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The Influence of Classroom Placement, Child, Parent and Teacher Characteristics on
Child Outcomes in ASD

A Dissertation submitted in partial satisfaction
of the requirements for the degree of

Doctor of Philosophy

in

Education

by

Regan Heath Linn

August 2015

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ABSTRACT OF THE DISSERTATION

The Influence of Classroom Placement, Child, Parent and Teacher Characteristics on
Child Outcomes in ASD

by

Regan Heath Linn

Doctor of Philosophy, Graduate Program in Education
University of California, Riverside, August 2015
Dr. Janet Blacher, Chairperson

The purpose of the study is to identify the patterns and predictors of literacy and

social skill acquisition during the transition to formal schooling in a sample of young

children with autism spectrum disorder (ASD). The current research base indicates that

individuals with ASD show limited growth in social-adaptive behaviors and may

experience difficulties with aspects of reading comprehension and decoding. Results

indicated that children with ASD in general education had higher levels of language

ability, IQ and social skills than their peers placed in special education. However, special

education teachers reported receiving significantly more ASD related training and felt

more confident in their ability to teach this population. In regards to academic and social

outcomes, child language level and behavioral challenges proved to be the most

significant predictors of success at the beginning of the school year. Despite the fact that

little change occurred between child performance on outcome measures from the

beginning to the end of the school year, teacher characteristics, such as ASD training and

management strategies, emerged as significant predictors of child success by the end of

the school year. Implications for practice and future research are discussed.

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Introduction

Autism Spectrum Disorder (ASD), as defined by the Diagnostic and Statistical Manual of Mental Health Disorders, Fifth Edition (DSM 5; APA, 2013), is characterized by deficits in social communication and interaction in combination with an excess of restricted, repetitive, stereotyped patterns of behavior or interests (RRB's), which must be present in early childhood. It is generally accepted in the literature that behavioral challenges and RRB's tend to decrease in individuals with ASD over time, although rates of comorbid psychological difficulties remain high (Rutter, Greenfield & Lockyer, 1967; Shattuck et al., 2007; Taylor & Seltzer, 2010, Gray, Keating, Taffe et al., 2012). Social and adaptive behaviors, however, have not displayed a similar, cohesive pattern in the literature, as some studies have found improvements in these areas over time, while other studies report that these skills remain below the individual's cognitive functioning level throughout childhood and into adulthood, particularly for those who are deemed high-functioning (Constantino, Przybeck, Friesen et al., 2000; Howlin & Mawhood, 2000). Similarly, while literacy skill patterns in children with ASD are not thoroughly understood, it is believed that many of these children struggle with reading comprehension and, possibly, aspects of decoding (Nation, 1999; Nation et al., 2006). In light of the current study, which aims to identify predictors and effects of school context for young children with high functioning ASDs, a brief review of the literature concerning the broad, longitudinal development of social-adaptive behaviors in individuals with ASD, literacy skills for children with and without ASD, and issues related to classroom placement for individuals with ASD will be presented.

Development of Social-Adaptive Functioning in Children with ASD

Longitudinal analysis of the social skill development of young children with ASD has indicated that these individuals tend to make moderate growth over time in this area, particularly during early childhood. Baghdadli, Assouline, and Sonie et al. (2012) examined the longitudinal changes in social-adaptive behaviors of 152 children with ASD three times across a 10-year time frame. The mean age of participants at entry to the study was five years, and follow-ups were held at eight years and again at 15 years of age. Three subscales of the Vineland Adaptive Behavior Scale (Communication, Daily Living Skills and Socialization), as well as semi-structured parent interviews were used to measure social-adaptive functioning; possible protective factors, such as hours spent in ABA intervention and expressive language ability, were garnered from parent reports and medical records.

Growth trajectories in the area of social skills revealed two distinct groupings of participants. The first group, which comprised the majority of the sample (68%), demonstrated a growth pattern that showed low levels of acceleration in early childhood, but stabilized in adolescence. The second group was categorized by a faster growth slope between the first two assessment points which also leveled out between the second and third assessment points. Predictors of group membership included language and cognitive ability, with those who experienced lower scores on these variables present in the first, or slow growth, group. Additionally, presence of co-morbid disorders was negatively predictive of growth in social skills, while number of weekly hours of intervention received in early childhood positively predicted membership in the second, or faster

progressing, group. Overall, the authors concluded that while important skill deficits in social-adaptive functioning remain over the course of childhood and adolescents in individuals with ASD there is, universally, positive change over time in these areas. Additionally, higher-functioning individuals, without the presence of co-morbid disorders, appeared to make the largest gains. Furthermore, the majority of improvement appeared to occur in childhood, during the time that most received early intervention services, and reached a plateau as the children aged into adolescence, possibly due to the increased demands of adolescent relationships (Baghdadli et al., 2012).

Studies examining social skills data from 8 to 15 year olds at two time-points five years apart reported less dramatic results. Constantino, Abbacchi and Lavesser et al. (2009) examined social skill development across two time points in a previously recruited sample of 95 male twin pairs without ASD diagnoses and 85 boys with a documented developmental delay. The Social Responsiveness Scale (SRS) was used as a measure of overall social functioning, and completed by both parents and teachers. The authors found that, for the sample with clinical diagnoses (Pervasive Developmental Disorder diagnosis, which today would fall under ASD), parent and teacher reports on the SRS were correlated at both time points. While some improvements were seen in total SRS scores over time, these only reached significance in parent reports, leading the authors to conclude that any growth over time in social skill acquisition for the clinical sample was relatively modest. Additionally, the only statistically significant predictor of change was that of baseline severity. In summary, the individuals who began the study with the lowest scores in social functioning evidenced the most gain. These findings lead the

authors to conclude that while improvement over time could be identified based upon a total impairment score at baseline, any improvements seen in the clinical population were subtle, and could only be evidenced over a considerable amount of time (Constantino et al., 2009).

For individuals with ASD, social demands become more complex and challenging with age, and this is typically reflected in the deterioration of social skills as these individuals reach adolescence and young adulthood (Howlin, Mawhood & Rutter, 2000). In their 2000 study, Howlin et al. examined changes in in social skill acquisition and functioning from childhood assessments to young adulthood in two cohorts of young men, one group diagnosed with developmental language disorder (n = 28) and one diagnosed with autism (n = 19). Measures of social functioning were taken from subscales of the Autism Diagnostic Observation Scale (ADOS) and Autism Diagnostic Interview-Revised (ADI-R), as well as the social subscale of the Vineland Adaptive Behavior Scales. Additionally, the informant version of the Socio--Emotional Functioning Interview (SEF-I) was administered with participants at the follow up assessment in adulthood. In comparison to adults with developmental language disorder, those with autism were found to have substantial difficulties with developing age-appropriate relationships, social-communication and basic daily living skills.

Contributions of Parents to Social Skill Development

Investigation into the role of parents in social skill acquisition indicates that parental behaviors may contribute to and predict social skill development over time in

very young children with ASD. Siller and Sigman (2002) investigated the link between parental sensitivity during play interactions, and the longitudinal development of joint attention and language in a sample of 25 children with ASD, 18 children with developmental delay, 18 typically developing children and their mothers matched for IQ, mental age, language age and maternal education levels; children were between the ages of two and five years at the onset of the study. Assessments of child verbal and non-verbal communication ability, as well as adaptive skills, included coded, video-taped interactions between children and trained assessors, and the administration of the Cattell Infant Intelligence Scale and Reynell Developmental Language Scale.

Analysis of video recorded and coded mother child play tasks revealed that no statistically significant differences in parental synchronization of verbal and non-verbal behaviors with their children's focus of attention were evidenced between the three diagnostic groups. Additionally, follow up assessments in the areas of pragmatic language development at one, 10 and 16 years post study indicated that children with mothers who were able to synchronize their behaviors to their children's interests (i.e. displayed more sensitivity in their interactions) showed the most growth in joint attention and communication. Specifically, the use of undemanding, child orientated language during play activities by mothers proved to be the greatest predictor of child gains across the 16 year time span.

Contributions of Teachers to Social Skill Development

Literature regarding the role of teacher in the social development of children with ASD over time has been investigated only in relation to the teacher's role in social skills interventions. In particular, the role of the general education teacher in the implementation of manualized social skill interventions has become the primary focus of recent investigations. The 2012 studies conducted by Lawton and Kasari (2012), and Dykstra, Boyd, Watson, Crais and Baranek (2012) investigated the effectiveness of two scripted interventions, the Joint-Attention and Symbolic Play/Engagement and Regulation intervention (JASP/ER) and Advancing Social-communication and Play (ASAP), respectively. Lawton and Kasari (2012) utilized a randomized controlled trial design to determine if general education early childhood educators could competently implement the JASP/ER intervention to improve the joint attention and engagement of students with ASD. Sixteen participating preschoolers, with a school diagnosis of ASD, enrolled in eleven different classrooms, and their teachers were randomly assigned to either the immediate treatment group or a wait-listed control group. The Early Social Communication Scales (ESCS), classroom observations, and video-taped play interactions between the child and teacher were administered pre and post intervention in order to measure the child's level of social communication skills (i.e. nonverbal gestures and joint referencing of objects and people). Similarly, Dykstra et al. (2012) examined the efficacy of the ASAP intervention to develop the social-communication and play skills of three preschool children with ASD utilizing a multiple-base line study design. The intervention was implemented by the classroom teachers and/or their assistants, in

both small group and one-to-one settings, and data were collected through classroom observations as well as project-created assessments.

At the conclusion of one week of teacher training followed by five weeks of intervention in the study conducted by Lawton and Kasari and an average of 11 weeks of intervention in Dykstra et al.'s study, analyses revealed that all participants showed improvements in social communication and play skills. Specifically, participants who received the JASP/ER intervention increased their frequency of initiation of joint attention and joint engagement in structured play settings, while those who received the ASAP intervention increased their frequency of requests and demonstration of joint attention, as well as their quality and duration of engagement in pretend play. Interestingly, the group implementation of the ASAP intervention did not produce positive outcome effects for two of the three participants; it was not until the one-to-one implementation component was added to the intervention phase that significant changes in behavior were evidenced. Additionally, results from teacher fidelity and implementation measures revealed that teachers in both studies achieved good to excellent fidelity of intervention implementation and used significantly more strategies garnered from the programs during classroom observations. Therefore, both groups of authors concluded that the interventions not only served to improve the skill deficits of children with ASD, but that they could also be effectively implemented by teachers in naturalistic settings (Dykstra et al., 2012; Lawton & Kasari, 2012).

While it does appear that the majority of the participants in the studies reviewed evidenced growth in social-adaptive functioning longitudinally, particularly in the period

of early childhood before adolescence, some issues remain. Most studies in the current literature include a wide age range of individuals with ASD, and do not specify their levels of cognitive functioning. The current study was conducted with children in a narrow age range (4 to 7 years) and the majority will have IQs greater than 70 (the cut-off for intellectual disability). While individuals with high functioning ASD, may, by definition, have less pronounced social difficulties, they would still have sub-par functioning in this area in comparison to their typically developing peers in order to meet the qualification for an autism spectrum diagnosis (DSM 5; APA, 2013).Second, the majority of studies did not have measures of social skills from more than one respondent, nor did they investigate the effects of parent and teacher characteristics on child development outside of intervention research. Finally, it was not the intent of this review to focus on the results of specific social skills interventions, as that is a very large literature. In the current study, no specific intervention took place, but all children were in school, which is itself a type of intervention, providing indirect language and social stimulation for at least four hours of the day.

Early Literacy Development in TD, Academically Delayed and Speech Impaired Youth

An important milestone in the early educational process for many young children and their families is learning to read. Traditionally, this process begins before the formal schooling years, with the acquisition of early literacy skills and the precursors of formal reading, and continues to dominate the instructional curriculum through the early elementary school years (Dickinson, McCabe & Anastasopoulos, 2003; Lonigan, Burgess

& Baker et al.; Whitehurst & Lonigan, 1998). There is a preponderance of research concerning the longitudinal course of reading development through the early school years involving both typically developing children, as well as those who experience delays in academic development, with and without formal special education diagnoses. While not comprehensive, the following longitudinal studies pertaining to early literacy skills inform the current study.

