

ECOLOGICAL FEATURES OF PRESCHOOL ENVIRONMENTS AND THE SOCIAL  
ENGAGEMENT OF CHILDREN WITH AUTISM SPECTRUM DISORDER

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## ABSTRACT

STEPHANIE S. RESZKA: Ecological Features of Preschool Environments and the Social Engagement of Children with Autism Spectrum Disorder  
(Under the direction of Samuel L. Odom)

Children with ASD have difficulties socially engaging with adults and peers. The prototypical approach to remediate these difficulties is to directly teach the child appropriate social skills. However, researchers have consistently demonstrated that children do not maintain or generalize these skills when taught in non-naturalistic environments (Bellini et al., 2007). One way to support the social engagement of children with ASD is to identify features of their natural environment that increase the likelihood of social interaction (Boyd, Conroy, Asmus, McKenney, & Mancil, 2008). This study examined the (1) social engagement of preschoolers with ASD in classrooms with peers and adults, (2) ecological features of preschool classrooms that promoted social engagement, and (3) relationships between social engagement and ecological features. The *CASPER-III* (Tsao, et al, 2001), an ecobehavioral observational system, was used to code data on the social engagement and classroom ecology of 68 preschoolers with ASD. Children in the study were between 3-5 years of age, enrolled in a public school-based preschool program, and had a clinical or educational diagnosis of developmental delay or ASD. Ecological variables examined included: activity area, child behavior, group arrangement, adult behavior, and initiator of activity. The proportion of social engagement with peers and with adults during each category of ecological variables was calculated, and was compared to the base rate of social

engagement with peers and with adults across all ecological features. Overall, children with ASD were more likely to be socially engaged with peers in the Books and Food/Snack classroom areas, when participating in Book or Large Motor behaviors, in Small Groups or Large Groups with an Adult, and during child-initiated activities. Children were more likely to be socially engaged with adults when in the Large Motor and Books areas, when engaged in Book, Preacademic, or Large Motor behaviors, when 1:1 with an Adult, in a Small Group with an Adult or Large Group with an Adult, and when adults showed Approval. Implications for practice and future research are highlighted.



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## **CHAPTER 1: INTRODUCTION AND LITERATURE REVIEW**

Autism spectrum disorder (ASD) is an umbrella classification of three related neurodevelopmental disorders including: autistic disorder, Asperger syndrome, and Pervasive Development Disorder-Not otherwise specified. Children diagnosed with ASD often demonstrate: a) delays in social development, such as limited initiations and responses to social invitations by peers (Strain, Schwartz, & Bovey, 2008), b) limitations in communication skills, including verbal and nonverbal skills, and c) presence of restricted interests and/or repetitive behaviors and a need for sameness (Volkmar, Lord, Bailey, Schultz, & Klin, 2004). Perhaps the most defining characteristic deficit of children with ASD lies in the area of social development.

Current treatment approaches to address the social development needs of these children often take the form of early intervention, which sometimes takes place in inclusive early childhood program contexts. While many of these approaches involve interventions designed to support the development of specific social skills, there may be features of the early childhood classroom environment that can provide opportunities for further social development. Furthermore, one way to promote the social development of children with ASD may be through identifying features of the environment that may be influential in social development (Boyd, et al., 2008). This study will explore the relationship between features of preschool classrooms designed for children with ASD and the social engagement of children with ASD.

## **Description of Autism Spectrum Disorder**

While individuals within the spectrum of ASD display a wide range of abilities, generally, ASD is characterized by delays in social development, communication, and the presence of repetitive behaviors (Volkmar, et al., 2004). Once thought to be a low-prevalence disorder, recent epidemiological studies estimate the prevalence of ASD to be 1 in 110 children in the U.S. (Centers for Disease Control and Prevention, 2009). An increased prevalence among young children has heightened the need for early childhood programs to meet the developmental needs of young children with ASD and their families.

The original articles documenting and describing autism identify a lack of interest in social interactions as a defining feature of autism (Kanner, 1943). Since that time there have been numerous studies exploring the social development of children with ASD. Research suggests that children with ASD tend to have deficits in social competence including the areas of: a) communicative abilities, b) responsiveness to others' emotions and needs, and c) peer interactions (Sigman & Ruskin, 1999). More specifically, children with ASD often display difficulties in social behaviors such as eye gaze and eye contact (e.g., Volkmar & Mayes, 1990), joint attention (e.g., Osterling & Dawson, 1994), orientation to social speech (e.g., Osterling & Dawson, 1994), imitation (e.g., Dawson & Adams, 1984; Stone, Lemanek, Fishel, Fernandez, & Altemeier, 1990). Children with ASD also display delays in the development of play skills (Sigman & Ruskin, 1999; Stone, et al., 1990). Specifically, children with ASD often show delays in the development of functional play skills, and tend to use fewer toys, spend less time playing with toys, and more time playing inappropriately with toys (e.g., self-stimulatory and repetitive behaviors, aggressive use of toys) when compared to their typically developing peers (Rettig, 1994; Stone, et al., 1990). Furthermore,

children with ASD may not participate as frequently as their peers in pretend play due to delays in the development of imaginative and pretend play skills, and rather spend more time displaying lower levels of play (e.g., more manipulating of materials rather than using materials in imaginative, creative play) (Chawarska & Volkmar, 2005; Loveland & Kotoski, 2005). These difficulties begin to appear by 36 months of age and often earlier (Carter, Ornstein Davis, Klin, & Volkmar, 2005; Sigman & Ruskin, 1999). Furthermore, children with ASD tend to miss more social cues, display a more limited range of social expression (e.g., fewer gestures and facial expressions) (National Research Council, 2001), and are less likely to initiate or respond to social initiations by others when compared to their typically developing peers (Mundy, Sigman, Ungerer, & Sherman, 1986). As a result of these social skill deficits, children with ASD may be at an increased risk for social isolation and rejection by their peers (Odom et al., 2006).

### **Importance of Social Development for Children with Disabilities**

One of the goals of early childhood education is to encourage the development of children's social behaviors and social competence. Social interaction skills and behaviors during early childhood (i.e., birth through age 8) are related to children's future social, behavioral, and emotional adjustment (Murray & Greenberg, 2006), school performance and enjoyment of school (Ladd, 1990), peer acceptance, and adult psychopathology and criminal behavior (Parker & Asher, 1987). In fact, social relationships that result from children's use of positive social skills during early childhood may serve as a protective factor for later development for children with learning disabilities (Al-Yagon & Mikulincer, 2004).

