below 70. These findings help explain why many of the children



in this study were not meeting grade level early literacy expectations, or were at risk for not meeting grade level expectations according to the North Carolina Department of Public Instruction Standards of Learning (NC-SOL, 2008).

The difficulties with oral language experienced by the majority of the children in this study reminds speech-language pathologists and teachers that current emergent literacy theory supports teaching traditionally viewed early literacy skills within a broader linguistic framework. The CELL (2007) posits that emergent and early literacy skills include both “linguistic processing” skills (children’s oral language and phonological awareness skills) and those that are “print-related” (print concepts knowledge, alphabet knowledge, and name writing and other forms of emergent writing). This theory posits that children’s development in both linguistic processing and print-related areas are necessary for their literacy achievement.

Most of the children in this study exhibited strengths in the mechanical aspects of book handling (e.g., independently turning the pages of a book). Alphabet knowledge, in terms of letter name identification, also was a relative strength with the majority of the children in this study performing commensurate with academic expectations for their grade. Oral language, pretend reading, and understanding the purpose of reading and writing were relative weaknesses. Variable skills included print concepts such as environmental print recognition, print forms and conventions, alphabet knowledge in terms of letter sound identification, name writing, and phonological awareness. The overwhelming majority of the child participants expressed high levels of literacy motivation. Although in the minority, the number of children with ASD who were found to have difficulty with letter identification and

limited literacy motivation serve as a reminder that these children are unique and will require individualized emergent literacy assessment and intervention.

The variability in skill performance observed for many of the children in this study serves as a reminder to speech-language pathologists and teachers that although these skills may not be consistent with state standards, they are achievable. The CELL (2006) framework illustrates the importance of instructional practices for children to develop literacy skills. The uneven profile of skills observed in the children in this study may indicate that these children are not being provided with instructional practices outside of the home that are in keeping with best practices. Best practice includes addressing children's language needs in an integrated manner with their literacy learning needs (CELL, 2006) and teaching the components of literacy in meaningful activities (e.g., writing and delivering notes to other people, reading notes aloud and commenting or acting on them) (NRC, 1998).

### Research Question Three

Research question three explored the associations between the children's ages, oral language and nonverbal cognitive skills and abilities with their early literacy skills and abilities. In terms of the skills evaluated in this study, findings suggest that the children's language skills were moderately correlated with the children's formally assessed early literacy skills. Moderate relationships were found between the children's oral language skills and their formal measures of environmental print, print forms, letter sound identification, and name writing abilities. The associations observed among the oral language and literacy skills observed in this study is consistent with children who have typical development (Dickinson et al., 2003;

NICHD, 2005; NELP, 2007; Scarborough, 2003) and oral language impairments (Boudreau & Hedberg, 1999; Cabell et al., 2009). It also is supported by current literacy theory (CELL, 2007) which, again, supports the view that children's development in both linguistic processing and print-related areas are necessary for their literacy achievement. A secondary analysis of the NELP (2007) by the CELL (2007) supports this postulation. Their analysis found that linguistic processing skills (all  $r_s > .3$ ) and print-related skills (all  $r_s > .4$ ) were all at least moderately associated with word reading and reading comprehension. As these component skills are believed to be advanced through instruction and experience (Scarborough, 2003), the implication is that educators, such as speech-language pathologists and teachers, should promote these skills in young children to provide a stronger foundation for literacy learning. Since this study did not evaluate instructional practices outside of the home provided to the children in this study, it is not understood if they were not being afforded instruction reflective of best practices or if the children were not responding to instruction reflecting best practices. Research is needed to document the responses of children with ASD to instruction that utilizes best practices.