The acquisition of early reading skills and their progress over time for typically developing children as well as those deemed "at risk" or with mild disabilities has been examined. For example, Zucker et al. (2012) investigated the effects of shared classroom reading experiences on 178 preschool-aged children, following them through kindergarten and first grade. The Expressive Vocabulary subtest of the Clinical Evaluation of Language Fundamentals – Preschool and the Letter Knowledge subtest of the Phonological Awareness Literacy Screening for Preschool were given at two times points during the preschool year of the study. Kindergarten and first grade measures of literacy ability included the Peabody Picture Vocabulary Test (PPPVT) and the Woodcock Johnson Tests of Achievement (WJ-III), which were given once each year. Additionally, the frequency and features of the shared reading experiences were obtained through detailed teacher logs and videotaped class read-alouds. Results indicated that the preschool children evidenced gains related to the frequency of shared reading in the preschool setting. Additionally, this relationship between shared reading and growth in early literacy skills continued into the kindergarten year in the areas of vocabulary and

letter identification (Missall, McConnell and Cadigan, 2006; Zucker, Cabell and Justice et al., 2012).

Similarly, O'Connor and Jenkins (1999) longitudinally examined the early reading abilities of 445 children from kindergarten to first grade in order to ascertain if weaknesses apparent in the kindergarten year could predict qualification for services under reading disabilities (RD's) in first grade. Kindergarten predictors such as aspects of phonological awareness, sound repetition, rapid letter naming and dynamic segmentation were measured at three time points. Data gathered both at the end of the kindergarten year and the beginning of the first grade year showed high rates of predictive ability of later RD status. Skills in the areas of rapid letter naming and segmenting phonemes at all three time points were found be significantly predictive of RD status; while dynamic segmentation was found to be a strong discriminator of group placement when measured at the beginning of the first grade year.

Growth in reading development from the kindergarten year through early elementary school was also documented in both Foster and Miller's (2007) and Aarnouste, Leeuwe and Verhoeven's (2005) studies for children with typical development and those with identified disabilities, in order to determine the effects that mastery of early literacy skills have on the development of more advanced literacy components in later grades. Foster and Miller (2007) utilized the 12,621 students from the Early Childhood Longitudinal Study, which contained literacy data from four time points derived from the literacy assessment developed for the study. Aarnouste et al.

(2005), however, utilized data from 243 Dutch students also using assessments designed for the study to measure the development of early reading skills across three time points.

Results in Foster and Miller's (2007) study revealed that participants who entered kindergarten with higher levels of literacy readiness skills maintained heightened performance through first grade, and spent second and third grade attaining more fluency in decoding and emerging reading comprehension abilities. In contrast, participants who did not enter kindergarten with these pre-requisite skills did not attain mastery over decoding until the end third grade, significantly behind that of the high readiness group. The authors concluded that literacy skills develop in stages, and in order to move to the next stage, one must gain mastery of the previous stages. Similarly, Aarnouste et al. (2005) also found that growth in later reading processes, such as comprehension, could be predicted by earlier skills from the kindergarten year, particularly the knowledge of letter names and sounds, and phonemic awareness in grade one.

While the aforementioned studies examined the longitudinal reading processes of predominantly typically developing samples, Nathan, Stackhouse, Goulandris and Snowling (2004) examined predictors of literacy skill achievement in 82 children, ages four and five, all with speech and language impairments (SLI). Receptive and expressive language levels of participants were measured using the Test for Reception of Grammar (TROG) and the British Picture Vocabulary Scale (BPVS), while multiple standardized measures of phonological awareness and literacy skills were administered at three time points spanning the preschool through third grade years. Utilizing correlational and multi-level modeling strategies to determine the relationships among multiple skills necessary

for successful reading, the authors were able to track the participant's literacy growth over time. Nathan et al. (2004) found that while the risk of developing a literacy delay for children with speech difficulties was high, the amount of risk could be determined by the severity of the speech delay. Additionally, the authors concluded that while language skills were the greatest predictor of very early reading ability from ages four to five, phonemic awareness arose as a sounder predictor of reading ability between the ages of five and seven, and acted as a mediator between persisting speech delays and reading ability. This study is particularly relevant because many children with ASD also have difficulties with speech and language.

Parent Contributions to Literacy Development

The level of parental involvement in literacy activities with their very young children has also been the focus of longitudinal research concerning the reading development of children without known disabilities. Senechal and LeFevre examined the predictive power of early literacy experiences in 93 Canadian kindergarteners. The frequency and intensity of print exposure was measured through parent questionnaires given at the onset of the study and at the end of first grade. Children's literacy and language development were tested yearly during the first, second and third grade years using the PPVT, the Stanford Early School Achievement Test (SESAT), the Concepts About Print Test and the Gates-MacGinitie Reading Tests.

The authors' hypothesis that a clear link between home literacy experiences in early childhood and later reading skills in the elementary grades would be found was

confirmed through hierarchical linear modeling. Specifically, the amount of time parents

spent reading books to their children positively predicted the child's development of

receptive language skills. In addition, the parents' reports of informally teaching their

children about letters and print positively influenced later reading skills in the early

elementary grades. Surprisingly, as children gained more skills in areas of phonological

awareness and receptive language, the link between parental involvement and children's

reading ability became more indirect over time, and was mediated by strength in the

aforementioned emerging skills. Additionally, the authors concluded that in the sample,

levels of receptive language and phonological awareness were highly related, but

language ability was not directly related to other emergent literacy skills in the early

grades. However, language skill correlate with reading performance as the children

progressed through third grade (Senechal & LeFevre, 2002).

Teacher Contributions to Literacy Development

One would expect classroom instruction to impact children's literacy skills, and

that is what a study by Missall, McConnell and Cadigan (2006) showed. The study

included 69 children in their last year of preschool, including 26 with only mild

disabilities. The investigators used subtests of the Individual Growth and Development

Indicators (IGD), including Picture Naming, Rhyming, and Alliteration, to measure

growth in literacy skills, while information regarding classroom environment was

ascertained from an observational data system created for the study at monthly intervals

for five months during the winter and spring. Differential levels of growth were observed

in the areas of rhyming and alliteration, although all children showed positive growth in

all measured areas. Children with mild disabilities evidenced lower rates of growth, in addition to lower initial scores in comparison to their typically developing (TD) peers in these areas across the school year. Additionally, classroom activities such as pretend play and time spend in instructional activities were related to growth in literacy skills.

Literacy Skills in ASD

Reading difficulties are not yet identified as part of the ASD phenotype; however, unusual patterns of literacy development and routine storytelling abilities were first evidenced in Kanner's (1943) defining study of the disorder. While there is a dearth of literature describing reading patterns in children with ASD, one of the most researched reading difficulties associated with the disorder is that of hyperlexia. Although current research has failed to conclusively define hyperlexia, it is generally accepted as a reading profile in which word reading ability exceeds that of a child's language and cognitive level, coupled with a relative weakness in reading comprehension. Additionally, hyperlexia is often associated with an early onset of word reading, and preoccupation with reading to the exclusion of other activities, a description that aligns with the restricted, repetitive interests found in many children with ASD.

In her 1999 review of the literature Nation argued that hyperlexia was often comorbid with serious developmental and intellectual delays, including, but not limited to ASD. While hyperlexia is not specific to ASD and reading profiles of individuals with hyperlexia with and without ASD show similar patterns, the cognitive profiles of hyperlexia and ASD, which often include strengths in memorization and visual

processing skills in combination with observed weaknesses in pragmatic reasoning, have been found to be similar. Additionally, the aforementioned pattern of ritualistic, and oftentimes obsessive behavior inherent in the ASD phenotype may leave these individuals more susceptible to hyperlexia, as their repetitive practice of decoding and sight word reading may promote advances in these skills.

In order to further investigate the possible link between ASD and hyperlexia, as well as to build a literature base that accurately reflected the reading profile of individuals with ASD, Nation et al. (2006) investigated the comprehensive reading patterns across multiple domains of early literacy skills of 41 children with ASD diagnoses. The children ranged in age from 6 to 15 years, and they had varying degrees of autism symptom severity. The authors hypothesized that a variety of skill levels in areas of letter knowledge, phonemic awareness, and accuracy combined with relatively impaired reading comprehension would emerge in the sample. The Graded Nonword Reading Test, British Abilities Scales (BAS-II) and the Neale Analysis of Reading Ability-II (NARA-II) were used to measure decoding ability, reading accuracy and reading comprehension, respectively; while the British Picture Vocabulary Scale-II (BPVS-II) and the Wechsler Intelligence Scale for Children (WISC-III) provided a measure of oral language and nonverbal ability.

In summary, results revealed that the majority of the participants (65%) had reading profiles characterized by deficits in reading comprehension. However, the sample showed more heterogeneity in areas of decoding and accuracy; approximately 42% of the sample struggled with decoding non-words in addition to comprehension, while the vast

majority of the group evidenced average to above average scores in domains of reading accuracy when presented with real words. Additionally, correlations between real word identification and non-word reading were evidenced, but were significantly lower than those found in typically developing readers, leading the authors to conclude that reading processes, such as word recognition and phonological awareness, are not as tightly linked in children with ASD (Nation et al., 2006).While many of the children who struggled with reading comprehension may have had a combination of poor decoding and accuracy skills in the Nation et al. (2006) study, some showed a pattern of impairments in vocabulary and oral language coupled with low comprehension rates and average to above average word reading skills. This finding led the authors to conclude that children with ASD and reading comprehension difficulties may have underlying difficulties with language comprehension in general. Interestingly, while the aforementioned hyperlexic profile in children with ASD is relatively well documented, many children in the study showed difficulties with decoding non-words despite possessing adequate sight word reading ability. The authors hypothesized that this may to be due to the poor oral language skills in the sample, which contributed to poor phonological processing ability, resulting in difficulties with decoding. However, these findings suggest that children with ASD might use rote memorization as their primary strategy when learning to read, thereby leading to relative weaknesses in the ability to phonologically decode unknown words (Nation et al., 2006).

While the above studies have examined the reading abilities of children with ASD at a solitary time point, Wei, Blackorby and Schiller (2011) investigated longitudinal

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patterns of growth in 3,421 students from early elementary school through high school (ages 7-17), all served under 11 IDEIA disability categories, including the classification of "autistic like." Broad ability across word reading and comprehension domains was measured using the Woodcock-Johnson Test of Achievement (WJ-III) (letter-word identification and passage comprehension sub-scores). Disability status and demographic measures were collected from school district and parent reports across the span of the study.

The authors confirmed that a quadratic model of growth was the most appropriate fit for the growth curves apparent in all disability categories. While all students showed positive growth over time in both letter-word identification and passage comprehension, the students in each distinct category evidenced differential levels of mean reading achievement, both at the onset of the study and over time. In particular, students being served under the category of "autistic-like" evidenced lower rates of growth in reading ability across the study than students with learning disabilities, emotional/behavioral disturbances, or speech or visual impairments. Their performance mirrored that of students with intellectual disabilities and hearing impairments. Additionally, while the students with ASD classifications made steady gains in reading achievement throughout the elementary and middle school years, their slope of progress tended to plateau during the high school years, illustrating why these students did not catch up to students in higher performing categories over time. These findings lead the authors to accept a deficit model of reading ability, in which students who lag behind their peers in the early grades continue to do so throughout their educational career, as opposed to a lag model, in which

students who initially begin school with sub-par reading achievement eventually catch up over time (Wei et al., 2011).