Some children, specifically those with disabilities like ASD, may have difficulty developing the social skills needed to engage in appropriate social interactions with peers and



adults. Hestenes and Carroll (2000) found that typically developing children tend to play with other typically developing children more than they play with children with disabilities in inclusive preschools. As a result of these challenges, children with disabilities tend to have fewer friends than their typically developing peers (Buysse, Goldman, & Skinner, 2002) and tend to be more isolated, even in inclusive environments (Guralnick & Groom, 1988). However, Harper and McCluskey (2003) reported that peers attempt to initiate social contact with children with limited communication abilities even more frequently than do adults in the classroom. Unfortunately, often these interaction attempts are unsuccessful or become infrequent (Odom, 2002), and particularly when unacknowledged or unreciprocated by children with ASD. A lack of social competence by these children may make them less desirable playmates than their more socially skilled peers (Guralnick, Connor, Hammond, Gottman, & Kinnish, 1996). The inherent deficits and reactions of peers may place children with ASD at risk for social isolation and rejection.

Social isolation and rejection can hinder social development, particularly in children with pervasive social difficulties (Whitaker, Barratt, Joy, Potter, & Thomas, 1998). Children with disabilities that affect their social problem solving and emotional regulation, such as those with ASD, are more likely to be rejected by peers than children with disabilities who do not have deficits in these areas (Odom, et al., 2006). If opportunities for interaction are limited, children have fewer opportunities to learn appropriate interactions, further increasing the likelihood of future difficulties establishing relationships (Whitaker et al., 1998).

**Interactions with peers.** Children with disabilities in inclusive preschool classrooms spend approximately 11 percent of their time in peer-directed social behavior (Tsao, et al., 2008). These interactions usually involve typically developing peers. Children with

disabilities who have opportunities to interact with typically developing children tend to have more positive social development than those who interact only with other children with disabilities or with adults (Odom & Diamond, 1998). Early research by Guralnick and Groom (1988) demonstrated that children in playgroups including children with and without disabilities showed more peer interactions and adult-child interactions than children in playgroups consisting of only those with disabilities. Exposure to typically developing peers allows children with social deficits to learn appropriate interactions through observation and imitation of the appropriate social behaviors demonstrated by peers (Cooper, Griffith, & Filer, 1999).

In recognizing the importance of observational learning, Garfinkel & Schwartz (2002) found that this type of observation can be an effective method for teaching adaptive social behaviors to children with ASD. Garfinkel and Schwartz (2002) assert that children with ASD can learn to imitate a peer's appropriate behaviors, and demonstrate these behaviors if placed in a similar situation. Through imitation, children with ASD and typically developing children may become more aware of other children in the classroom, more accepting of each other, and more willing to wait and take turns (Garfinkel & Schwartz, 2002). These behaviors are considered to be important adaptive skills for facilitating successful peer interactions (Garfinkel & Schwartz, 2002).

While exposure to typically developing peers may be a focus of inclusive early childhood education, some studies suggest that there are no differences in the positive social behaviors of children with disabilities in inclusive and segregated settings (Sontag, 1997; Tsao, et al., 2008). This finding suggests that there are other characteristics of the environment, beyond the presence of typically developing children, that may be related to

children's social development. Overall, the development of children's social competence is greater when children have contact with peers, and lower when children have more contact with teachers (Kontos & Wilcox-Herzog, 1997). However, the direction of the correlation of social competence and contact with peers and adults is not clear. It is possible that children needing more assistance with developing social skills need more adult support, and therefore require increased contact with teachers, whereas children whose social competence develops more rapidly have less need for adult support.

**Interactions with adults.** The teacher is considered a "critical factor" in the early childhood environment (Buysse, Goldman, & Skinner, 2003; Hestenes & Carroll, 2000). Teachers guide children's development in the classroom setting, and may be especially important in the overall social development of children (Gallagher, Dadisman, Farmer, Huss, & Hutchins, 2007). They are responsible for arranging and organizing the environment for the children and promoting positive social engagements among all children in the classroom.

Furthermore, teachers have a direct influence on the social dynamics of their classrooms (Farmer, 2000; Gallagher, et al., 2007; Hestenes & Carroll, 2000). Children may look to the teacher for social cues as they learn how to relate to one another. For instance, a teacher who dismisses or ignores a child's requests for attention may be giving a cue to the other children in the class that ignoring that child is appropriate social behavior. Or, more positively, a teacher can demonstrate desirable ways to approach a child who may have difficulties initiating and maintaining social interactions with others. Teacher social behavior modeling may be especially important for children with disabilities (Gallagher, et al., 2007) including those with autism spectrum disorder.

Teachers play a role in children's social development beyond social behavior modeling. Positive relationships with teachers in preschool and early elementary school are related to children's social and academic skills (Pianta & Stuhlman, 2004) as well as emotional, behavioral, and cognitive development later in life (Murray & Greenberg, 2006). More immediate effects of positive social interactions with teachers are evident in the complexity in cognitive activities in which children participate. Specifically, increased positive social interactions with adults are associated with fewer instances of physical gross motor play, and more engagement in play that requires more advanced cognitive skills (Howes & Smith, 1995). Additionally, teachers establish the social climate of the classroom and are responsible for arranging opportunities for children to develop positive social behaviors when interacting with adults and peers. Teachers can create these opportunities through arranging the classroom environment to promote positive social behaviors.

### **Theoretical Framework**

The framework for this study is based on two related, but distinct, areas of research: ecological theory and ecobehavioral analysis. Bronfenbrenner and Morris (1998) proposed a bioecological model of child development in which characteristics of children interact with characteristics of the environment to shape their development. In other words, children will learn from their exposure to and interaction with the features of their environment and these features, including peers, teachers, and materials will influence their development. For example, through interactions with peers and teachers, children with ASD will have the opportunity to observe and imitate the social behaviors displayed by these individuals, thus increasing the range of social behaviors with which they are familiar. These individuals are part of the children's environment, and as such, have an influence on the social development

of children with autism in the early childhood classroom. This model also suggests that characteristics of individual children will influence the ways in which children relate to the environment. Children with ASD will experience a different “environment” than typically developing children due to the characteristics of ASD that they display (e.g., deficits in social development).

Similar to the bioecological model, the related field of ecobehavioral analysis also focuses on the interaction between child characteristics and features of the environment. Ecobehavioral analysis has its roots in ecological psychology, behavior analysis, applied behavior analysis, and interbehavioral psychology (Morris & Midgley, 1990b). This field was heavily influenced by the work of Roger Barker who asserted that an individual’s environment is composed of behavior patterns, or “behavior settings,” that are a result of the structure of the rest of the environment. Similarly, Bronfenbrenner acknowledged that one of the first steps in studying the ecology of child development should be through examining the settings in which children spend time and develop (Bronfenbrenner, 1979). Bronfenbrenner also noted that previous research on children in preschool environments, the most revealing, useful findings with regard to child outcomes are directly related to children’s everyday experiences rather than other measures of achievement (e.g., intelligence test scores) (Bronfenbrenner, 1979).