In this study, oral language skills and nonverbal skills were strongly correlated with one another. This also is found in individuals with typical development (Tager-Flusberg, 2004). In this study, nonverbal cognitive skills also were found to be moderately correlated with the children's knowledge of print forms and their name writing abilities. Nonverbal cognition has not been found to be predictive of early reading development in children with typical development (NELP, 2007; Scarborough, 2003). The relationships between nonverbal cognition and early literacy

skills observed in this study may be a reflection of either the nonverbal cognitive measure that was used in this study, or the early literacy measures that were used in this study. A nonverbal cognitive measure with diversified subtests could demonstrate which aspects of nonverbal skills are the most correlated with language ability. The use of a standardized literacy test also may have revealed different findings. Further research is needed to more fully consider the role of nonverbal cognition in literacy achievements for children with ASD.

#### Research Question Four

Research question four sought to describe the caregivers' use of behaviors that promote literacy learning, personal literacy abilities, and beliefs and attitudes about their child's education. Based on their responses to the HELPA, the parents in this study generally could be described as facilitators of their children's literacy learning. They both directly and indirectly taught them literacy skills. With regard to indirect facilitation, the majority of the parents in this study reported reading to their children three or more times a week. This again was similar to findings from Watson et al. (1996) who found that parents of preschool children with autism frequently read to their children. The parents in this study also directly taught their children and were aware of their children's strengths and weaknesses. For example, during shared book readings, when the parents in this study were asked what types of questions they ask their child, reports included asking a particular types of questions because they knew that was an educational goal and/or weakness for their child (e.g., questions concerning the character's feelings).

The vast majority of the parents in this study had college degrees and reported themselves as capable readers and writers. This also was found by Watson et al. (1996) where parents of preschool children with autism reported numerous reading materials in the home. The parents in the present study also reported feeling that their child's literacy development was an important educational objective, and felt responsible for their children's academic development. They did not report feeling that the schools alone should be responsible for teaching their children academic skills. The strength of the parents' convictions regarding the important role that they play in literacy development for their children may have led them to provide the frequency and types of opportunities that help explain the relative strength in literacy skills many of the children presented. There may be reasons for concern that almost half of the parents felt that the family was more responsible for their child's literacy development than their child's formal education. This finding, however, may not be so much reflective of dissatisfaction with their child's formal education but reflect the varying ages of the children in the study and the high educational levels of the parents. More research is needed to explore parent's satisfaction with formal education in children with ASD. While it is yet unknown why this was the parents' response, the parents' sentiments suggest that greater communication between parents and educational professionals about literacy achievements and goals for children with ASD is warranted. Possibly, parents perceive that public schools are struggling to respond to the educational needs of children with autism (U.S. Department of Education, 2007). More knowledge among educational professionals about literacy

development in children with ASD may promote their communication efforts with these children's parents.

It was interesting that most of the parents viewed their children's early literacy skills as a unique strength, despite their acknowledgements that their children may have lacked a conceptual understanding that a primary purpose of reading and writing is to communicate. This finding suggests that educational professionals may need to adopt a broad definition of literacy that includes a conceptual understanding that literacy serves as a communication medium and to communicate this important aspect of emergent literacy development to the children's parents.

#### Research Question Five

Research question five analyzed how the oral language and early literacy abilities of children with ASD were associated with primary caregivers' behaviors that may promote literacy learning and caregivers' beliefs and attitudes about their child's education. The findings suggested that the parents' use of literacy practices and their confidence to teach their children literacy skills may have been influenced by at least some characteristics of the child. This has been theorized for children with typical development (Scarborough & Dobrich, 1994). For example, parallels were found between the child participants' literacy interests and their parents' behaviors. The children in this study were reported by their parents to frequently look through books and were reportedly frequently read to by their parents. Conversely, the children in this study were reported by their parents to less frequently write, and were reportedly less frequently taught to write by their parents than be engaged in shared reading activities with their parents. This finding may reflect how the children's

abilities may have affected the parents' indirect teaching strategies (or vice versa). It also may reflect the parents' knowledge of teaching writing to their children. It may not be as intuitive for parents to write with their children as it may be for them to read them a bedtime book.