Limited research concerning the predictive effects of school-based special education services on the academic achievement of students with ASD exists. However, Kurth and Mastergeorge (2010) examined long term academic outcomes for 15 children with ASD ,aged 12 to 15, enrolled in either an inclusive general education (n=7) or self-contained special day class (n=8). The authors hoped to gain an overall picture of skill acquisition in autism while concurrently examining the effects of school placement on the adolescent participants. The WJ-III was utilized to measure several domains of reading ability, while the Vineland Adaptive Behavior Scales, 2nd Edition (VABS) and the WISC or Test of Non-Verbal Intelligence (TONI) were used to gain a descriptive understanding of the cognitive and adaptive functioning of the participants. While students enrolled in general education had a higher overall mean score in areas of cognition and adaptive behavior, these differences did not achieve statistical significance. Instead, the authors concluded, based on these findings and those of an earlier study, that student placement may be a function of district preference. In other words, districts with an inclusion philosophy placed students in general education while districts that retained classes for special education purposes placed students with ASD there. Despite non-significant differences on global measures of intelligence and behavioral functioning, the students' reading achievement appeared to differ significantly based on classroom placement. While both groups of participants showed a similar pattern of strengths and weakness (i.e. letter identification was a strength, while comprehension was a relative weakness),

students in general education settings outperformed students in special education classrooms across all literacy domains. The authors concluded that inclusion environments were more conducive to academic growth in adolescents with ASD (Kurth & Mastergeorge, 2010).

ASD and Classroom Placement

In his 1987 seminal article regarding ASD intervention, Lovaas declared that approximately half of his sample participants diagnosed with autism achieved "normal functioning" based upon their improvements in standardized IQ tests in combination with their placement in general education settings. Lovaas faced considerable criticism (Schopler, Short & Mesibov, 1989; Lovaas, Smith & McEachin, 1989) for using classroom placement as an indicator that the children in the study became indistinguishable from their typical peers, due to the fact that inclusion and promotion from grade-to-grade, at that time, were based as much on parental advocacy for placement in one classroom over another as on actual child ability. In addition, placement criteria may have varied between school sites and may not necessarily have correlated with autism symptomology. The Lovaas (1987) study was ground breaking and made a vitally important contribution to existing literature and practice by revolutionizing the treatment of children with ASD. However, in doing so, Lovaas unwittingly began a decades-long debate about where these children may best be educated. This debate continues today, as demonstrated by the number of contested IEP's and right-to-education suits in the area of autism (Fogt, Miller & Zirkel, 2003; Zirkel, 2002; Zirkel, 2011)

Twenty-seven years after the publication of the Lovaas study, The Individuals with Disabilities Education Improvement Act (IDEIA), issued in 2004, mandated that educational programs for children with disabilities be delivered in the natural, or least restrictive environment (LRE). Inherent in the definition of the LRE is the notion that a child with special needs should be educated in an environment containing chronologically-aged similarly aged peers. In order to comply with this mandate, many school districts have implemented a full-inclusion policy for young children with disabilities, including those diagnosed with Autism Spectrum Disorder (ASDs) (Etscheidt, 2006). While many children with developmental delays garner both academic and social benefits from inclusion programming, they are often at a heightened risk for poor relationships with general education teachers, (Blacher et al, 2014) peer victimization, and more restrictive classroom placement (Etscheidt, 2006; Hilton & Liberty, 1992; Kasari, Rotheram-Fuller, Locke, & Gulsrud, 2012). These aforementioned problems may be due to the marked difficulty they often display in social interactions and the presence of challenging behaviors (Etscheidt, 2006; Blacher, Baker, & Eisenhower, 2009; Hilton & Liberty, 1992). In addition, teachers of children with ASD who display challenging behaviors coupled with low levels of social competence in full or partial inclusion programming have been found to show lower rates of self-efficacy and higher rates of stress and burnout than any other subgroup of teachers (Crozier & Tincani, 2007).

Despite the many challenges inherent with mainstream placements for children with ASD, support for inclusion programming dominates the empirical literature.

Although not disability specific, McGregor and Vogelsberg (1998) reported in their review of the literature that best practice for educating students with disabilities is to include them in the general education classroom, where inclusion programming garnered positive benefits for students, teachers and parents. Specifically, the authors argued that research indicated that students with disabilities interacted more frequently with their typically developing peers when placed in general education, thereby having opportunities to improve their social competence and pragmatic language ability. Additionally, the academic engagement and skill acquisition for students with disabilities are improved in inclusive settings, due to increased opportunities for instruction in multi-level small groupings. Notably, while parents tended to value the student-teacher relationship and specialized services between students with disabilities and special education teachers, they also valued the friendships their children with disabilities formed with typically developing peers in inclusive settings. The authors stated that one attractive feature of inclusive education was that, while it may initially cost school districts more to develop services to meet the needs of students with disabilities in the general education environment, the long-term costs may be less than educating these students in more isolated, specialized settings.

Studies supporting school-based interventions for students with ASD also indicated that these children benefit from the availability of social relationships and opportunities for participation in activities with typically developing peers when specific strategies to do so are incorporated (Hilton & Liberty, 1992; Kasari, Rotheram-Fuller, Locke, & Gulsrud, 2012; Owen-DeSchryver, Carr, Cale & Berkeley-Smith; 2008; White,

Scahill, Klin, Koenig, & Volkmar, 2007). Results of specific, peer-mediated interventions in the regular education setting indicated significant improvements in initiations towards the target children by typically developing peers, and improvements in the responses of the students with ASD towards peers. Clearly, there is ample evidence in the literature that interventions that train peers to interact with, and model pro-social behaviors for, children with ASD may be feasible for increasing social engagement in a general education setting (Kasari et al., 2012; Owen-Deschryver et al., 2008). These widely cited findings are also influential when schools make classroom placement decisions for children with ASD, and when parents advocate at their child's IEP.

Parents and Classroom Placement

While parent litigation in the area of special education services received by their children with ASD is currently on the rise, and had increased to approximately 45 contested cases per year in the state of California by the early 2000's, little research has examined parent's perspectives regarding inclusion practices, or their possible role in getting services for their children specifically (Scheuermann et al., 2003). In their 1999 study Kasari, Feeman, Bauminger and Alkin investigated the opinions of 113 parents of children autism and 149 parents of children with Down Syndrome ages 2-18 years regarding the effectiveness of inclusion in general education for their respective children. Parent's satisfaction with their child's current educational placement as well as their ideal educational placement were gathered using a survey created for the study. Results indicated that parents with children with autism were more likely to desire a mainstreaming option for their child than parents of those with Down Syndrome, who

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preferred that their children be placed in special day classes for children with special

needs. The authors suggested that this finding may be due to the fact that children with

autism, by definition, have difficulty with social interactions, and parents feel that by

being in proximity to typically developing children their child may learn more socially

appropriate behaviors. However, parents in both diagnostic groups tended to become less

supportive of inclusion as their children aged. Parents of preschool-aged children were

the most adamant supporters of inclusion, while parents of children in elementary school

and beyond reported less enthusiasm for inclusive placements.

Teachers and Classroom Placement

The sustained increase in the incidence of ASD diagnoses, coupled with the rising

trend towards integrating these students into general education classrooms indicates that

general education teachers are now more likely than ever before to be expected to provide

educational benefits to students with ASD (Blacher, Linn & Zeedyk, 2015; U.S.

Department of Education, 2007). However, lack of appropriate teacher and administrator

training and support has become one of the most problematic challenges facing

successful implementation of inclusion programs. In Scheuermann, Webber, Boutot and

Goodwin's (2003) study, which examined teachers' opinions regarding inclusion

programs, approximately 61% of the general education teachers who participated

reported that they exited their teacher preparation program without the necessary mastery

of instructional and managerial techniques needed to competently teach in an inclusive

environment. Furthermore, data from the National Research Council (NRC, 2001)

indicates that most educators (approximately 96%) in the general education field

graduated from programs where they receive little-to-no instruction in evidenced-based research practices for students with ASD.

Synthesis of Findings to Date

With regard to research concerning literacy ability in students with ASD, it appears that the majority of studies have found a pattern of average to above average ability in identifying the names and sounds of letters and memorization of frequently found common words. However, this is coupled with a relative weakness in reading comprehension and discrete methods of decoding, or "sounding-out" more complex words. However, the majority of studies that reported this phenomena focused on students with ASD in upper elementary and adolescent years, after one would have expected these skills to have developed. Very little literature has investigated the time period from preschool through the early elementary years (kindergarten through second grade) when early literacy skills, such as letter-sound correspondence and decoding, constitute a majority of literacy instruction. Additionally, while Kurth and Mastergeorge's (2010) study did examine growth in literacy skills as predicted by a student's placement in general or special education, this study also examined a very small sample (n = 15) of adolescents with ASD in middle and high school settings; their participants also represented varying levels of functioning across the autism spectrum. Absent from the literature are studies examining the patterns of literature skill acquisition in young, verbal elementary and preschool-aged children with ASD, as well as the characteristics of these children , their parents and teachers that may predict this growth. Additionally, growth patterns in skill acquisition as predicted by school context (i.e.

whether students spends of the majority of their school day in general or special education classes) need to be further elucidated.

While the best school context for educating students with ASD continues to be a hotly debated topic, a large gap in the literature concerning outcomes of school context currently exists. The majority of empirical investigations focus on teacher training and implementation of successful social and behavioral interventions in inclusive settings for students with ASD; few studies have been conducted that focus on student outcomes in the areas of social and academic skill acquisition and currently no studies exist which examine the similarities and differences between children, parents and teachers relative to classroom setting. Similar to the literature base regarding literacy patterns in children with ASD, the majority of studies that look at student outcomes as predicted by school context and special education services tend to focus on older, middle and high-school aged students, or very young pre-school-aged children enrolled in early intervention programs.

The purpose of the current study is to examine the patterns and predictors of literacy and social skill acquisition during the transition to formal schooling in a sample of young students with ASD. Research questions which drove the analyses included:

1. Do child (language ability, IQ, behavior problems, symptom severity, academic engagement), parent,(ethnicity, income, age, employment status, education, level of classroom involvement) and teacher (years of teaching experience, ASD specific training, competency, classroom size and classroom strategies) characteristics differ

by placement context (general education vs. special education)? 2. Do these child, parent and teacher characteristics relate to literacy and social skills outcomes for young children with ASD at time-point one? 3. Are there changes in child outcomes (literacy and social skills) across one school year? If so, can the end of the year scores (time 2) be predicted by previous performance, child characteristics, parent characteristics, teacher characteristics and/or classroom placement, gathered at the beginning of the year (time 1)?

Methods

Participants

Participants included 138 children with ASD and their parents and teachers. All were involved in a two-site, three wave longitudinal study. This study utilized data from the first two waves of participants. Children, parents and teachers were recruited in Southern California and in Massachusetts. The purpose of the larger study was to examine the transition of young children with ASD to early elementary settings (pre-K through grade 3). ASD diagnoses of participating children were confirmed for research purposes using the Autism Diagnostic Observation Schedule-II (ADOS-II; Lord, Rutter, DiLavore, Risi, Gotham & Bishop, 2012); for those without previous clinical diagnoses, the Autism Diagnostic Interview-Revised (ADI-R; Rutter, Le Couteur & Lord, 2003) was also used. The majority of children qualified for a classification of "autism" (85%) as opposed to "autism spectrum." The mean age of children was 5.0 years at entry to the study and mean IQ was 84.7; 26% had an IQ below 70. Slightly over half of the children (52%) spent the majority of their day in general education classes.

Parent mean age at onset of the study was 38 years. The majority of participating families reported an average annual income of $50,000 or above. Seventy-one percent of parents reported that they were of Caucasian ethnicity. The majority of teachers were female (88%) and Caucasian (70%) and taught at a public school (87%). While a surprising percentage of teachers held a master's degree (67%) and had five years or more of teaching experience, less than 30% reported receiving training specifically for teaching children on the autism spectrum. However, the majority of teachers (65%) reported that they felt "pretty much" or "very prepared" to teach students with ASD. A descriptive summary of child, parent and teacher characteristics can be found in Table 1; a summary of parent, teacher, and child descriptive statistics for standardized measures (see below for detailed descriptions) can be found in Tables 2 through 4.

Child Measures

Comprehensive Assessment of Spoken Language (CASL-2, Carrow-Woolfolk, 1999). The CASL-II is an orally administered language assessment designed for children ages 3-21 years of age. The total language score (derived from the sum of standard scores on the basic concepts, syntax construction and pragmatic judgment sub-tests) was utilized in the current study. The CASL-2 has good construct validity and strong reliabilities of .90-.96 on each of the three indices. This measure has been widely used with children with ASD, as well as with children with language delays, aphasia and intellectual disabilities (Reichow, Salamack, Paul, Volkmar & Klin, 2008). This measure was given at the first time-point in this study.