The exclusion of descriptions of these settings in research has led to a “one-sided picture” of child development, so it is important to include child activities and relationships with others when considering ecology (Bronfenbrenner, 1979, p. 164). Ecobehavioral analysis developed as a way to examine these relationships (Odom, Favazza, Brown, & Horn, 2000). These analyses focus on the ecosystems of an environment, or in other words,

the physical structure and the interpersonal actions that occur within the environmental settings (Morris & Midgley, 1990). Previous research using ecobehavioral assessment has focused primarily on interaction between structural features of classrooms (e.g., organization of the classroom, classroom materials) and child behaviors (e.g., engagement) (Hamilton, 2005; Missell & McConnell, 2006).

The current study applies ecobehavioral analysis methods to examine the relationship between ecological features of preschool environments and the social behaviors of children with ASD. Children with ASD often are not very socially oriented, and given that social development is a goal in early childhood education, teachers and parents often look for ways to promote the social skill development of these children. While there are many interventions available to target these skills, it is possible that there are features of the everyday environment that also may facilitate social behaviors.

### **Ecological Features of Environments and Social Development**

From an ecobehavioral view of child development, children's characteristics interact with characteristics of the environment as the child develops. Ecobehavioral analysis allows for an examination of behaviors and the context of the environment in which those behaviors occur (Morris & Midgley, 1990a). The context may include features such as the physical structure as well as the interactions among individuals in the environment (Morris & Midgley, 1990a).

There are several features of early childhood environments that may be influential in the social development of children with ASD. In particular, there may be specific classroom features that help to promote social development, as evident by social initiations and responses by children with ASD in the presence of these features. The features of interest in

this study include: a) the Activity Area, b) Child Behavior, c) the Group Arrangement (i.e., presence of other children and/or adults), d) Adult Behavior, and e) the Initiator of the Activity. Current research related to the social behaviors of children with ASD, or the broader category of children with disabilities and typically developing children within these contexts, will be discussed in the subsequent sections.

**Social engagement and activity area.** Some areas of early childhood environments may be more conducive to the promotion of social behaviors than others. Areas in which children are encouraged to play with one another may encourage children to initiate social interactions with other children. For typically developing preschoolers, peer interactions occur most often during freeplay and less often during more structured activities such as snack/lunch, teacher-directed individual activities, and teacher-directed group activities (Innocenti, et al., 1986). Similarly, less structured areas of preschool classrooms, such as sociodramatic/pretend play areas, may be more likely to support social engagement among children. For example, instances of peer talk tended to be most common during pretend play activities in preschool classrooms (Odom & Peterson, 1990; Sontag, 1997).

Current research on the potential influences of the activity area on the social behaviors of children with disabilities and typically developing children, however, may not extend to children with ASD. Children with ASD may not participate as frequently in pretend play due to delays in pretend play skills (Chawarska & Volkmar, 2005; Loveland & Kotoski, 2005). However, research has not examined whether social engagement tends to occur more often in certain classroom activity areas relative to other activity areas in classrooms including children with ASD. If children with ASD follow the same patterns as typically developing children, it would follow that social engagement with peers would be

more likely in less structured areas, such as the sociodramatic/pretend play area of the classroom.

Additionally, the pattern of increased social behaviors in less structured environments, as is seen in typically developing children, may not extend to interactions between adults and children. Children with disabilities routinely receive more help from adults in the classroom than their typically developing peers (Brown, Odom, Li, & Zercher, 1999). These children may need even more adult support when completing challenging tasks, such as preacademic activities. Specifically, preacademic tasks are designed to teach and practice new skills, and they may be more difficult than tasks in other classroom areas for the child to complete independently. Children may require adult contact in order to stay engaged in and complete activities in the Preacademic area, thus social engagement with adults may occur more often in this classroom area.

**Social engagement and child behavior.** Research on typically developing children suggests that engaging in some classroom behaviors are more conducive to social engagement than others. In general, behaviors such as manipulative play (e.g., playing with puzzles, small blocks, Legos, cars and trucks), art (e.g., paper and pencils, paints and easels), and sensory play (e.g., sand and water table) tend to be used during solitary or non-interactive, parallel play. For all children, toys associated with solitary play tend to be books, fine motor toys, and art materials, while toys associated with more social play include blocks, musical instrument activities, and housekeeping or sociodramatic play (Stoneman, Cantrell, & Hoover-Dempsey, 1983). Additionally, materials associated with books and sociodramatic/pretend behaviors (e.g., dress-up clothes, housekeeping materials) tend to be used in shared or cooperative play by typically developing children (Hendrickson, Tremblay,



Strain, & Shores, 1981). Thus, social behaviors may be more common when children are in sociodramatic/pretend play areas of the classroom because social behaviors are more likely when children are engaged in sociodramatic/pretend play (Odom & Peterson, 1990).

In terms of how children spend their time, children with disabilities in preschool classrooms spend more of their time engaging in behaviors involving manipulatives, art, books, and nonplay activities and they spend less time in computer-related, science-related, and dramatic play behaviors than their typically developing peers (Kontos, Moore, & Giorgetti, 1998). When compared with their typically developing peers, children with disabilities also tend to spend more time in low-level object play (Kontos, et al., 1998), less time in functional play (Baranek, et al., 2005; Kontos, et al., 1998), and engage in less high-level peer play (Kontos, et al., 1998). During freeplay, children with disabilities tend to engage in play with manipulatives 25% of the time and in nonplay behaviors 23% of the time (Kontos, et al., 1998). Other studies suggest that children with disabilities spend a large amount of their freeplay time in preacademic, transition, and various play behaviors (Odom & Peterson, 1990). Generally, children with disabilities tend to engage in more solitary play behaviors and non-play behaviors than their typically developing peers (Kim, et al., 2003).

Additionally, children with developmental disabilities tend to engage in more symbolic, complex play when they are alone rather than when they are with peers (Lieber & Beckman, 1991), indicating that when social interactions with peers are possible, children with developmental disabilities, like ASD, may not participate in socially-oriented play behaviors, like symbolic or sociodramatic play, thus missing opportunities to engage in social interactions. In contrast to typically developing children and those with other disabilities, children with ASD tend to use fewer toys and spend less time playing with toys, and more

time playing inappropriately with toys (e.g., self-stimulatory and repetitive behaviors, aggressive use of toys) (Rettig, 1994; Stone, et al., 1990). Further research suggests that children with ASD engage in less creative and lower levels of play than children diagnosed with other disabilities or their typically developing peers (Rettig, 1994; Stone, et al., 1990).