Direct teaching strategies also may have been influenced by the children's abilities (or vice versa). Most parents reported that the most frequent type of question they ask during shared reading is identification, and that identification was the type of question most likely to be answered by their child. Similarly, most of the parents reported that they felt their child did not understand the purpose of reading and writing, and the parents were less likely to point out why people read and write to their children than to engage in other direct teaching of literacy skills. It also was found that parental confidence to teach their child literacy skills were related to the child's language abilities.

### Limitations

There were a number of limitations to this study. First, there was a relatively small sample size, which limited this study's ability to detect smaller effects with greater statistical probability. This study also was descriptive in nature, and involved many correlational analyses. Given the descriptive nature of the study, and the fact that little previous research has examined emergent literacy among children with ASD, the risk of over-identifying significant associations was considered preferable to the risk of missing some important associations; thus, no corrections for multiple significance tests were made. This decision renders the interpretation of the results of the study more tenuous. Second, the children were recruited from different

educational centers; hence, they had different educational experiences and this variability was not controlled in the current study. Third, the parents in this study were predominantly well educated; they did not reflect a broad range of educational levels. Thus, the findings of this study may not generalize to children of parents with less formal education. Fourth, the formal early literacy tool used (ELP) and the HELPA were not well-researched psychometric tools and did not provide a broad description of the skills assessed within this study. There are only a few published articles providing data on the performance of young children on the ELP. The HELPA was created for this study and has not been previously researched. Many of the skills assessed in this study (e.g., oral language, print concepts, and phonological awareness) include a broad range of subskills. This study provides only a narrow reflection of children's abilities in these areas. Fifth, the diagnoses of ASD in the child participants were provided by various individuals, who used different diagnostic methods and had different levels of expertise. Although this limitation was minimized with the inclusion of the SCQ and the CARS as confirmatory measures, formal evaluations by a trained professional using the same diagnostic tool would have been preferred. Sixth, one inclusion criterion for the study was that the children should be in the emergent literacy stage rather than conventionally literate. The principal investigator of this study communicated to parents and teachers that children at the emergent literacy level may be able to read the words, but still struggle with reading comprehension. As a result of the subjective method of determining eligibility on this criterion (i.e., parent and/or teacher opinion) the children's actual reading status was not confirmed. It is possible that some parents and teachers may not have considered



this study appropriate for children they believed were or were not conventionally literate. Some of the children in this study may have been at a conventional reading level and some may not have been referred. Lastly, not all of the children had nonverbal cognitive scores, and some of those that did were retested with this measure. This decreases the confidence, to some extent, in the validity of findings related to nonverbal cognitive skills from this study.

Despite the limitations of this study, it makes a number of contributions to the existing literature. This study was the first study that has evaluated a wide range of early literacy skills in children with ASD, many of whom had significant language and cognitive disabilities. It also provided a greater understanding of the range of home literacy practices among families of children with ASD and how these may (or may not) be associated with their early literacy development. This is important information for educational professionals, such as speech-language pathologists and teachers, because best practice in teaching includes having an understanding of the abilities of one's students (DEC, 2003) and including children's families in educational objectives (IDEA, 2004). The findings from this study may serve to help speech-language pathologists and teachers refine their pedagogy by more fully considering children's oral language skills as important in their emergent literacy curriculums, teaching emergent literacy skills in functional activities, and including the children's parents in the educational process.

#### Future Research

In terms of future research, more studies are needed to demonstrate specific strengths and weakness within and across early literacy skills to more fully

understand the profiles observed in this study. Further research also is needed to develop and assess literacy curricula for this population relative to the children's language abilities. The most striking finding was that early literacy skills related to a conceptual understanding of the communicative purpose of reading and writing (e.g., pretend reading, understanding the purpose of reading and writing) were found to be weaker than those that do not require this understanding (e.g., environmental print recognition, book orientation, letter name identification). While this distinction should be interpreted with caution given the way these areas were measured, this finding is parallel to what we know about language development in the population affected by ASD. Pragmatic language abilities are universally impaired (Tager-Flusberg, 2004), whereas development of the structural aspects of language is variably affected. More research is needed to explore how pragmatic language abilities relate to literacy knowledge in children with typical development, oral language impairments in the absence of ASD, and children with ASD.