Weschler Preschool and Primary Scales of Intelligence (WPPSI-III, Weschler, 2002). The WPPSI-III is a test of cognitive ability for children ages two years, six months to seven years, three months. The full-scale IQ of participants was calculated from the matrix reasoning, vocabulary and picture completion subtests. This three subtest version has demonstrated predictive validity (r=.90) and adequate reliability (r_{xx} =.95) as an indicator of cognitive ability (Sattler & Dumont, 2004). A select group of participants who were unable to complete one or more of the aforementioned subtests were given the block design and/or information subtests. This measure was given at the first time-point in this study.

Woodcock-Johnson-III Test of Cognitive Abilities and Achievement (WJ-III, Woodcock, McGrew & Mather, 2001). The WJ III was used to assess the letter naming ability, phonological awareness, and vocabulary of participating children and was given at each time-point. The current study utilized the letter/word identification, word attack, and vocabulary subtests. The WJ-III demonstrates strong test-retest reliability and adequate validity with young children (reliabilities of individual subtests range from .74 to .94). Additionally, it has been widely used with children with ASD (Newmann et al., 2007). The WJ-III was administered at both time-points.

(See Table 2 for child completed data on the CASL-2, WPPSI-III and WJ-III)

Parent Measures

Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2000). The CBCL is a norm-referenced scale of child behavior problems and parents completed this measure at

all time points. Two versions exist, one for children from 1.5 to 5 years of age, consisting of 99 items, and another for children ages six to eighteen, consisting of 118 items. Parents rank each item as "not true," "somewhat or sometimes true," or "very true" or "often true" now or within the last six months. Total scores in the areas of externalizing and internalizing problems, as well as the total behavior problems scores were used in the current study. Parents completed this measure at both time-points.

Family Child Background Survey (FCBS). The FCBS is a questionnaire measure completed by parents that provides basic demographics (e.g. educational level, household income, number of children, etc. The measure also extracted information regarding the target child's school experiences (e.g. how often he/she attended school and received any special education services) and the child's current medical history (e.g. if he/she had any concurrent physical health problems). Additionally, parents were asked to define the classroom placement of their children by designating one of four categories (1. Entire school day in special education; 2. Most of the school day in special education; 3. Some of the school day in special education, but most of the day in general education; and 4. Entire day in general education).

 Social Responsiveness Scale (SRS; Constantino, 2002). The SRS is a 65 item, norm-referenced measure that covers dimensions of interpersonal behavior, communication and repetitive or stereotypical behaviors characteristic of autism spectrum disorders. The parent rating form is intended for use with children ages 4-18; reported Cronbach's alpha = .94. Parents rate each question with scores of 1 = not true, 2 = sometimes true, 3 = often

true or 4 = almost always true. The autistic mannerisms subscale of the SRS was used as a measure of autistic characteristics. Parents completed this measure once.

Social Skills Inventory System (SSIS; Gresham & Elliott, 2008). The SSIS is a parent completed, norm-referenced measure used to rate the frequency of occurrence of behaviorally specified social skills on a four-point scale of never, seldom, often and almost always. The SSIS has 79 items and provides a broad assessment of social skills, problem behaviors and academic competence of children, ages 3-18. The total social skills score was used as a determinant of children's social skill ability in the current study. The parent report form indicated Cronbach alpha = .95 for social skills and test-retest reliability = .84. Parents completed this measure at both time-points.

Parent and Teacher-Involvement Scale – Parent Version (PTIS-P; Corrigan, 2002; NICHD, 2005). The PTIS is a standardized measure given to both the parent and the teacher, which measures the parent's level of school involvement as well as her relationship with the teacher and school. The PTIS consists of 20 questions rated on a seven- point scale ranging from never to almost every day, and assesses parent's involvement with the child's school activities and perceptions of the quality of relationship with the child's teacher. Total scores were utilized for analysis in this study. Parents completed this measure at each time-point.

 (See Table 3 for parent-reported data on the CBC-L, SRS, SSIS and PTIS.)

Teacher Measures

Academic Engagement Scale (AES; Skinner & Belmont, 1993) The eight item AES is

a teacher measure adapted from the 20-item Student's Achievement-Relevant Actions in

the Classroom (SARAC) measure (Skinner & Belmont, 1993). Items are rated on a four-

point scale and range from *not at all true* to *very true*. Two separate subscale summed

totals were used in this study, behavioral engagement in school and emotional

engagement in school. The AES has been shown to demonstrate strong predictive validity

with teacher-rated student involvement (Skinner & Belmont, 1993). Teachers completed

this measure at both time-points.

Classroom Climate Inventory (CCI). The CCI is a questionnaire completed by

teachers that provides information on classroom structure, teacher experience, ASD

competence, and teacher demographic information. Questions from the CCI that were

used in the current study included those that asked the teacher how many years they had

been teaching, whether they received training specific to teaching children with ASD, if

they felt confident to teach children with ASD, and how many students were in their

class. Additionally, the teachers were asked how long they had known the target child.

Answers to this latter, open-ended question ranged from six weeks to two and one-half

years. This variable was recoded as a categorical variable ($0 = 0 - 4$ months, $1 = 5 - 8$

months, $2 = 8$ months $- 12$ months, $3 =$ more than 1 year)

Caregiver Teacher Report Forms (CTRF; Acchenbach & Rescorla 2001). The

CTRF is a measure completed by participating teachers that measures their perception of

the student's behavioral functioning in the classroom environment, and corresponds to the parent-completed CBCL. The CTRF consists of 113 items rated on a scale of *not true* (0), *somewhat or sometimes true* (1), and *very true or often true* (2). The measure yields a total problem score, broadband externalizing and internalizing scores, and seven narrow-band scales. Only the total broadband T scores for externalizing and internalizing behavior problems subscales as well as the total problems score were utilized in this study. Teachers completed this measure at two time-points.

Social Skills Inventory System (SSIS; Gresham & Elliott, 2008). The SSIS was utilized in the current study as a measure of the teacher's perception of the participating child's social skills. The teacher version of the SSIS is identical in scoring and item responses to the parent version. The SSIS teacher version has internal reliability = .97 and test-retest reliability = .82. Additionally, it has moderate construct validity and good ability for discriminating between children affected by different psychological disorders. Teachers completed this measure at two time-points.

Parent and Teacher Involvement Scale – Teacher Version (PTIS-T; NICHD, 2005). The PTIS-T is the teacher version of the parent-completed PTIS-P. This measure consists of 22 items, rated on a five point scale, that assess the teacher's perceptions of a parent's involvement in the child's school activities, and the quality of the teacher's relationship with the parent. Total scores were utilized for analysis in the current study. Teachers completed this measure at both time-points.

Teacher Strategies Questionnaire (Webster-Stratton, Reid & Stoolmiller, 2008). The

Teacher Strategies Questionnaire is a 44 item measure used to assess the teacher's use of

specific, behaviorally-oriented strategies for interacting with individual students, groups

of students and parents. Items are rated on a five point scale, ranging from *rarely/never* to

very often, to determine the frequency with which the teacher uses the strategies. Total

scores in the areas of praise and incentives, proactive strategies, limit setting strategies

and inappropriate strategies were utilized in the current study. The Teacher Strategies

Questionnaire has been used with teachers of young children with a range of

developmental and behavioral challenges (Williford & Shelton, 2008).

 (See Table 4 for teacher-reported data on the AES, CTRF, SSIS, PTIS and Teacher

Strategies Questionnaire.)

Procedure

Study procedures were approved by the Institutional Review Boards of the

participating universities. During on-site assessments graduate student researchers trained

in the study protocol met separately with parents and children to complete measures of

child functioning, literacy and language level, as well as semi-structured interviews with

parents concerning their views regarding their children's teachers, school personnel, and

the context of the child's educational program. Parents and children completed an

eligibility visit, as well as three study visits, for a total of four visits. The eligibility visit

was very close in time to the first visit, therefore, measures from this visit are considered

as part of the time one protocol. This study utilized data from times one and two only. At

each visit, parents were interviewed extensively. Participating teachers were asked by parents to fill out and return standardized measures, and a large number of them (but not all) did so at the two time-points.

Child characteristics analyzed here were obtained from several different measures. Child language and IQ came from total scores on the CASL-2, WJ Picture Vocabulary subtest and WPPSI-III respectively. Parent reports of child levels of externalizing, internalizing and total behavior problems were derived from the CBCL, and their report of their child's autistic mannerisms was derived from the SRS. Additionally, the correlational analyses included teacher reports of internalizing, externalizing and total behavior problems on the CTRF. Parent characteristics, including their ethnicity, yearly household income, age, employment status and education level were gathered from the FCBS (demographics measure) given to parents at the entrance to the study. Similarly, teacher characteristics, such as their years of teaching experience, if they had received training specific to working with children with ASD, their level of competency (how prepared they felt to teach children with ASD) and the number of students in their classes, were obtained from the demographic measure (CCI), completed by the teacher after the family's first study visit. The perceived level of parent involvement in their child's classroom was obtained from the total score of both parent and teacher reports on the PTIS. Additionally, the classroom management strategies that the teacher engaged in were obtained from the total scores of the praise and incentives, proactive strategies, limit setting strategies and inappropriate strategies subscores on the Teacher Strategies Questionnaire.

Results

In order to answer research question one *[Do child (language ability, IQ, behavior problems, symptom severity, academic engagement), parent, (ethnicity, income, age, employment status, education and level of classroom involvement) and teacher (years of teaching experience, ASD specific training, competency, classroom size and instructional strategies) characteristics differ by placement context (general education vs. special education)?],* correlation matrices were created. Classroom placement was recorded as a continuous variable to be used in all analyses (see tables 6-11). The classroom placement variable contained four categories of services: 1. Entire school day in special education (n = 33); 2. Most of the school day in special education (n= 35); 3. Some of the school day in special education, but most of the day in general education (n = 33); and 4. Entire day in general education (n = 37). For use in regression analyses, this variable was examined in two ways. First it was dummy coded. Because there are four levels of special education services, three dichotomous variables were constructed that contained the same information as the single categorical variable (reference group = special ed.). However, current literature on inclusion indicates that this variable could also be considered to be continuous, in which the parent is asked to rank their child's placement in regard to a continuum of possible services. In this scenario, a placement in general education for the full day (rated as a four in the data set) would be considered to be the least restrictive placement while spending the entire day in self-contained special education setting (rated as one in the data set) would be considered to be the most restrictive option (Cook, 2002; Etscheidt, 2006).

Due to the wide ranges demonstrated on child outcome measures, particularly in the area of literacy skills, an examination of outliers was also conducted by creating scatterplots to determine visually if any participants differed substantially from the general trend. Furthermore, the data for the three subscales of the WJ-III literacy assessment (word attack, letter/word identification) at both Time 1 and Time 2 was standardized, or expressed in terms of a distribution with a mean of zero and a standard deviation of one, by completing a z-score transformation. If the z score absolute value for the score of any participant was greater than two standard deviations from the mean these scores were constrained to be within two standard deviations from the mean. Positive outliers were set to two standard deviations above the mean, while negative outliers were set to two standard deviations below the mean (Field & Miles, 2010). A total of three scores on the WJ Letter Word Identification subtest were constrained, while one score on the WJ Word Attack subtest was constrained at time 1. At time 2, three scores were constrained on the WJ Letter Word Identification subtest, while two scores were constrained on the Word Attack subtest.