**Social engagement and group arrangement.** Group arrangement refers to the presence of other children or adults in a classroom area with the focal child. Examples include small groups (1-3 children), small groups with an adult, large groups (4 or more children), large groups with an adult, etc. Findings are mixed with regard to the most common groupings for children with disabilities. Some studies suggest that in general, children with disabilities are more likely to spend time 1:1 with an adult than are their typically developing peers (Brown, et al., 1999). In contrast, other studies have found that children with disabilities are less likely to be 1:1 with another child or 1:1 with a teacher (Kontos, et al., 1998) than in other group arrangements (e.g., large groups). One study suggests that children with disabilities spend a majority of their time in small or large groups with peers and little time in solitary play (Sontag, 1997), while others have observed that they are more likely to be alone (Brown, et al., 1999) or are more likely to be in a group with a teacher than are their typically developing peers (Kontos, et al., 1998). One possible reason for the discrepancies in previous findings may be related to methodological differences among studies (e.g., differences in operational definitions of variables). Some studies may use coding systems that contain different operational definitions of group size. For example, while the CASPER coding system defines small groups as those containing the focal child and 1 or 2 peers (and 3 or more peers is a large group), another coding system may consider 3 or 4 peers to be a small group.

Group arrangement during activities may have an impact on the potential social interactions between children. Children with disabilities are more likely to talk with their peers when they are in small group settings rather than large group settings (Sontag, 1997). Similarly, preschool aged children with ASD tend to engage in more social initiations (verbal or gestural behaviors) and social interactions with peers when in small group (2-4 children) settings rather than large group settings (Boyd, et al., 2008).

It is not clear whether the activities in which children with ASD are engaged are different in these settings, and it is possible that pretend play and other activities that promote social engagement are more likely to occur in small group settings such as during center time rather than in larger group activities such as circle time. Additionally, it follows that there would be more opportunities for children to interact when they are in a group rather than alone in an activity area.

Alternately, when children are alone with an adult at a center, there will be more opportunities for direct instruction and social interaction between the adult and child. In these situations, the adult can devote all of his or her attention to helping the child complete activities, or simply for social play with the child.

**Social engagement and adult behavior.** Generally, play with toys or other materials is less likely when children are involved in adult-child interactions (Stoneman, et al., 1983). Furthermore, teacher presence plays a major role in predicting the frequency of interactions between children with and without disabilities in inclusive preschool settings (Hestenes & Carroll, 2000). The amount of teacher interaction, however, rather than teacher presence appears to influence peer social behaviors (Guralnick & Groom, 1988). Moreover, adult

behaviors may have differential effects on the social behaviors of children with disabilities based on whether the child is interacting with a peer or interacting with an adult.

Research suggests a complex and often contradictory pattern of the impact of adult behaviors on children's social behaviors (Kontos & Wilcox-Herzog, 1997). Some studies have found that for typically developing children, when adults are involved in children's freeplay activities, there are fewer peer interactions, and there are greater instances of teacher-child interactions (Shores, Hester, & Strain, 1976). In fact, peer interactions among typically developing children occur most during activities when teachers are not involved (Harper & McCluskey, 2003), like freeplay (Innocenti, et al., 1986). Furthermore, after an interaction with an adult, regardless of the interaction type (e.g., care-giving or play) children are more likely to attempt another interaction with that adult rather than initiating a new interaction with a peer (Harper & McCluskey, 2003). Children may show a preference for adult partners because adults may be more responsive than their peers, and more consistent in their interactions (Shores, et al., 1976).

In contrast to their typically developing peers, children with disabilities are more likely to receive adult support in the classroom (Brown, et al., 1999) and are more likely to socially interact with adults than with peers (Brown, et al., 1999; Sontag, 1997). While adult behaviors toward children may increase children's future interactions with adults, they may decrease children's future interactions with peers (Shores, et al., 1976). This trend may be especially problematic for children requiring more assistance and attention from teachers in the classroom, such as those with disabilities. These children need more care from teachers in their daily activities and thus spend more time with adults and consequently less time interacting, playing with, and developing relationships with their peers.

Overall, the development of children's social competence is greater when children have contact with peers, but decreases when children have more contact with teachers (Kontos & Wilcox-Herzog, 1997), however the direction of this relationship is unknown. Furthermore, a higher ratio of adults:children is associated with fewer peer interactions, lower initiations, lower levels of social play with peers (e.g., parallel play), and higher rates of adult control during social interactions with peers during independent tasks (Hauser-Cram, Bronson, & Upshur, 1993).

Additionally, lower rates of teacher prompting (for engagement with toys and engagement with other children) are associated with higher rates of peer interactions for children with language impairments (Chandler, Fowler, & Lubeck, 1992). Much like typically developing children, the rate of initiations and interactions with peers for preschoolers with ASD is higher for most participants when adults are not engaged in activities, and lower when adults are passively or actively engaged (Shores, et al., 1976).

Alternatively, other studies have found more positive results concerning the impact of teacher behaviors on children with disabilities. Teacher presence is associated with lower rates of hostile behaviors among children (Hauser-Cram, et al., 1993). One study found that verbal interactions between children with disabilities and their typically developing peers tended to occur more frequently when teachers provided prompts to the children (Sontag, 1997).

Minimal teacher support is associated with greater peer interactions during freeplay, while increased teacher support is associated with greater adult-child interactions (Smith & Connolly, 1980). Overall social competence tends to be higher when children play with other peers without adult involvement, but when adults are involved, responsive

involvements of the adults may actually increase general social competence (Kontos & Wilcox-Herzog, 1997). These responsive involvements often are necessary to help children stay engaged in activities and to facilitate interactions (Burstein, 1986).

**Social engagement and initiator of the activity.** Children with disabilities are more likely to be involved in adult-initiated activities than child-initiated activities in early childhood classrooms (Brown, et al., 1999). Additionally, research suggests that during adult-initiated activities, children with disabilities tend to interact more with adults than with their peers (Tsao, et al., 2008).

However, when opportunities for children to initiate activities are available, children with disabilities engage in more peer interactions and these interactions tend to occur on higher levels (Hauser-Cram, et al., 1993). Furthermore, when opportunities are available for children with disabilities to select activities, child-initiated activities are associated with less distraction and more persistent participation on the part of the child (Hauser-Cram, et al., 1993).