Table 1

*Child Participant Information: Race*

Demographic	Total # Child Participants (%)
Caucasian	30/41 (73.2%)
African American	7/41 (17.1%)
Asian American	4/41 (9.8%)
Total	41/41 (100%)

*Note.* Race was based on visual observation and not always verified with parents.

Table 2

*Parental Respondents on the Home Emergent Literacy Profile for Children with Autism Spectrum Disorders (HELPA)*

Respondents	All Participants
Mom	27/37 (73%)
Dad	1/37 (2.7%)
Mom and Dad	8/37 (21.6%)
Grandmother	1/37 (2.7%)
Totals	37/37 (100%)

*Note.* SCH = US Public Schools.

Table 3

*Child Participant Information: TELD Grouped Language Standard Scores and Means and Standard Deviations (SD)*

Standard Score	TELD Subtests		
	Receptive Language	Expressive Language	Composite Language
49 and below	5/41 (12.2%)	12/41 (29.3%)	13/41 (31.7%)
50-69	16/41 (39%)	13/41 (31.7%)	13/41 (31.7%)
70-84	6/41 (14.6%)	6/41 (14.6%)	5/41 (12.2%)
85-99	9/41 (22%)	9/41 (22%)	5/41 (12.2%)
100-115	2/41 (4.9%)	1/41 (2.4%)	5/41 (12.2%)
116 and beyond	3/41 (7.3%)	-	-
Totals	41/41 (100%)	41/41 (100%)	41/41 (100%)
Means (SD)	74.24 (22.73)	*66.63 (16.99)	64.56 (23.10)

*Note.* \* Denotes a significantly non-normal distribution of scores according to the Kolmogorov-Smirnov test of normality; TELD = *Test of Early Language Development* (3rdEd.), by W. P. Hresko, D.K. Reid, and D.D. Hammill, 1999, Minneapolis: Person.

Table 4

*Child Participation Information: Grouped Standard Scores, Means, and Standard Deviations (SD) of the Child Participants' K-BIT Nonverbal Cognitive Scores*

K-BIT	Group
Standard Score(s)	
49 and below	2/29 (6.9%)
50-69	10/29 (34.5%)
70-84	4/29 (13.8%)
85-99	8/29 (27.6%)
100-115	3/29 (10.3%)
116 and beyond	2/29 (6.9%)
Totals	29/29 (100%)
Mean (SD)	*79 (24.50%)

*Note.* \* Denotes a significantly non-normal distribution of scores according to the Kolmogorov-Smirnov test of normality; K-BIT = *Kaufman Brief Intelligence Test* (2ndEd.), by A.S. Kaufman and N.L. Kaufman, 2007, Minneapolis: Pearson.

Table 5

*Child Participant Information: Means and Standard Deviations (SD) of the Child*

*Participants' ELP Scores Measured as Percent Correct*

Subtests	Mean (SD)	Totals
Environmental Print Recognition	*68.78 (32.42)	41/41 (100%)
Print Forms	*46.95 (37.58)	41/41 (100%)
Letter Name Identification	*77.29 (32.41)	40/40 (100%)
Letter Sound Identification	*52.92 (47.24)	40/40 (100%)

*Note.* \* Denotes a significantly non-normal distribution of scores according to the Kolmogorov-Smirnov test of normality; ELP = *Emergent Literacy Profile*, by D.K. Dickinson and C. Chaney, 1997, Newton, MA: Education Development Center, Inc. & Carolyn Chaney.