Following examination of the correlations matrices, analyses to determine group differences among child, parent and teacher characteristics based upon the classroom climate in which the child is placed were executed. When using the dichotomous variable of classroom placement to distinguish differences between two group means (i.e. between those in general education and those in special education), independent-means t-tests were utilized. The child characteristics of behavioral engagement, language ability, IQ, parent and teacher reports of social skills and WJ Picture Vocabulary were found to

correlate with classroom placement, for a total of six independent t-tests. Bonferroni's

correction was applied to correct the significance level to account for running multiple,

univariate analyses and a significance level of p = 0.01 was used. On average,

participants in general education evidenced significantly higher language ability (M =

173.92, SD = 31.18) than participants in special education [(M = 154.53, SD = 33.29),

$t(136) = -3.15$, $p = 0.00$] on the CASL and on the WJ Picture Vocabulary subtest [(M =

98.55, SD = 12.62) $t(136) = -2.71$, $p = 0.01$] versus those in special education (M =

92.16, SD = 14.55) on the CASL and (M = 92.15, SD = 14.56) on the WJ Picture

Vocabulary subtest. Additionally, participants in general education were found to have

higher scores in the areas of IQ (M = 96.14, SD = 16.05) versus those in special

education [(M = 81.47, SD = 16.60) $t(136) = -5.05$, $p = 0.00$], parent-reported social

skills (M = 80.31, SD = 13.84) versus those in special education [(M = 74.02, SD =

14.52), $t(136) = -2.50$, $p = 0.01$] and teacher reported social skills (M = 86.36, SD =

14.86) versus those in special education [(M = 79.16, SD = 15.97), $t(136) = -2.55$, $p =$

0.01]. Significant differences between children in general and special education in the

area of behavioral engagement were not evidenced (see Table 12).

Only the parent characteristic of employment was found to be significantly

correlated with classroom placement. However, independent t-tests revealed no

statistically significant differences in the employment levels of parents of children in

general education (see Table 13). Teacher characteristics that were found to significantly

correlate with classroom placement included teacher report of specific training in ASD,

their competency for teaching students with ASD, and the size of the classrooms. A total

of three independent t-tests were executed and after Bonferroni's correction was applied a significance level of $p = 0.02$ was used to determine significant differences. On average, special education teachers reported receiving more ASD specific training (M = 0.39, SD = .49), than general education teachers (M = .15, SD = 0.36), $t(136) = 3.22$, $p = 0.00$. Special education teachers also reported significantly more competency to teach students with ASD (M = 3.19, SD = 0.82), than general education teachers M = 2.74, SD = 0.92), $t(136) = 2.97$, $p = 0.00$. No significant differences were evidenced in regard to classroom size (see Table 14).

When using the categorical variable of classroom placement as the independent, or grouping variable, ANOVA analyses were undertaken to determine group differences among participants in the four categories of special education services. The first group of ANOVA analyses was undertaken with the six child characteristics (behavioral engagement, language ability, IQ, parent and teacher reports of social skills and WJ Picture Vocabulary Scores), which evidenced significant correlations with classroom placement. Because multiple univariate tests were run, Bonferroni's correction was applied and the significance level was set at $p = 0.01$. There was a significant effect of levels of special education services on child language ability as demonstrated on the CASL $F(3,134) = 4.62$, $p = 0.00$, and child IQ $F(3,134) = 8.55$, $p = 0.00$. All other ANOVA analyses were found to be insignificant at the $p = 0.01$ level. Post hoc analyses using Tukey's HSD revealed significant differences in language ability (CASL) between children who spent most of the day in special education and those who spent the entire day in general education (M difference = -15.94) or most of the day in general education

(M difference = -13.58), indicating that children who spent most of the day in special

education had significantly lower language ability as demonstrated by the CASL than

those who spent most or all of the day in general education. In terms of IQ, significant

differences were found between children who spent the entire day in special education

and those who spent either most of the day (M difference = -13.30) or the entire day in

general education (M difference = -15.67). Thus, children who spent the entire day in

special education had significantly lower IQ scores than those who spent either all or

most of the day in general education. (see Table 15).

Due to the fact that only one parent characteristic (parent employment) correlated

significantly with classroom placement, only one ANOVA analysis was run, with p =

0.05 used as a determinant of statistical significance. Parent employment did not differ by

level of classroom placement (see Table 16). ANOVA analyses were also undertaken for

teacher characteristics that were found to significantly correlate with classroom

placement (professional training in autism, competency and classroom size). Because

multiple univariate tests were run, Bonferroni's correction was applied and the

significance level was set at p = 0.02. There was a significant effect of levels of special

education service provided on amount of professional training in autism that teachers

reported receiving $F(3,134) = 8.59$, $p = 0.00$ and by how competent the teacher reported

that she felt teaching students on the autism spectrum $F(3,134) = 4.83$, $p = 0.00$. No

significant effect of the level of special education services was found on the classroom

size of the participating teachers. Tukey's HSD post hoc analyses revealed significant

differences in autism training received by teachers of students who spent the entire day in

special education and those who spent most of the day in special education (M difference = 0.38), most of the day in general education (M difference = 0.36) and the entire day in general education (M difference = 0.50). This indicates that teachers of students who spend the entirety of their day in special education report receiving significantly more ASD related training then do any other category of teachers. In terms of teacher competency, significant differences were found between teachers of students who spent the entire day in special education and those who spent the entire day in general education (M difference = 0.77); as well as those whose students spent the entire day in general education and those who spent all (M difference = -0.56) or most of the day in special education (M difference = -0.56). This indicates that teachers of students who spend the entire day or most of the day in special education reported feeling significantly more prepared to teach students with ASD than did teachers of students who spent all of their time in general education (see Table 17).

Research question two*[Do these child, parent, teacher and classroom placement characteristics relate to literacy and social skills outcomes for young children with ASD at time-point one?]* was addressed by examining the correlation matrix for all variables to determine significant predictors to be included in regression analysis. At time 1 data collection, 76% of the sample had been in the participating teacher's classroom for more than four months (zero-four months n = 30, five months to seven months n = 61, eight months to 12 months n = 23, more than one year n = 26). Only this subsample of the total data set (n = 110) was used in analyses to answer question two, as any correlations between student outcomes and teacher characteristics and practices from students who

had been in classrooms with participating teachers for periods of less time may have been spurious. Four separate hierarchical regression analyses blocking on child characteristics, parent characteristics, teacher characteristics and/or classroom placement were undertaken in order to predict children's scores at time 1 on measures of early reading ability (WJ Letter/Word Identification and Word Attack), as well as parent and teacher reports of social skill ability. Significantly correlated child characteristics were entered into each model first, followed by parent and teacher characteristics, and, finally classroom placement.

The first hierarchical regression, in which the time 1 WJ Letter/Word Identification score was the outcome variable is summarized in Table 18. The overall model was found to predict 22% of the total variance in scores ($R^2 = 0.22$). Step one, in which the child characteristics of IQ, language ability (CASL and WJ Picture Vocabulary) and parent reports of total behavior problems were added to the model, accounted for 20% of the variance ($\Delta R^2 = 0.20$), with the majority of the variance accounted for by language ability as measured by the WJ Picture Vocabulary subtest ($\beta = .25$, p < 0.05) and parent reports of total behavior problems ($\beta = -.20$, p < .05). While the externalizing and internalizing subscales of the CBCL were also correlated with scores on the WJ Letter/Word Identification subscale, only the total behavior problems scores were entered into the model to avoid multicollinearity. In step two the parent characteristic of parent's level of education was entered into the model. This block accounted for 2% of the total variance ($\Delta R^2 = 0.02$) and contributed significantly to the model ($\beta = 0.22$, p < .01). No other characteristics were entered into the model, as they

did not correlate significantly with WJ Letter/Word ID scores. In the final model, stronger language ability as demonstrated on the WJ Picture Vocabulary subtest and lower total parent-reported behavior problems significantly predicted higher scores at time 1 on the WJ Letter/Word Identification subtest (see table 18).

The second hierarchical regression, in which the total score on the WJ Word Attack subtest was the outcome variable, predicted 33% of the overall variance (R^2 = 0.33). Step one, where the child characteristics of language ability and IQ were added to the model was found to predict 26% of the variance (ΔR^2 = 0.26). Children's language ability on both the CASL (β = 0.29, p < .05) and the WJ Picture Vocabulary subtest (β = 0.33, p < .01) contributed significantly to the model. In step two parent's level of education was found to contribute significantly to the model (β = 0.20, p < .05), and accounted for 5% of the total variance (ΔR^2 = 0.05). Finally, in step three the teachers use of inappropriate management strategies as well their competency to teach students with ASD did not contribute significantly to the model, but did account for 2% of the total variance (ΔR^2 = 0.02). In the final model, higher language ability on both the CASL and WJ Picture Vocabulary subtest and higher levels of parental education were found to significantly predict higher word attack skills at time 1 (see Table 19).

The third and fourth hierarchical regression predicted parent and teacher reports of child social skills. The model predicted 38% of the overall variance in parent reported social skills, and contained three blocks (R^2 = 0.38). In block one child characteristics (language ability (CASL), IQ, parent reported total behavior problems, behavioral

engagement and autistic mannerisms) accounted for 35% of the overall variance ($\Delta R^2 = 0.35$). While parent reports of internalizing and externalizing behavior problems were also significantly correlated with parent reports of social skills, only CBCL total scores were entered into the model to avoid mulitcollinearity. Parent reports of total behavior problems ($\beta = -0.46$, $p < .001$) and teacher reports of behavioral engagement in the classroom ($\beta = 0.18$, $p < .05$) contributed significantly to the model. In step two teacher characteristics (ASD training and years teaching) were added to the model; the number of years the teaching had been teaching contributed significantly to the model ($\beta = 0.19$, $p < .05$), and this block contributed to 3% of the overall variance ($\Delta R^2 = 0.03$). While classroom placement was added to the model in step three, it did not contribute significantly to model, nor did it add any additional predictive power. In the final model, lower total levels of behavior problems, higher levels of behavioral engagement and more experienced teachers significantly contributed to higher levels of parent reported social skill ability at time 1 (see Table 20).

Due to the fact that both parent and teacher reports of total behavior problems correlated significantly with parent reports of social skill ability, this regression was completed a second time, substituting total scores on the CTRF for total scores on the CBCL. The overall model predicted 27% of the variance ($\Delta R^2 = 0.27$). In block one child characteristics (language ability (CASL), teacher-reported total behavior problems, behavioral engagement, and autistic mannerisms), which accounted for 22% of the overall variance ($\Delta R^2 = 0.22$). However, only autistic mannerisms contributed significantly to the model ($\beta = -0.36$, $p < .00$). In step two teacher characteristics were

added to the model (ASD training and experience) and contributed to 5% of the overall variance ($\Delta R^2 = 0.05$), with teacher experience contributing significantly to the predictive power of the model ($\beta = 0.21$, p < .05). Finally, classroom placement was added to the model in step three, which did not contribute significantly to the model or explain any further variance. In the final model, lower levels of autistic mannerisms and more experienced teachers significantly predicted higher levels of parent-reported social skills (see table 20).

For teacher reports of child levels of social skill ability, the model was found to predict 59% of the overall variance ($R^2 = 0.59$). In block one child characteristics (IQ, language ability (CASL and WJ Picture Vocabulary subtest) and teacher reports of total behavior problems and behavioral engagement predicted 59% of the overall variance ($\Delta R^2 = 0.59$). However, only teacher-reported total behavior problems ($\beta = -0.34$, p < .001) and behavioral engagement ($\beta = 0.36$, p < .001) contributed significantly to the model. While teacher reports of externalizing and internalizing behavior problems and emotional engagement were also found to correlate significantly with teacher reports of social skills, only the CTRF total scores and AES behavioral engagement scores were included in the model to avoid multicollinearity. Teacher characteristics (years spent teaching) were added to the model in the second block, and predicted 1% of the overall variance ($\Delta R^2 = 0.01$), but did not contribute significantly to the model. Classroom placement was added in block three; however, it did not contribute to the model or add any additional predictive value. In the final model, lower levels of teacher-reported total

behavior problems and higher levels of behavioral engagement significantly predicted higher teacher reported social skill ability at time 1 (see Table 21).