Research suggests that allowing children to choose their activities and providing opportunities for self-direction may be especially important in promoting both the development of independence for children with disabilities (Hauser-Cram, et al., 1993) and social interactions among children with disabilities and their peers (Tsao, et al., 2008). Social initiations and social interactions tend to occur at higher rates for preschool children with ASD when they are engaged in child directed (child or peer selected and structured the activity) rather than adult directed activities (adult selected and structured activity) (Boyd, et al., 2008). This pattern may extend to both social engagement with peers and with adults.

**Summary.** There are many potential features of the environment that have an impact on children's social behaviors and overall social development. These include the features discussed in the previous section: Activity Area, Child Behavior, Group Arrangement, Adult Behavior, and the Initiator of the Activity. In order to determine the relationship between these features and the social behaviors of children with ASD, a systematic observation of these relationships is necessary. These relationships can be examined using ecobehavioral assessments.

### **Ecobehavioral Assessment**

Observational measures of children's social behaviors are commonly used in research to assess children's social development and interactions with other children (Brown, Odom, & Holcombe, 1996). Ecobehavioral assessments are observational measures that examine the structural features of classrooms and behaviors of children and adults in those classrooms (Odom, et al., 2000). These assessments have been used in studies seeking to identify ecological contexts that promote child social interactions in early childhood classrooms (e.g., Boyd, et al., 2008; Kontos, 1997; Odom & Peterson, 1990).

One of the first well-established ecobehavioral assessment instruments for preschool settings was the Ecobehavioral System for the Complex Assessment of Preschool Environments, or ESCAPE (Carta, Greenwood, & Robinson, 1985). The ESCAPE includes assessments of ecological elements of the environment, teacher behaviors, and child behaviors. It has been used in numerous studies of the social behaviors of children with disabilities (e.g., Kontos, 1997; Odom & Peterson, 1990).

Another ecobehavioral assessment is the Code for Active Student Participation and Engagement (*CASPER*) series of scales (Tsao, Odom, & Brown, 2001). The *CASPER* is a

“direct observational system designed to collect information about preschool environments (e.g., classrooms, child care settings) and behavior of participants (e.g., children, adults) in those environments (Tsao, Odom, & Brown, 2001, p. 4). These scales have been used in several more recent studies of the social interactions and social environment of children with disabilities (Brown, et al., 1999; Tsao, et al., 2008). The *CASPER II* (Brown, Favazza, & Odom, 1995) is an adaptation of the original *CASPER* and the *ESCAPE* instruments. It includes assessments of group arrangement, peer group composition, activity area or activity, initiator of activity, child behavior, child social behavior, and adult behavior (Brown, et al., 1999). The latest revision of this scale, the *CASPER III* (Tsao, et al., 2001) was used in the current study.

### **Contribution of this Study**

One limitation of previous studies has been the failure to capture nonverbal interactions. These measures (including the *ESCAPE*) only provided a code for “talk to peer” (e.g., Odom & Peterson, 1990; Sontag, 1997). In contrast, the *CASPER III* code for child social behavior that identifies both verbal behaviors directed toward other and nonverbal behaviors (e.g., gestures). The inclusion of nonverbal social behaviors may be especially helpful in observing the behaviors of children with disabilities who may have limited verbal skills, like young children with ASD who may experience delays in this area (Volkmar, et al., 2004).

Additionally, related research studies have suggested a need for further examination of the potential relationship between the initiator of an activity and the behaviors of children with disabilities (Kontos, et al., 1998; Tsao, et al., 2008). Little is known about the types of activities occurring when adults and children are initiators, and this information could be



used to determine the characteristics of classrooms that affect different types of social engagement (Tsao, et al., 2008).

Previous studies have recommended that future research should explore the activities during which children with disabilities are likely to demonstrate competent play (Kontos, et al., 1998). This examination would help to determine possible relationships between the contextual variables in the environment and behavioral variables demonstrated by the child to ultimately determine which of these factors can be used to promote social behaviors (Brown, et al., 1999). Finally, few disability studies have examined the importance of the influences of multiple factors in the environment on children's sociability (Buysse & Bailey, 1993).

### **Research Questions**

This study examines the relationship between the contextual features of preschool classrooms and the social behaviors of children with ASD. The specific research questions and hypotheses follow:

1. In what activity areas (i.e., Transition, Manipulative, Large Motor, Storytime/Books, Art, Pretend/Sociodramatic, Large Blocks, Sensory, Dance/Music/Recitation, Food/Snack, Self Care/Self Help, Preacademics, Computer, Circle/Large Group time) are children with ASD more likely to engage in social behaviors with peers or adults?

*Hypothesis:* Social engagement with peers will occur significantly more often than the base rate of social engagement when children are in the Pretend/Sociodramtic play area.

*Hypothesis:* Social engagement with adults will occur significantly more often than the base rate when children are in the Preacademic area.

2. During what types of child engagement (i.e., Books, Preacademics, Pretend/Sociodramatic, Art, Games with Rules, Dance/Music/Recitation, Self Care/Self Help behaviors, Stereotypic/Repetitive, Manipulating, Large Motor, Clean Up, or Not Engaged) are children with ASD more likely to engage in social behaviors with peers or adults?

*Hypothesis:* Social engagement with peers will occur significantly more often than the base rate when children are engaged in Pretend/Sociodramatic behaviors.

*Hypothesis:* Social engagement with adults will occur significantly more often than the base rate when children are engaged in Preacademic behaviors.

3. In what group arrangements (i.e., Solitary, 1:1 with an Adult, Small Group with 1 or 2 Peers, Small Group with an Adult and 1 or 2 Peers, Large Group with 3 or more Peers, or Large Group with an Adult and 3 or more Peers) are children with ASD more likely to engage in social behaviors with peers or adults?

*Hypothesis:* Social engagement with peers will occur significantly more often than the base rate when children are in Small Group arrangements.

*Hypothesis:* Social engagement with adults will occur significantly more often than the base rate when children are 1:1 with an Adult.

4. How does social engagement with peers or adults vary in the context of different adult behaviors (i.e., Adult Support, Adult Approval, Adult Comment, or No Adult Behavior directed to the focal child)?

*Hypothesis:* Social engagement with peers will occur significantly less often than the base rate when adults are providing support.

*Hypothesis:* Social engagement with an adult will occur significantly more often than the base rate when adults are providing support.

5. Are children more likely to be socially engaged with peers during Child-initiated or Adult-initiated activities?

*Hypothesis:* Social engagement with peers will occur significantly more often than the base rate when the child initiates the activity.

*Hypothesis:* Social engagement with adults will occur significantly more often than the base rate when the child initiates the activity.

## **CHAPTER 2: METHOD**

### **Data Collection**

The data were collected as part of the multi-site Autism Spectrum Disorders Treatment Comparison Study led by Principal Investigators Sam Odom and Brian Boyd. Data from 68 children with ASD were collected across multiple sites during the first year of data collection. Data from direct observation measures collected by project staff during the fall of the first year were used to address the research questions in this study.