Table 6

*Child Participant Information: ELP Grouped Scores Measured as Percent Correct*

Percent Correct	# Participants in ELP Subtest(s)			
	Environmental Print	Print Forms	Letter Name Identification	Letter Sound Identification
0-9%	5/41 (12.2%)	13/41 (31.7%)	4/40 (10%)	17/40 (42.5%)
10-39%	1/41 (2.4%)	3/41 (7.3%)	2/40 (5%)	1/40 (2.5%)
40-69%	9/41 (22%)	7/41 (17.1%)	4/40 (10%)	2/40 (5%)
70-89%	13/41 (31.7%)	12/41 (29.3%)	7/40 (17.5%)	1/40 (2.5%)
90-100%	13/41 (31.7%)	6/41 (14.6%)	23/40 (57.5%)	19/40 (47.5%)

*Note.* ELP = *Emergent Literacy Profile*, by D.K. Dickinson and C. Chaney, 1997,

Newton, MA: Education Development Center, Inc. & Carolyn Chaney.



Table 7

*Child Participant Information: Question Types Child Most Able to Answer as Reported by Caregiver on the Home Early Literacy Profile for Children with Autism Spectrum Disorders (HELPA)*

	Number/total survey respondents (%)			
	Question Type			
	Identification	Prediction	Feelings	Relational
Most to least				
1	29/35 (82.9%)	2/35 (5.7%)	4/35 (11.4%)	2/35 (5.7%)
2	4/35 (11.4%)	5/35 (14.3%)	14/35 (40%)	8/35 (22.9%)
3	-	4/35 (11.4%)	6/35 (17.1%)	6/35 (17.1%)
4	-	5/35 (14.3%)	1/35 (2.9%)	4/35 (11.4%)
Never	2/35 (5.7%)	19/35 (54.3%)	10/35 (28.6%)	15/35 (42.9%)
Totals	35/35 (100%)	35/35 (100%)	35/35 (100%)	35/35 (100%)

Table 8

*Parental Responses to Questions Regarding Child Emergent Literacy Skills on the Home Emergent Literacy Profile for Children with Autism Spectrum Disorders (HELPA)*

	Yes	No	Emerging/ Not Sure
Identify name by site	31/35 (88.6%)	3/35 (8.6%)	1/35 (2.9%)
Identify words by site	30/35 (85.7%)	2/35 (5.7%)	3/35 (8.6%)
Place book upright	33/35 (94.3%)	1/35 (2.9%)	1/35 (2.9%)
Turn individual pages	34/35 (97.1%)	-	1/35 (2.9%)
Point to words	27/35 (77.1%)	8/35 (22.9%)	-
Move finger along words	21/35 (60%)	13/35 (37.1%)	1/35 (2.9%)
Know reading words	25/35 (71.4%)	-	10/35 (28.6%)
Understands purpose of reading/writing	11/35 (31.4%)	10/35 (28.6%)	14/35 (40%)
Identify letter names	34/35 (97.1%)	-	1/35 (2.9%)
Know sound of letters	29/35 (82.9%)	4/35 (11.4%)	2/35 (5.7%)
Write letters by copying	27/35 (77.1%)	4/35 (11.4%)	4/35 (11.4%)
Write letters from memory	26/35 (74.3%)	9/35 (25.7%)	-
Write words by copying	25/35 (71.4%)	8/35 (22.9%)	2/35 (5.7%)
Write words from memory	22/35 (62.9%)	13/35 (37.1%)	-
Spontaneous rhyme	14/35 (40%)	18/35 (51.4%)	3/35 (8.6%)
Read words by sounding out / figuring out	18/35 (51.4%)	13/35 (37.1%)	4/35 (11.1%)

Ever seen child pretend      14/35 (40%)      19/35 (54.3%)      2/35 (5.7%)  
reading