Research question three, *Are there changes in child outcomes (literacy and social skills) across one school year, (i.e. at time-point two)? If so, can the end of the year scores (time 2) be predicted by previous performance, child characteristics, parent characteristics, teacher characteristics and/or classroom placement, gathered at the beginning of the year (time 1)?*, was first addressed by conducting dependent sample t-test analyses to determine if significant differences were evidenced between scores on child outcome variables gathered at time 1 and those gathered at time 2. A total of four t-tests were conducted, and after Bonferonni's correction was applied a significance level of $p = 0.01$ was used. No significant differences were evidenced between time 1 scores on the WJ Letter/Word Identification subtest and parent reports of social skills and scores at time 2, although both means did decrease. Mean scores from time 1 (M = 115.23, SD = 16.17) to time 2 (M= 113.46, SD = 14.37) on the WJ Word Attack subtest also decreased and were found to be significant at the trend level, $t(136) = 1.72$, $p = 0.08$. However, significant, positive change from time 1 (M = 82.28, SD = 15.35) to time 2 (M = 85.36, SD = 15.28) was evidenced for teachers' reports of social skill ability $t(136) = -3.37$, $p = 0.001$ (see Table 22).

The regression model was then used to examine children's literacy and social skill outcomes by measuring the extent to which child characteristics, parent characteristics and teacher characteristics gathered at the beginning of the year explained the variance in academic and social outcomes at the end of the year. The first regression, which predicted

time 2 scores in children's WJ Letter/Word Identification ability predicted 71% of the total variance ($R^2 = 0.71$). Block one consisted of the children's scores in this area measured at time 1 (the beginning of the school year). This block accounted for 68% of the change in scores ($\Delta R^2 = 0.68$) and contributed significantly to the overall model ($\beta = 0.80$, p < .001). In block two the child's language ability (CASL and WJ Picture Vocabulary subtest) was entered into the model; this characteristic was not found to contribute significantly to the model, or the overall predictive value. In block three the parent characteristic of level of education attained was added to the model. While this step did not contribute significantly to the model, it did predict 1% of the overall variance ($\Delta R^2 = 0.01$). Finally, the teacher characteristic of ASD training was added to the model, which did contribute significantly to the overall model ($\beta = -0.13$, p < .05) and predicted 1% of the overall variance ($\Delta R^2 = 0.01$). In the final model, lower scores at time 1 on the WJ Letter/Word ID subtest and higher levels of ASD specific training received by the teacher predicted less decrease in total scores on the WJ Letter/Word ID subtest (see table 23).

The second regression was found to predict 67% of children's performance on the WJ Word Attack subtest at time 2 ($R^2 = 0.67$). Previous performance on this subtest at time 1 was entered into the first block, which accounted for 61% of the overall variance ($\Delta R^2 = 0.61$) and contributed significantly to the model ($\beta = 0.61$, p < .001). The second block consisted of children's language ability (CASL and WJ Picture Vocabulary subtest) and IQ gathered at time 1. None of these characteristics contributed significantly to the model, however they did account for 2% of the total variance ($\Delta R^2 = 0.02$). In the third

step, parent characteristics of level of education received, age and parent-reported level of classroom involvement were added to the model. Again, none of these characteristics contributed significantly to the model, but this step accounted for 2% of the overall variance ($\Delta R^2 = 0.02$). The fourth, and final, block consisted of the teacher characteristics ASD training received and use of inappropriate management strategies. Inappropriate strategy use was found to contribute significantly to the model ($\beta = -0.16$, p < .05). This block contributed to 2% of the overall predictive power ($\Delta R^2 = 0.02$). In the final model, lower scores on the WJ Word Attack subtest at time 1 and less usage of inappropriate classroom management strategies by teachers contributed to less decrease in total scores on the WJ Word Attack subtest at time 2 (see Table 24).

In the third regression, parent reports of social skill ability at time 2 was the outcome variable. This regression predicted 58% of the total score at time 2. The first block, which consisted of parent's pervious reports of children's social skill ability gathered at time 1, contributed significantly to the overall model ($\beta = 0.61$, p < .001) and accounted for 52% of the overall variance ($\Delta R^2 = 0.52$). While parent reports of externalizing and internalizing behavior problems and teacher reports of emotional engagement were also found to correlate significantly with social skills reports, only CBCL total scores and AES behavioral engagement scores were added to the model to avoid multicollinearity. In the second and third blocks child characteristics (language ability (CASL and WJ Picture Vocabulary subtest) IQ, behavioral engagement, autistic mannerisms and total behavior problems) and parent characteristics (income) were added to the model. While none of these characteristics were found to contribute significantly to

the model, they did account for 5% ($\Delta R^2 = 0.05$) and 1% ($\Delta R^2 = 0.01$) of the overall variance, respectively. Finally, in block four the teacher's use of inappropriate management strategies was added to the model. This step did not contribute significantly to the model, nor did it predict any of the overall variance above and beyond blocks one through three. In the final model, only previous scores on the SSIS reported at time 1 contributed significantly towards predicting time 2 scores. Children with lower levels of parent-reported social skill ability at time 1 had less decline in scores at time 2 (see table 25).

The final set of regressions predicted 79% ($R^2 = 0.79$) of teacher reports of social skill ability at time 2. In step one of this regression teacher reports of student's social skills gathered at time 1 were entered. These previous reports contributed significantly to the model ($\beta = 0.54$, p < .001) and predicted 62% of the overall variance ($\Delta R^2 = 0.62$). Block 2 consisted of child characteristics (language ability (CASL and WJ Picture Vocabulary), IQ, behavioral engagement and teacher reports of total problem behaviors) and predicted 12% ($\Delta R^2 = 0.12$) of the overall variance, with IQ contributing significantly to the model ($\beta = 0.24$, p < .05), as well as child's language ability as measured by the WJ Picture Vocabulary subtest at time 1 ($\beta = -0.16$, p < .05). While teacher reports of externalizing and internalizing behavior reports were also found to correlate significantly with social skills reports, only CTRF total scores were included in the model to avoid issues of multicollinearity. In step three, class size and the teacher's use of proactive strategies was added to the model and accounted for 4% ($\Delta R^2 = 0.04$) of the total variance; use of proactive strategies contributed significantly to the model ($\beta =$

0.23, p < .001). In the final step classroom placement was added to the model, which did contribute significantly to the overall predictive power (β = -0.15, p < .05). In the final model, higher levels of teacher-reported social skill ability at time 1, higher IQ scores at the beginning of the year, more use of proactive teaching strategies and placement in general education contributed significantly to increased scores in social skill ability at time 2 (see Table 26).

Due to the fact that both parent and teacher reports of total behavior problems gathered at time 1 were found to correlate significantly with parent reports of social skills gathered at time 2, this regression was repeated, substituting parent reports of total behavior problems for teacher reports. This model was found to predict 79% of scores at time 2 (R^2 = 0.79). Block one (previously collected reports at time 1) accounted for 61% of the variance (ΔR^2 = 0.61) and contributed significantly to the overall model (β = 0.53, p < .001). Block two consisted of child characteristics (language ability (CASL and WJ Picture Vocabulary), IQ, behavioral engagement and parent reports of internalizing behavior problems) and contributed to 12% of the overall variance in the outcome. However, IQ was the only characteristic which contributed significantly to the model (β = 0.31, p < .05). Block three consisted of classroom size and the teacher's use of proactive strategies, of which proactive strategy use contributed significantly to the model (β = 0.22, p < .05). This step accounted for 5% of the overall variance (ΔR^2 = 0.05). In the final step classroom placement was added to the model. While this addition contributed to 2% of the overall variance (ΔR^2 = 0.02), it did not contribute significantly to the overall model's predictive power. In the final model, higher teacher-reported social

skill ability at time 1, higher IQ scores at time 1, as well as greater use of proactive strategies in the classroom significantly contributed to higher scores of teacher-reported social skill ability at time 2 (see Table 26).

Discussion

The current study focused on the relationships among child, parent, and teacher characteristics, as well as their correlation with classroom placement and social and academic outcomes for young children with HFASD. With regard to the effects of child, parent, and teacher characteristics on classroom placement, two empirical studies have investigated differences in children with ASD placed in special education and those in general education, with very different conclusions. In the aforementioned 2010 study conducted by Kurth and Mastergeorge, findings revealed no significant differences in the areas of cognitive and adaptive functioning existed between adolescents with ASD placed in general education and those placed in self-contained, special day classes. However, in the current study, which examined differences among very young children with HFASD, significant differences in children's language and social skill ability, as well as IQ gathered at the beginning of the school year were evidenced, with children with higher levels of the aforementioned skills placed in general education classrooms. This finding mirrored White, Scahill, Klin, Koenig and Volkmar's (2007) findings that lower cognitive and communication skills were associated with placement in special education for adolescents with high functioning ASD. This may be due to the fact, that, when compared to Kurth and Mastergeorge's (2010) sample, which included students with varying levels of functioning along the autism spectrum, White et al.'s sample more

closely mirrored the functioning level of students included in the current study in terms of language ability and full-scale IQ. Findings from the 2013 study by Howell, Lauderdale-Littin and Blacher, which investigated differences between children with ASD placed in public and non-public school settings, also supports the argument that placement may be determined by child characteristics. Findings from this study indicated that children with higher levels of behavior problems and lower level of social skills were more likely to be placed in non-public, more restrictive, settings. Therefore, the current study may indicate that classroom placement decisions for children with HFASD are based upon their unique characteristics very early on in their academic careers, and that these placement decisions may remain stable as these students enter adolescence.

While differences in the characteristics of parents who have young children with high functioning ASD have not been thoroughly explored in the literature, the current findings indicate that parents who have children with ASD in special and general education classrooms are more alike than different, at least in terms of those characteristics measured. However, special education teachers reported receiving significantly more training with which to teach children with ASD and felt more competent to do so than did general education teachers. The current findings indicate that the participating schools placed young children with high functioning ASD in special and general education settings based upon unique child characteristics and needs, but that general education teachers, overall, received less training relevant to teaching children with ASD and felt less prepared to do so. When making placement decisions for young children with HFASD, school personnel may wish to keep in mind not only child

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characteristics, but the fact that special education teachers may possess higher levels of disability specific training than do general education teachers. A policy of collaboration between the special education teacher and the general education teacher may help to alleviate general education teacher's feelings of apprehension towards instructing a child with ASD in their classroom. Although parent characteristics were not found to differ significantly based upon child placement, a policy of parent-teacher-collaboration may be warranted as well, particularly for children with high functioning ASD placed in general education classes. Early intervention services for children with ASD often include a parent training component. Therefore, collaboration between the general education teacher and the parent may also serve to supplement the general education teacher's knowledge of ASD specific issues and strategies related classroom instruction (Schreibman, Dawson, Stahmer et al., 2015).

Current literature in the areas of literacy and social skill development of children with ASD suggests that these children make some positive gains over time in both areas; however, this growth has been noted to be particularly modest in children with HFASD (Baghdadli et al., 2012; Constantino et al., 2009; Wei et al, 2011). While some modest, positive growth in the literacy areas measured (Letter/Word Identification and Word Attack) was hypothesized in the current study, the opposite proved true. Mean scores in both areas declined, with word attack scores approaching a statistically significant decline. This may indicate that while very young children with HFASD begin school with average ability in this area, they are unable to acquire new skills at an expected rate throughout the year in order to keep up with their typically developing peers. While

typically developing children would be expected to maintain their standard scores on these measures over time, the current study indicates that for children with ASD, the gap between their performance and that of the expected norms for the aforementioned measures begins to widen from the beginning to the end of the school year. In terms of social skills growth, teachers reported a significant increase in social skill ability from the beginning to the end of the school year, while parents reported a non-significant decline in scores.

Literature concerning the influence of parent and teacher behaviors as well as classroom placement has indicated that placement in general education classes, as well as parent and teacher involvement, has a positive influence on the development of literacy skills over time in children with and without disabilities (Dykstra et al., 2012; Kurth & Mastergeorge, 2010; Lawton & Kasari, 2012; Missal et al., 2006; Senechal & LeFevre, 2002; Siller & Sigman, 2002). However, very little literature has investigated the effects of these activities with young children with HFASD. At the beginning of the school year, success on measures of early literature skills in the current study was largely predicted by child characteristics such as IQ, language ability and behavioral problems. These findings highlight the importance of early intervention services targeted at remediating the deficits in language ability and decreasing the behavioral challenges exhibited by young children with ASD, in preparation for the transition to early school environments and enhancement of academic skills. While it was hypothesized that certain parent and teacher characteristics, such as parental involvement and use of classroom management strategies, would contribute significantly to the model, only the level of education

attained by the parent contributed significant predictive power. This may indicate that parents who have attained higher levels of education are more likely to participate in reading activities with their children that involve the direct teaching of literacy skills, such as phonemic awareness.