### **Participants**

Sixty-eight children participated in this study. Fifty-eight (89%) were male. Fifty-five children (80.88%) were identified as being White, four (5.88%) were Black, five (7.35%) were Asian, and two (2.94%) were multi-racial. Twenty-two children (33%) lived in North Carolina, 16 (24%) lived in Colorado, and the remaining 30 children (43%) lived in Florida. The mean chronological age of participants at Time 1 data collection was 3.86 years. All participating children had received an ASD diagnosis by their school district prior to enrollment in the study. Demographic data were collected using a separate demographic form, some of which were missing during data analysis, so the exact numbers may not match the total number of children enrolled. Demographic data by state are available in Table 2.1.

Table 2.1: Participant Demographic Data by State

		NC	CO	FL	Total
Gender	Male	17	12	29	58
	Female	4	3	0	7
Ethnicity	Asian	4	1	0	5
	Black	3	0	1	4
	White	14	14	27	55
	Multi-racial	0	1	1	2
Mean Age at Enrollment		3yrs, 9mo.	3yrs., 10mo.	3yrs, 11mo.	3yrs, 10mo.

Note. Demographic data were collected using a separate demographic form, some of which were missing during data analysis, so the exact numbers may not match the total number of children enrolled.

For each child, data were collected on the severity of the symptoms of autism using the *Autism Diagnostic Observation Schedule* (ADOS) (Lord, Rutter, DiLavore, & Risi, 1999), and *Childhood Autism Rating Scale* (CARS) (Schopler, Reichler, & Renner, 1988). Additionally, data were collected on children's social functioning using the *Social Responsiveness Scale for Preschoolers* (SRS-P) (Constantino & Gruber, 2007). The *Mullen Scales of Early Learning* (Mullen, 1995) and *Preschool Language Scale, 4<sup>th</sup> Edition* (PLS-4) (Zimmerman, Steiner, & Pond, 2003) provided an assessment of children's cognitive and language abilities. Assessment results from all children are provided in Table 2.2.

Table 2.2: Participant Assessment Scores

Assessment	Statistic	NC	State CO	FL	Total
<i>ADOS</i> Module 1					
	N	17	11	17	45
	Mean	18.82	19.36	18.71	18.91
	SD	4.75	4.46	4.36	4.44
	Range	11 – 27	12 – 25	11 – 26	11 – 27
	Median	19	21	18	19
<i>ADOS</i> Module 2					
	N	5	5	11	21
	Mean	15.60	15.60	12.27	13.86
	SD	3.91	4.28	3.58	4.00
	Range	11 – 21	10 – 21	6 – 18	6 – 21
	Median	14	16	13	14
<i>CARS</i> Total					
	Mean	33.45	33.88	32.48	33.13
	SD	5.01	5.18	6.33	5.62
	Range	24.50 – 42.50	24.50 – 42.00	21.00 – 44.00	21.00 – 44.00
	Median	33.25	34.00	32.00	33.25
<i>SRS-P</i> T-Score					
	Mean	78.33	83.14	78.84	79.77
	SD	12.53	10.56	12.36	12.05
	Range	46 – 90	48 – 90	44 – 90	44 – 90
	Median	84.00	89.50	82.00	84.50
<i>Mullen</i> Standard Score					
	Mean	59.38	61.00	67.41	63.24
	SD	16.14	19.74	20.08	18.82
	Range	49 – 108	49 – 107	49 – 117	49 – 117
	Median	54.00	49.00	59.00	55.00
<i>PLS-4</i> Total					
	Mean	53.77	54.31	53.83	53.93
	SD	18.44	32.34	26.48	25.37
	Range	3 – 80	19 – 108	17 – 105	3 – 108
	Median	55.50	45.50	47.00	51.00

Note: One child in Florida was given the *ADOS* Module 3

The *ADOS* (Lord, et al., 1999) is considered to be the “gold standard” instrument for evaluating the social and communication behaviors of individuals suspected of having a pervasive developmental disorder. There are four modules, only one of which is given to a single individual based on their verbal abilities (e.g., Module 1 is used for children who do not consistently use phrases, while Module 4 is used for adults who have fluent verbal skills). Forty-five of the children in this study were given the Module 1 assessment, 21 were given the Module 2, and one child was given the Module 3. Scores on the *ADOS* Module 1 ranged from 11 to 27, with a mean of 18.91 across all children. Scores above 11 on the Module 1 assessment are considered to be in the Autism Spectrum range, while scores above 16 are in the Autism range. On average, the children who took the Module 1 assessment scored in the Autism range. Scores on the Module 2 ranged from 6 to 21, with a mean of 13.86. On the Module 2 assessment, scores above 7 are in the Autism Spectrum range, and scores above 10 are in the Autism range. On average, children who took the Module 2 assessment also scored in the Autism range. The only child given the Module 3 assessment scored a 19, which is above the cut-off of 9 for an Autism diagnosis, also confirming the autism diagnosis. The scoring algorithms for the *ADOS* are dependent on the age and verbal abilities of the child (Gotham, Pickles, & Lord, 2009) but on average, the children fell into the autism diagnosis category. Some participants did not meet the scoring criteria for ASD using the *ADOS*, however, all children had received a diagnosis of ASD from their school district. School districts may use methods and measures other than the *ADOS* to determine diagnoses.

The *CARS* (Schopler, et al., 1988), is a widely used instrument designed to assess behaviors (relationships to people, emotional responses, communication, activity level, etc.) of children with autism (age 2 through adulthood). Scores range from 15 to 60, with the

standard minimum cut-off score for children with autism is a raw score of 30. Scoring is based on direct observation in clinical settings. Higher scores indicate more severe symptoms of autism. The mean score for children in this sample was 33.13 with a range of 21 to 44 ( $sd = 5.62$ ), indicating that, on average, the children in this sample had fairly mild symptoms of autism, but that there was considerable variation within the sample.

The *SRS-P* (Constantino & Gruber, 2007) is a 65-item parent or teacher report measure that provides an assessment of the severity of social impairments, level of social awareness, social information processing, social anxiety/avoidance, reciprocal communication skills, and other social traits common among individuals with ASD. Each behavior is rated on a Likert scale of 1 to 4 (with 4 indicating more severe impairments). Generally, scores of 76 or higher indicate severe social impairments, while scores between 60 and 75 are considered to be moderate, and scores of 59 or less indicate social behaviors in the normal range. Children in this study had scores ranging from 44 to 90, with a mean of 79.77 ( $sd = 12.05$ ). These scores suggest that children in this study had a wide range of social abilities and impairments, but that on average, scores fell in the severe range.