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Table 9

*Child Participant Information: Children's Frequency Looking at Books, Asking/Gesturing for Someone to Read, Pretend Reading, Independently Writing, and Interest in Letters According to the Home Early Literacy Profile for Children with Autism Spectrum Disorders (HELPA)*

Frequency	Book Characteristic			
	Looking at Books	Asking/gesturing for someone to read to him/her	Independent Writing	Playing with or intrigued by letters
Less than monthly	-	7/35 (20%)	9/35 (25.7%)	1/35 (2.9%)
1-3 x a month	-	3/35 (8.6%)	1/35 (2.9%)	-
4-5 x a month	-	1/35 (2.9%)	3/35 (8.6%)	2/35 (5.7%)
1-3 x a week	-	1/35 (2.9%)	3/35 (8.6%)	2/35 (5.7%)
3 or more week	35/35 (100%)	23/35 (65.7%)	19/35 (54.3%)	30/35 (85.7%)
Totals	35/35 (100%)	35/35 (100%)	35/35 (100%)	35/35 (100%)

Table 10

*Child Participant Information: Children's Observed Affect During Shared Reading and Inferred Feelings of Getting a Book as a Gift According to the Home Early Literacy Profile for Children with Autism Spectrum Disorders (HELPA)*

	Number/total survey respondents (%)
<b>Child's inferred affect during shared reading</b>	
Does not enjoy it	1/35 (2.9%)
Tolerates it	2/35 (5.7%)
Appears indifferent	-
Enjoys it somewhat	11/35 (31.4%)
Enjoys it very much	21/35 (60.0%)
Totals	35/35 (100%)
<b>Child's inferred feelings about getting a book as a gift</b>	
Very upset	-
Be upset	1/35 (2.9%)
Indifferent	4/35 (11.4%)
Would like	11/35 (31.4%)
Would love	19/35 (54.3%)
Totals	35/35 (100%)

Table 11

*Spearman Rho Correlations between the Children's Language and Nonverbal Cognitive Scores*

	TELD Rec	TELD Exp	TELD Com	K-BIT
	<u>n= 41</u>			<u>n=29</u>
TELD				
Rec	-	.90**	.98**	.80**
TELD				
Exp	.90**	-	.97**	.72**
TELD				
Com	.98**	.97**	-	.78**
		<u>n=29</u>		
K-BIT	.80**	.72**	.78**	-

*Note.* TELD = *Test of Early Language Development* (3rdEd.), by W. P. Hresko, D.K.

Reid, and D.D. Hammill, 1999, Minneapolis: Person. Rec = receptive language subtest; Exp = expressive language subtest; Com = composite language subtest; K-

BIT = *Kaufman Brief Intelligence Test* (2ndEd.), by A.S. Kaufman and N.L.

Kaufman, 2007, Minneapolis: Pearson; n = number of participants; \*\* =  $p < .01$ .

Table 12

*Spearman Rho Correlations between the Children's Early Literacy, Language, and Nonverbal Cognitive Scores*

	TELD Rec	TELD Exp	TELD Com	K-BIT
	<u>n= 41</u>			<u>n=29</u>
ELP				
Environmental				
Print	.32*	NS	.34*	NS
ELP Print				
Forms	.44**	.34*	.41**	.41*
ELP Letter				
Name ID***	NS	NS	NS	NS
ELP Letter				
Sound ID***	.39*	.42**	.39**	NS
PALS-PreK				
Name Writing	.45**	.43**	.45**	.49**

*Note.* ELP = = *Emergent Literacy Profile*, by D.K. Dickinson and C. Chaney, 1997, Newton, MA: Education Development Center, Inc. & Carolyn Chaney; PALS-PreK = *Phonological Awareness Literacy Screening PreK* (PALS-PreK), by M. Invernizzi, A. Sullivan, J. Meir, & L. Swank , 2004, Charlottesville, VA: The Board of Visitors of the University of Virginia,; TELD = TELD = *Test of Early Language Development* (3rdEd.), by W. P. Hresko, D.K. Reid, and D.D. Hammill, 1999, Minneapolis: Person; Rec = receptive language subtest; Exp = expressive language subtest; Com