In terms of social skill ability at the beginning of the school year, child characteristics again proved to drive the predictive model. In particular, children's levels of behavioral challenges, coupled with their behavioral engagement in the classroom were the most significant characteristics attributing to social success. These findings again highlight the importance of early identification and intervention for young children with ASD, ideally before they enter formal school settings, as child characteristics, such as language ability, behavior problems and IQ, proved to be most predictive of early academic and social success. However, when these skills were examined at the end of the school year, previous performance arose as the largest predictor of both academic and social skill ability, indicating that children who performed better on these measures at the beginning of the year were not able to learn new skills at a fast enough rate in order to keep up with age-based, standardized norms. This may indicate that children with HFASD who do evidence high scores in these areas at the onset of formal schooling have a particularly difficult time acquiring a level of new skills required to continue to fall within the average to above average range in comparison to their typically developing peers when specific interventions are not in place.

What is notable, however, is the amount of variance in scores explained by teacher characteristics by the end of the year. While the predictive models were largely

driven by child characteristics at the beginning of the school, teacher characteristics, such as the amount of ASD related training the teacher received and their use of appropriate behavior management strategies, proved to be much more significant predictors of academic and social skill development by the end of the year. Given these findings, school districts may wish to bolster professional development for teachers to include training relevant to the instruction of the children with ASD, implementation of evidenced-based practices, and effective behavioral management techniques (Doehring & Winterling, 2011). Significant differences were found between general and special education teachers in the amount of ASD specific training received in the current study, and literature suggests that professional development activities related to evidenced-based instructional practices for students with ASD may be lacking, even in special education settings (Henricks, 2011; Simpson, 2005). Therefore, schools may wish to consider providing ASD and behavioral management related training to general education and special education teachers, alike. Additionally, while many parents of young children with high functioning ASD may express a preference for having their child placed in general education settings due to beliefs that a less restrictive environment may provide more opportunities for social and academic growth, the current study did not find that classroom placement was predictive of academic outcomes or parent reports of social skills at either the beginning or end of the school year (Kasari et al., 1999; Leyser & Kirk, 2004). This finding, coupled with the fact that special education teachers were found to have higher levels of training and competency in which to teach children with ASD, may indicate that children with high functioning ASD placed in special education may benefit

from the teacher's more advanced, disability specific knowledge and may perform academically and socially quite similar to their peers with high functioning ASD placed in general education settings.

Limitations and Future Directions

As always, there were study limitations. Very little significant change was found in either academic or social outcomes from time 1 to time 2. This may be due to the fact that not enough time elapsed from the beginning to the end of the year to witness a significant change in skills. While little longitudinal research currently exists which tracks the development of literacy skills in young children with ASD over time, longitudinal studies of social/adaptive behaviors in individuals with ASD indicates that changes in skills are relatively modest, and only evident over significant periods of time (Baghdadli et al., 2012; Constantino et al., 2009; Wei et al., 2011) Therefore, researchers of the patterns of development of literacy and social skills in very young children with HFASD may wish to examine these skills through the upper elementary grades and beyond in order to determine a more definitive pattern of skills acquisition.

Additionally, due to the age range of the participating children, measures of reading comprehension were not investigated in the current study. While sparse, literature regarding literacy development in children with ASD suggests that reading comprehension may be a particular area of weakness for this population (Nation, 1999; Nation et al., 2006). Following young children with HFASD diagnoses over longer periods of time would allow researchers to examine the development of reading

comprehension over time in this population. Therefore, future studies may wish to include measures of reading comprehension as children with HFASD enter the later elementary and middle school grades.

Finally, some limitations exist due to the way in which certain variables were measured. Teachers were asked to report how many students were in their class, but special education teachers, in particular, may carry a larger case load of students that are not in their classroom for the full day. Teachers participating in the larger study were not asked to differentiate between the students who are on their case load and those that spend the entire school day in their classroom. Therefore, it was not possible to determine if the teacher reported their actual class size or their case load size. In the future, researchers may wish to examine official class rosters for additional information regarding the number of students in each class.

Conclusion

In conclusion, the current study highlighted several positive findings regarding classroom placement and academic and social outcomes for young children with high functioning ASD. The first was that classroom placement appeared to be determined by children's unique needs and characteristics, as those participants with lower levels of IQ, language ability and social skills were placed in special education at the beginning of the year. Second, special education teachers seemed to be highly trained to teach children with ASD, as evidenced by the fact that these teachers reported receiving significantly more ASD related training and felt more competent to teach this population than general

education teachers. Third, by the end of the school year malleable teacher characteristics, such as the amount of ASD related training received and the management strategies used, arose as significant predictors of children's literacy and social skill achievement. Finally, teachers reported that students significantly improved in social skill ability from the beginning to the end of the year. This improvement appeared to be the most evident for students with higher IQ scores at the beginning of the year who were placed in general education classes with teachers who used more proactive strategies

However, the study also highlighted some areas of concern in regards to social and academic success for young children with high-functioning ASD. The first is that literacy and social skill ability at the beginning of the year was largely predicted by child characteristics such as IQ, language ability, and behavior problems. Although efficacious early interventions to remediate these deficits do exist, providing early identification, accessing services and remedying core deficits inherent in the ASD phenotype are challenging (cite if used). Additionally, while not statistically significant, mean scores in literacy areas did decline from the beginning to the end of the school year. This decline seemed to be the most evident for students with higher scores at the beginning of the year who were placed in classes with teachers who received less ASD related training and used less appropriate behavior management strategies.

These results highlight areas of importance for teachers and school district personnel who serve young children with ASD. First, the importance of early intervention services, designed to ameliorate the social-communication deficits and reduce behavioral challenges, is highlighted by the fact that literacy and social skill outcomes at the

beginning of the year were largely predicted by skills and characteristics that children brought to school. Intervention services that have been proven efficacious at remediating the deficits in the ASD phenotype should be available to this high-functioning population as early as possible. However, as the participating children who did enter school with higher levels of academic and social skills evidenced more decline in standard scores, these interventions should be continued throughout formal schooling, in order to continue to keep these children performing at high levels as they age.

However, results indicate that training and development of teachers with regard to least restrictive environment policies also warrants attention. In particular, it may prove beneficial to offer ASD specific training to both general and special education teachers in teacher training programs as well as on-going professional development. Results indicated that children with HFASD placed in classrooms with teachers who reported receiving this training evidenced better outcomes by the end of the school year, regardless of their innate or disability-related characteristics. Additionally, school district personnel may wish to encourage a policy of collaboration between general and special education teachers, as well as parents, especially in regards to children with HFASD placed primarily in general education. This may help to bolster the general education teacher's access to ASD-related information and their feelings of competency to instruct children with ASD, as well as to allow their students to benefit from the special education teacher and parent.

Table 1

Child Demographics

Characteristics	Percent of the Sample	Mean
Classification		
Autism	85%	
Autism Spectrum	15%	
Age		5.0 years
IQ		84.7
Classroom Placement		
1. Entire Day in Sped	24%	
2. Most of the day in Sped	25%	
3. Most of the day in Gen. Ed.	24%	
4. Entire day in Gen. Ed.	27%	

Parent Demographics

Characteristics	Percent of the Sample	Mean
Ethnicity		
Caucasian	71%	
Non-Caucasian	29%	
Income		
Under $50,000	29%	
$50,000 and Above	71%	
Age		38 years
Employment Status		
Outside of the Home	51%	
Not Outside of the Home	49%	
Education		
Below Bachelor's Degree	34%	
BA or Higher	66%	

Teacher Demographics

Characteristics	Percent of the Sample	Mean
Teaching Experience		
<5 yrs.	5%	
>5 yrs.	95%	
ASD Training		
Yes	28%	
No	72%	
Competency		
Very/Pretty Prepared	65%	
Somewhat/Not Prepared	35%	
Class Size		16

Table 2

Descriptive Statistics of Child Variables Time 1

	n	Mean	Standard Error	Standard Deviation	Range
CASL sum of standard scores	138	165.18	2.88	33.00	101-259
WJ letter/word ID	138	111.18	1.51	18.14	49-159
WJ picture vocabulary	138	94.70	1.32	15.82	11-137
WJ word attack	138	114.47	1.75	19.05	0-159
WPPSI FSIQ	138	88.73	1.48	17.65	55-139

Table 3

Descriptive Statistics for Parent Reported Variables Time 1

	n	Mean	Standard Error	Standard Deviation	Variance
CBCL Externalizing	138	60.63	.91	10.83	32-92
CBCL Internalizing	138	63.82	.85	10.09	34-93
CBCL Total	138	65.01	.89	10.57	40-91
SRS Autistic Mannerisms	138	79.97	.96	11.45	46-90
SSIS Social Skills Total	138	77.73	1.26	14.89	42-120
PTIS Total	138	48.60	.94	11.27	25-91

Table 4

Descriptive Statistics for Teacher Reported Variables Time 1

	n	Mean	Standard Error	Standard Deviation	Variance
AES Behavioral Engagement	138	10.40	.24	2.81	4-16
AES Emotional Engagement	138	12.26	.21	2.53	6-16
CTRF Externalizing	138	58.24	.77	9.29	36-79
CTRF Internalizing	138	58.42	.85	10.22	34-89
SSIS Social Skills Total	138	82.90	1.30	15.42	45-121
PTIS Total	138	38.88	.57	6.78	19-50
Praise and Incentives Total Score	138	24.23	.40	4.74	10-30
Proactive Total Score	138	27.17	.35	4.08	7-35
Limit Setting Total Score	138	18.37	.29	3.43	7-25
Inappropriate Strategies Total Score	138	16.08	.35	3.94	9-27

Table 5

Descriptive Statistics for Child Outcome Variables T2

	n	Mean	Standard Error	Standard Deviation	Range
SSIS Social Skills Parent	138	77.3	1.32	15.35	40-118
SSIS Social Skills Teacher	138	85.71	1.41	14.95	46-123
WJ Letter/Word ID	138	110.92	1.32	14.95	75-148
WJ Word Attack	138	112.55	1.26	19.05	76-150

Table 6

Correlations amongst T1 Child Outcomes and Child Characteristics

	WJ Letter/Word ID	WJ Word Attack	Social Skills Parent	Social Skills Teacher	Classroom Placement
CASL Total Score	.26**	.41**	.26**	.43**	.28*
CBCL Total	-.19*	-.14	-.41**	.07	.04
CBCL Internalizing	-.18*	-.04	-.26**	.16	.11
CBCL Externalizing	-.17*	-.11	-.36**	.05	.04
CTRF Total	-.08	-.07	-.21*	-.60**	-.05
CTRF Internalizing	-.07	.00	-.16	-.51**	-.05
CTRF Externalizing	-.11	-.08	-.15	-.58**	-.06
IQ	.20*	.32**	.23**	.47**	.38**
AES Behavior	.01	.15	.22*	.64**	.19*
AES emotion	.03	.16	.16	.50**	.06
SRS Autistic Mannerisms	-.08	-.13	-.35*	-.01	-.12
WJ Picture Vocabulary	.38**	.45**	.14	.27**	.25**

* *p* < .05. ** *p* < .01. *** *p* < .001

Table 7

Correlations amongst T1 Child Outcomes and Parent Characteristics

	WJ Letter/Word ID	WJ Word Attack	Social Skills Parent	Social Skills Teacher	Classroom Placement
Parent Age	-.02	.16	-.13	.00	-.13
Parent Education	.31**	.32**	.02	-.10	.09
Parent Employment	.03	.09	-.11	.08	.20*
Parent Ethnicity	.02	-.11	.01	.00	-.04
Parent Income	.08	.02	.12	-.04	.08
PTIS Total Parent	-.04	-.11	-.08	-.09	-.09
PTIS Total Teacher	.13	.13	.09	.16	.12