The *Mullen Scales of Early Learning* (Mullen, 1995) is a developmental assessment tool used to assesses nonverbal, language, and motor skills of children from birth through 68 months. The domains include: Visual Reception (nonverbal discrimination, perceptual skills, memory), Receptive Language, Expressive Language, Fine Motor, and Gross Motor. All subscales, with the exception of the Gross Motor subscale, were administered to the children in this study. For this sample of children, the total standard scores ranged from 49 to 117, with a mean of 63.24 ( $sd = 18.82$ ). These scores suggest that some children had scores at least one standard deviation above the mean of 100, but most were well below the standard



score mean. On average, children demonstrated below average nonverbal, language, and fine motor skills.

The *PLS-4* (Zimmerman, et al., 2003) provides an assessment of children's total language abilities and auditory comprehension skills for children from one month through 6 years of age. The total scores for this sample of children ranged from 3 to 108 (mean = 53.93, sd = 25.37), indicating that there was a very wide variation in children's language abilities. Overall, the scores ranged from the age equivalent of 1 month to 4 years, 6 months, with an average age equivalent score of 1 year, 10 months. Given the chronological age of the children, on average, the language scores were below what would be expected.

**Program Settings.** The participants were served in three different preschool settings: a) classrooms using the TEACCH model, b) programs using the LEAP model, and c) programs that do not adhere to one model but use a "business as usual" (BAU) approach to providing services. The purpose of the current study was not to compare participants among settings, and these comparisons are beyond the scope of this study. However, given that the children were served in these settings, a brief description of the primary components of the three program settings follows.

Classrooms using the TEACCH intervention model use structured teaching strategies with an emphasis on adapting the classroom environment to provide children with ASD with experiences that are meaningful for their own ways of processing information (Mesibov & Shea, 1996; Mesibov, Shea, & Schopler, 2005). The TEACCH model emphasizes providing a predictable structure to the environment, minimizing distractions, and providing intensive interventions (Mesibov, et al., 2005). There are six specific intervention components to the TEACCH model: 1) clearly marked classroom activity areas and minimal environmental

distractions, 2) predictable sequences of activities, 3) visual schedules, 4) flexible classroom routines, 5) Work/Task Activity Systems, 6) visually structured activities that are understandable to the children (Mesibov, et al., 2005).

The LEAP model has a different approach to instruction for children with ASD. While the TEACCH model is specific to the needs of children with ASD, classrooms following the LEAP model include typically developing preschool children in the classroom. LEAP begins with a curriculum approach that is similar to a general early childhood education curriculum and adapts the curriculum to address the developmental needs of children with ASD. There are six specific components to the LEAP model: 1) individualized learning programs, 2) typically developing children enrolled as fulltime class members and constitute the majority of children in the class (ratio is usually 10:6), 3) individual instruction following naturalistic teaching methods, 4) parent participation in a parent education program that extends children's learning into the home and community, 5) transition to the next educational setting through activities and communication with the "next" teacher, and 6) staff members trained in the LEAP model procedures (Strain & Cordisco, 1994; Strain & Hoyson, 2000).

Finally, a "business as usual" (BAU) approach is used as a contrasting condition for establishing the efficacy of the TEACCH and LEAP models. BAU is not a specific intervention approach but rather represents the type of services that children with ASD would typically receive from the local school system. These classrooms may use an "eclectic" service model, combining intervention practices from many models or resources rather than following a specific intervention framework (Howard, Sparkman, Cohen, Green, & Stanislaw, 2005).

In the first year of data collection, participants and classrooms were distributed across three states: North Carolina (21 participants enrolled across 8 classrooms), Florida (28 participants enrolled across 9 classrooms), and Colorado (16 participants enrolled across 7 classrooms). A total of 24 classrooms were observed across all states. Of these classrooms, 9 used a TEACCH model, 6 used a LEAP model, and 9 used a BAU model. Table 2.3 shows the number of classrooms following each model by state, along with the number of children enrolled in parentheses. A total of 29 children across the study were served in TEACCH classrooms, 18 in LEAP, and 20 in BAU classrooms.

*Table 2.3: Descriptive Information on Classrooms and Participants by State*

	TEACCH	LEAP	BAU	<i>Total</i>
North Carolina	5 (14)	0 (0)	3 (7)	8 (22)
Colorado	1 (3)	3 (9)	3 (4)	7 (16)
Florida	3 (12)	3 (9)	3 (9)	9 (30)
<i>Total</i>	9 (29)	6 (18)	9 (20)	

Additionally, the number of children per classroom, number of full time staff members per classroom, and the duration/time of day, and length of school day are available for each classroom type and overall for all classrooms. This descriptive data is contained in Table 2.4.

**Table 2.4: Classroom Descriptive Data**

		Classroom Type			Total
		TEACCH	LEAP	BAU	
Number of Children					
With ASD	Mean (SD) Range	6.05 (1.96) 3-9	3.38 (0.82) 2-5	2.16 (2.12) 1-8	3.72 (2.28) 1-9
Typically Developing	Mean (SD) Range	0.70 (1.87) 0-8	7.48 (1.86) 5-13	5.64 (3.87) 0-13	5.03 (3.85) 0-13
With Other Disabilities	Mean (SD) Range	1.50 (2.21) 0-6	0.70 (0.99) 0-4	3.88 (2.55) 0-7	2.03 (2.41) 0-7
<i>Total in Class</i>	<i>Mean (SD)</i> <i>Range</i>	<i>7.77 (2.69)</i> <i>3-14</i>	<i>11.52 (1.66)</i> <i>8-16</i>	<i>11.68 (4.13)</i> <i>3-21</i>	<i>10.49 (3.40)</i> <i>3-21</i>
Number of Full Time Staff	Mean (SD) Range	3.36 (1.26) 2-8	3.95 (1.38) 2-6	2.68 (0.85) 2-4	3.36 (1.29) 2-8
Length of Day (in hours)	Mean (SD)	4.19 (0.92)	2.21 (0.41)	2.92 (1.15)	3.00 (1.17)
Duration/ Time of Day	Full day	19	0	9	28
	AM half day	2	19	5	26
	PM half day	0	10	11	21

**Measures**

Research staff videotaped each participating child for 30 minutes during center time in their preschool classroom. Staff members were instructed to videotape the focal child and his/her context in the classroom during center time for a full, continuous 30 minutes. Taping could begin during another activity (e.g., circle time, transition), but should not contain more than 5 minutes of an activity other than center time. The staff member was instructed to identify the target child immediately and, if possible, specify who initiated the activity in which the child was engaged at the beginning of the tape. Specific instructions for videotaping are available in Appendix A.