= composite language subtest; K-BIT = *Kaufman Brief Intelligence Test* (2ndEd.), by A.S. Kaufman and N.L. Kaufman, 2007, Minneapolis: Pearson; ID = identification; NS = not significant;  $n$  = number of participants; \* =  $p < .05$ ; \*\* =  $p < .01$ ; \*\*\* =  $n = 40$  and not 41 participants were in the sample; NS = not significant.



Table 13

*Spearman Rho Inter-Correlations between the Children's Early Literacy Skills*

	ELP Environmental Print	ELP Print Forms	ELP Letter Name ID	ELP Letter Sound ID	PALS- PreK Name Writing
n=41					
ELP Environmental Print ELP Print Forms ELP Letter Name ID*** ELP Letter Sound ID*** PALS-PreK Name Writing	-	.41**	.67**	.65**	.57**
	.41**	-	.78**	.54**	.56**
	.67**	.78**	-	.75**	.62**
	.65**	.54**	.75**	-	.59**
	.57**	.56**	.62**	.59**	-

*Note.* ELP = *Emergent Literacy Profile*, by D.K. Dickinson and C. Chaney, 1997, Newton, MA: Education Development Center, Inc. & Carolyn Chaney; PALS-PreK = *Phonological Awareness Literacy Screening PreK (PALS-PreK)*, by M. Invernizzi, A. Sullivan, J. Meir, & L. Swank, 2004, Charlottesville, VA: The Board of Visitors

of the University of Virginia;  $n$  = number of participants; \*\* =  $p < .01$ ; \*\*\* =  $n = 40$   
and not 41 participants were in the sample; ID = identification.

Table 14

*Adult Participant Information: Number of Different Types of Child and Adult Reading Materials, Writing Materials, Toy Related Educational Materials, and Books Owned by Child in the Home According to the Home Early Literacy Profile for Children with Autism Spectrum Disorders (HELPA)*

	Number/total survey respondents (%)
<b>Child/Adult Reading Materials</b>	
1	-
2	-
3	1/37 (2.7%)
4	4/37 (10.8%)
5	3/37 (8.1%)
6	7/37 (18.9%)
7	22/37 (59.5%)
Totals	37/37 (100%)
<b>Writing Materials</b>	
5	2/37 (5.4%)
6	5/37 (13.5%)
7	30/37 (81.1%)
Totals	37/37 (100%)
<b>Toy Related Educational Materials</b>	
1	-
2	-

3	1/37 (2.7%)
4	5/37 (13.5%)
5	6/37 (16.2%)
6	10/37 (27%)
7	15/37 (40.5%)
Totals	37/37 (100%)

Books Owned by Child

5 or fewer	-
6-30	-
31-55	3/35 (8.1%)
56-75	1/35 (2.7%)
75 or more	33/35 (89.2%)
Totals	37/37 (100%)

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Table 15

*Adult Participant Information: When Parents Started Reading to Child and the Person Whom Reads Most Often to the Child Participant in the Home According to the Home Early Literacy Profile for Children with Autism Spectrum Disorders (HELPA)*

	Number/total survey respondents (%)
<b>Age at when parents begin reading to child</b>	
Not reading to child	-
36 months or older	-
24-36 months	-
12-24 months	2/35 (5.7%)
0-12 months	33/35 (94.3%)
Totals	35/35 (100%)
<b>Person who reads most often to child</b>	
Mom	17/35 (48.6%)
Dad	3/35 (8.6%)
Mom and Dad	7/35 (20.0%)
Other	7/35 (20.0%)
No response	1/35 (2.9%)
Totals	35/35 (100%)