* p < .05. ** p < .01. *** p < .001

Table 8

Correlations amongst T1 Child Outcomes and Teacher Characteristics

	WJ Letter/Word ID	WJ Word Attack	Social Skills Parent	Social Skills Teacher	Classroom Placement
Autism Training	-.13	-.28**	-.20*	-.13	-.37**
Competency	.02	.07	.05	.02	-.31**
Years Teaching	.10	-.02	.20*	.24**	.13
Class Size	.00	.01	.02	-.18	.27**
Praise and Incentives	-.02	-.08	.16	-.05	.01
Proactive Strategies	.00	.07	.09	.11	-.00
Limit Setting	-.05	-.08	.06	.03	-.08
Inappropriate Strategies	-.03	-.20*	-.08	-.10	-.03

*$p < .05$. ** $p < .01$. *** $p < .001$

Table 9

Correlations amongst T2 Child Outcomes and Child Characteristics

	WJ Letter/Word ID	WJ Word Attack	Social Skills Parent	Social Skills Teacher
CASL total score	.27**	.52**	.32**	.57**
CBCL Total	-.15	-.02	-.39**	-.11
CBCL internalizing	-.13	-.04	-.27**	-.24*
CBCL externalizing	-.11	-.04	-.34**	-.11
CTRF total	-.04	-.08	-.15	-.53**
CTRF internalizing	-.05	-.05	-.15	-.46**
CTRF externalizing	-.05	-.05	-.15	-.49**
IQ	.15	.52**	.30**	.57**
AES behavior	.04	.13	.27**	.62**
AES emotion	.06	.04	.15	.50**
SRS Autistic Mannerisms	-.03	-.14	-.38**	-.06
WJ Picture Vocabulary	.41**	.64**	.25*	.38**

$* p < .05. ** p < .01. *** p < .001$

Table 10

Correlations amongst T2 Child Outcomes and Parent Characteristics

	WJ Letter/Word ID	WJ Word Attack	Social Skills Parent	Social Skills Teacher
Parent Age	.05	.18*	-.09	.17
Parent Education	.30**	.28**	.09	-.09
Parent Employment	.03	.11	-.12	.01
Parent Ethnicity	-.09	-.12	-.04	-.04
Parent Income	.07	.05	.19*	.02
PTIS total Parent	-.10	-.20*	.08	-.09
PTIS total Teacher	.01	-.00	.06	.18

* $p < .05$. ** $p < .01$. *** $p < .001$

Table 11

Correlations amongst T2 Child Outcomes and Teacher Characteristics

	WJ Letter/Word ID	WJ Word Attack	Social Skills Parent	Social Skills Teacher
Autism Training	-.13	-.28**	-.20*	-.13
Competency	.02	.07	.05	.02
Years Teaching	.10	-.02	.20*	.24**
Class Size	.00	.01	.02	-.18
Praise and Incentives	-.02	-.08	.16	-.05
Proactive Strategies	.00	.07	.09	.11
Limit Setting	-.05	-.08	.06	.03
Inappropriate Strategies	-.03	-.20*	-.08	-.10

* p < .05. ** p < .01. *** p < .001

Table 12

Independent T-Test Classroom Placement and Child Characteristics

	Mean Special Ed.	Mean Gen. Ed.	t	df	Significance
AES - Behavior	9.95	10.99	-2.03	136	.05
CASL – total score	154.53	173.92	-3.15**	136	.00
IQ	81.47	96.14	-5.05***	136	.00
Social Skills - Parent	74.02	80.31	-.250**	136	.01
Social Skill Teacher	79.16	86.36	-2.55**	136	.01
WJ Picture Vocabulary	92.16	98.55	-2.82**	136	.00

** p < .01. *** p < .001

Table 13

Independent T-Tests Classroom Placement and Parent Characteristics

	Mean Special Ed.	Mean Gen Ed.	t	df	Significance
Parent Employment	1.02	1.29	-1.90	136	.06

* $p < .05$. ** $p < .01$. *** $p < .001$

Table 14

Independent T-Tests Classroom Placement and Teacher Characteristics

	Mean Special Ed.	Mean Gen Ed.	t	df	Significance
ASD Training	0.39	0.36	3.22**	136	.00
Competency	3.19	2.74	2.97**	136	.00
Class Size	16	17	-1.21	136	.23

* p < .02. ** p < .01. *** p < .001

Table 15

ANOVA Classroom Placement and Child Characteristics

		Sum of Squares	df	Mean Square	F	Sig.
IQ (WPPSI)	Between Groups	7249.45	3	2416.48	8.96***	.00
	Within Groups	34796.64	134	269.74		
	Total	42046.09	137			
Language (CASL)	Between Groups	14943.04	3	4981.01	4.88**	.00
	Within Groups	119388.56	134	1020.42		
	Total	134331.60	137			
Language (WJ Picture Vocabulary)	Between Groups	1624.54	3	541.51	2.92	.04
	Within Groups	24122.59	134	185.56		
	Total	25747.13	137			
SSIS Social Skills (Parent)	Between Groups	1343.76	3	447.92	2.20	.09
	Within Groups	25412.91	134	203.30		
	Total	26756.67	137			
SSIS Social Skills (Teacher)	Between Groups	1664.83	3	554.94	2.30	.08
	Within Groups	29867.54	134	240.87		
	Total	31532.37	137			
AES Behavior	Between Groups	42.99	3	14.33	1.84	.14
	Within Groups	981.48	134	7.79		
	Total	1024.47	137			

Table 16

ANOVA Classroom Placement and Parent Employment

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.17	3	1.39	1.76	.16
Within Groups	100.80	134	.79		
Total	104.97	137			

* p < .05. ** p < .01. *** p < .001

Table 17

ANOVA Classroom Placement and Teacher Characteristics

		Sum of Squares	df	Mean Square	F	Sig.
Autism Training	Between Groups	4.30	3	1.43	8.59***	.00
	Within Groups	20.67	134	.17		
	Total	24.97	137			
Competency	Between Groups	10.76	3	3.59	4.83**	.00
	Within Groups	94.97	134	.74		
	Total	105.73	137			

* p < .05. ** p < .01. *** p < .001

Table 18

Regression WJ Letter/Word ID T1

	Predictors	ΔR^2	β
Block 1: Child Characteristics	IQ	.20	-.12
	Language (CASL)		.16
	Language (WJ-PV)		.32***
	Total Behavior Problems – Parent		-.18*
Block 2: Parent Characteristics	Parent Education	.02	.15
Total R2		.22	

* *p* < .05. ** *p* < .01. *** *p* < .001

Table 19

Regression WJ Word Attack T1

	Predictors	ΔR^2	β
Block 1: Child Characteristics	Language (CASL)	.26	.29*
	Language (WJ-PV)		.33**
	IQ		-.10
Block 2: Parent Characteristics	Parent Education	.05	.20*
Block 3: Teacher Characteristics	Inappropriate Strategies	.02	-.03
	Competency		.16
Total R2		.33	

* $p < .05$. ** $p < .01$. *** $p < .001$

Table 20

Regression Social Skills Parent Report T1

	Predictors	$_\Delta R^2$	β
Block 1: Child Characteristics	IQ	.35	.06
	Language (CASL)		.13
	CBCL Total Problems		-.46***
	AES - behavior		.18*
	SRS Autistic Mannerisms		-.07
Block 2: Teacher Characteristics	ASD Training	.03	-.12
	Years Teaching		.19*
Block 3: Placement	Classroom Placement	.00	-.01
Total R2		.38	

* p < .05. ** p < .01. *** p < .001

	Predictors	$_\Delta R^2$	β
Block 1: Child Characteristics	IQ	.22	-.06
	Language (CASL)		.13
	CTRF Total Problems		-.07
	AES - behavior		.15
	SRS Autistic Mannerisms		-.36***
Block 2: Teacher Characteristics	ASD Training	.05	-.15
	Years Teaching		.21*
Block 3: Placement	Classroom Placement	.00	-.03
Total R2		.27	

* p < .05. ** p < .01. *** p < .001

Table 21

Regression Social Skills Teacher Report T1

	Predictors	ΔR^2	**β**
Block 1: Child Characteristics	IQ	.59	.22*
	Language (CASL)		.05
	CTRF Total Problems		-.34***
	AES - behavior		.36***
	WJ – Picture Vocab.		.03
Block 2: Teacher Characteristics	Years Teaching	.01	.09
Block 3: Placement	Classroom Placement	.00	-.02
Total R2		.60	

* p < .05. ** p < .01. *** p < .001

Table 22

Dependent T-Test Child Outcomes at T1 and T2

	Mean	t	df	Significance
Pair 1		.44	136	.66
Social Skills Parent Report T1	77.73			
Social Skills Parent Report T2	77.33			
Pair 2		-3.37**	136	.00
Social Skills Teacher Report T1	82.90			
Social Skills Teacher Report T2	85.71			
Pair 3		.01	136	.99
WJ Letter/Word ID T1	111.18			
WJ Letter/Word ID T2	110.92			
Pair 4		1.73	136	.08
WJ Word Attack T1	114.47			
WJ Word Attack T2	112.55			

* p < .05. ** p < .01. *** p < .001

Table 23

Regression WJ Letter/Word ID T2

	Predictors	ΔR^2	β
Block 1: Previous Performance	WJ1 – LW/ID	.68	.80***
Block 2: Child Characteristics	Language (CASL)	.00	.04
	Language (WJ-PV)		-.05
Block 3: Parent Characteristics	Education	.01	.07
Block 4: Teacher Characteristics	ASD Training	.01	-.13*
Total R2		.71	

* $p < .05$. ** $p < .01$. *** $p < .001$

Table 24

Regression WJ Word Attack T2

	Predictors	ΔR^2	β
Block 1: Previous Performance	WJ1 – WA	.61	.67***
Block 2: Child Characteristics	Language (CASL)	.02	.18
	Language (WJ-PV)		.04
	IQ		-.09
Block 3: Parent Characteristics	Education	.02	.04
	Age		.12
	PTIS – Parent Report		-.13
Block 4: Teacher Characteristics	ASD Training	.02	.02
	Inappropriate Strategies		-.16*
Total R2		.67	

* $p < .05$. ** $p < .01$. *** $p < .001$

Table 25

Regression Social Skills T2 Parent Report

	Predictors	ΔR^2	β
Block 1: Previous Performance	SSIS T1 -Parent	.52	.62***
Block 2: Child Characteristics	Language (CASL)	.05	.13
	Language (WJ-PV)		.10
	IQ		-.05
	AES – Behavioral Engagement		.04
	SRS – Autistic Mannerisms		-.13
	CBCL Total Score		.03
Block 3: Parent Characteristics	Income	.01	.07
Block 4: Teacher Characteristics	Inappropriate Strategies	.00	-.08
Total R2		.58	

* p < .05. ** p < .01. *** p < .001

Table 26

Regression Social Skills T2 Teacher Report

	Predictors	ΔR^2	β
Block 1: Previous Performance	SSIS T1 - Teacher	.61	.53***
Block 2: Child Characteristics	Language (CASL)	.12	.11
	Language (WJ-PV)		
	IQ		.31*
	AES Behavioral Engagement		.12
	CBCL Internalizing		.09
Block 3: Teacher Characteristics	Class Size	.04	.11
	Proactive Strategies		.22**
Block 4: Placement	Classroom Placement	.02	-.15
Total R2		.79	

* $p < .05$. ** $p < .01$. *** $p < .001$

	Predictors	ΔR^2	β
Block 1: Previous Performance	SSIS T1 - Teacher	.62	.54***
Block 2: Child Characteristics	Language (CASL)	.12	.09
	Language (WJ-PV)		-.16*
	IQ		.34*
	AES Behavioral Engagement		.14
	CTRF total		.02
Block 3: Teacher Characteristics	Class Size	.04	.11
	Proactive Strategies		.23***
Block 4: Placement	Classroom Placement	.01	-.15*
Total R2		.79	

* $p < .05$. ** $p < .01$. *** $p < .001$

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