Table 16

*Adult Participant Information: Frequency Child is Read to, Frequency Parents Point out Why Someone Would Read, Frequency Parents Teach Reading (Outside Shared Reading), and Frequency Parents Teach Writing According to the Home Early Literacy Profile for Children with Autism Spectrum Disorders (HELPA)*

Number/total respondents (%)				
Frequency	Child is read to	Parents point out why someone would read	Parents teach reading	Parents teach writing
Less than monthly	1/35 (2.9%)	24/35 (68.8%)	4/35 (11.4%)	5/35 (14.3%)
1-3 x a month	-	3/35 (8.6%)	3/35 (8.6%)	6/35 (17.1%)
4-5 x a month	-	1/35 (2.9%)	1/35 (2.9%)	4/35 (11.4%)
1-3 x a week	6/35 (17.1%)	1/35 (2.9%)	1/35 (2.9%)	5/35 (14.3%)
3 or more x a week	28/35 (80%)	6/35 (17.1%)	25/35 (71.4%)	15/35 (42.9%)
Totals	35/35 (100%)	35/35 (100%)	35/35 (100%)	35/35 (100%)

Table 17

*Adult Participant Information: Maternal Education and Personal Literacy Abilities of Parents of Child Participants According to the Home Early Literacy Profile for Children with Autism Spectrum Disorders (HELPA)*

	Number/total survey respondents (%)
<b>Highest Educational Level</b>	
Less than High School	-
High School or GED	1/37 (2.7%)
Some College or Associates	7/37 (18.9%)
Bachelor's	19/37 (51.4%)
Graduate or Professional	10/37 (27%)
Totals	37/37 (100%)
<b>Reading Ability</b>	
Significantly below average	-
Below average	-
Average	2/37 (5.4%)
Above average	9/37 (24.3%)
Significantly above average	26/37 (70.3%)
Totals	37/37 (100%)
<b>Writing Ability</b>	
Significantly below average	-
Below average	1/37 (2.7%)
Average	3/37 (8.1%)

Above average	13/37 (35.1%)
Significantly above average	20/37 (54.1%)
Totals	37/37 (100%)

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Table 18

*Adult Participant Information: Parents Perception of Importance of Literacy Learning for their Children, Their Confidence to Teach Their Children Literacy, and Parents Perception of Their Child's Literacy Ability and Parent's Beliefs Regarding Whose Responsibility they Feel it is to Teach Literacy to Children with Special Needs According to the Home Early Literacy Profile for Children with Autism Spectrum Disorders (HELPA)*

	Number/total survey respondents (%)
<b>Parents' perceived importance of literacy learning for child</b>	
Not important	1/35 (2.9%)
Minimally important	-
Somewhat important	4/35 (11.4%)
Very important	14/35 (40.0%)
Extremely important	16/35 (45.7%)
Totals	35/35 (100%)
<b>Parents' perceived confidence to teach their child literacy</b>	
Not secure	-
Minimally secure	3/35 (8.6%)
Somewhat secure	10/35 (28.6%)
Very secure	15/35 (42.9%)
Extremely secure	7/35 (20.0%)
Totals	35/35 (100%)

Parents' perception that their child's reading/writing is a relative strength

	Reading	Writing
Yes	28/35 (80%)	8/35 (22.9%)
No	3/35 (8.6%)	25/35 (71.4%)
Not sure	4/35 (11.4%)	2/35 (5.7%)
Totals	35/35 (100%)	35/35 (100%)

Parents' belief of who is most responsible to teach literacy to children with special needs

Educational system	11/35 (31.4%)
Family	7/35 (20%)
Educational system equally to family	17/35 (48.6%)
Totals	35/35 (100%)

Parents' perceived belief of who is most responsible for their child's literacy growth

School fully responsible	-
School mostly responsible	3/35 (8.6%)
Family equal to school	16/35 (45.7%)
Family greater to school	16/35 (45.7%)
Totals	35/35 (100%)

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