The videotapes were coded using the *CASPER-III* (Tsao, et al., 2001) and the PROCODER software. Data were collected at 10-second intervals (180 total per video) using momentary time sampling. With the momentary time sampling coding system, the videotape paused every ten seconds to allow an observer to code each *CASPER-III* variable (described in the following section). The observation was based on the focal child's position and behaviors in the classroom at that instant.

Using the *CASPER-III*, each variable (e.g., Activity area) consists of a set of behavioral categories (e.g., Art, Large Blocks, etc.) used to describe the specific child behavior. These behavioral categories are mutually exclusive; only one behavioral category for each variable was coded for each interval (e.g., a child could be coded manipulating or participating in book activities, but not both).

### **Operational Definitions**

The specific variables of interest from the *CASPER-III* include: Child Social Behavior, Activity Area, Group Arrangement, Activities, Child Behavior, Adult Behavior, and the Initiator of the Activity. Any intervals coded as "Can't Tell" were excluded from further analyses. A copy of the training manual for the *CASPER III* is available in Appendix B.

The Child Social Behavior variable is the primary variable of interest in this study. This variable represents "any socially directed motor/gestural or vocal/verbal behavior that the focal child directs to a person (or persons)" (Tsao, et al., 2001, p. 20) during the observation. This code includes both verbal and nonverbal social behaviors. The behavioral categories in the Child Social Behavior variable include: a) social behavior directed to adult, b) negative social behavior directed to adult, c) social behavior directed to peer, d) negative

social behavior directed to peer, e) social behavior from a peer, f) negative social behavior from a peer, and g) no social behavior. Negative social behaviors both to and from a peer are very rare, generally occurring less than 1% of the time (Tsao, et al., 2008), and thus were not included in the analyses.

There are two dependent variables of interest in this study: peer social engagement and adult social engagement with an adult. The peer social engagement variable was created by aggregating the data from two categories: social behavior directed to a peer and social behavior from a peer. The social engagement with an adult variable represents instances in which the focal child directs a social behavior toward an adult. Any adult social initiations are coded in the adult behavior variable rather than the child social behavior variable, and thus were not included in the social engagement with an adult category.

The Activity Area variable “represents information about the location of the focal child within the physical ecology of an early childhood setting... activity area codes will be determined by where the child is within an early childhood setting rather than what the child is doing” (Tsao, et al., 2001, p. 9). Behavioral categories in the Activity Area variable include: Transition, Manipulative, Large Motor, Storytime/Books, Art, Pretend/Sociodramatic, Large Blocks, Sensory, Dance/Music/Recitation, Food/Snack, Self Care/Self Help, Preacademics, Computer and Circle/Large Group time.

The Child Behavior variable is used to indicate “when the focal child is attending to, engaged in, or involved in an activity” (Tsao, et al., 2001, p. 16) during the observation. Behavioral categories in the Child Behavior variable include: Books, Preacademic, Pretend/Sociodramatic, Art, Games with Rules, Dance/Music/Recitation, Self Care/Self Help, Stereotypic/Repetitive, Manipulating, Large Motor, Clean Up, and Not Engaged.

Unlike the original *CASPER III* manual, this study excludes the category for Computer activities, but includes a category for Stereotypic/Repetitive behaviors.

The Group Arrangement variable represents the children or adults who are in close proximity to the focal child at the time of observation. Behavioral categories in the Group Arrangement variable are: Solitary, 1:1 with an Adult, Small Group with 1 or 2 Peers, Small Group with Adult and 1 or 2 Peers, Large Group with 3 or more Peers, and Large Group with 3 or More Peers and an Adult.

The Adult Behavior variable indicates when there is a social behavior directed toward focal child by any adult in the environment. The behavioral categories in the Adult Behavior variable are: Adult Support (e.g., instruction or assistance in completing a task or activity), Adult Approval (e.g., praise for focal child's behavior), Adult Comment (e.g., talking or gesturing without providing direct support), and No Adult Behavior to the focal child.

The Initiator of Activities variable indicates the "person (or persons) who selected the activity area where the focal child is located or the activity in which the focal child is involved" (Tsao, et al., 2001, p. 14). The behavioral categories in the Initiator of Activities variable are: Adult-initiated, Child-initiated (i.e., the focal child selected the activity), and Peer-initiated. There were no Peer-initiated activities in this study, so that category has been excluded.

### **Inter-observer Agreement**

All videos were coded by one of three trained raters. Training included familiarization with the *CASPER-III* Training Manual for Observers (Tsao, et al., 2001), practice observations with analysis and discussion until all raters reached consensus with at

least an 85% agreement (i.e., the number of agreements divided by the number of agreements plus disagreements), or a Kappa of at least .80 for each variable.

Additionally, 20% of the observations were coded by an additional rater to establish inter-observer agreement. For this study, the inter-observer agreement was calculated for each variable (e.g., Activity Area, Group Arrangement). Generally, Kappa was used as a measure of the inter-observer agreement. The only exception is for the Initiator of Activity variable, in which the percent agreement (i.e., agreements divided by agreements plus disagreements) was more appropriate given that there were only two possible codes (i.e., child-initiated or adult-initiated). The average Kappa was calculated for the following variables: Child Social Behavior (.91, range .85-.95), Activity Area (.89, range .82-.94), Group Arrangement (.83, range .85-.95), and Adult Support (.72, range .49-.85). For Initiator of Activity, the percentage of inter-observer agreement was 89% (range .67-.97).

### **Data Analysis Plan**

The corresponding codes, as described above, were analyzed to determine the associations between the occurrence of social behaviors and the other ecological and social features (i.e., Activity Area, Child Behavior, Group Arrangement, Adult Behavior, and Initiator of Activity) in the classroom. The dependent variables in this study were the social engagement of the focal children with peers (peer social engagement) and the social engagement of the focal children with adults (social engagement with adults). The independent variables were the ecological features of the classroom.

Following the model of analysis of ecobehavioral variables used by Odom and Peterson (1990), first a base rate of the key variables of interest (i.e., the proportion of total observation time in which children were engaged in a category of social engagement, also



called the unconditional probability) was calculated. To analyze differences in social behavior across the ecological features, a conditional probability of peer social engagement given an individual ecological feature was calculated. To calculate the conditional probability of peer social engagement, the intervals in which a specific ecological feature occurs were selected (e.g., intervals in which the child was engaged in Sociodramatic/Pretend play). Then, the proportion of intervals in which peer social engagement occurs was calculated from the selected intervals containing that ecological feature (e.g., intervals during which the child demonstrated peer social engagement while engaging in Sociodramatic/Pretend play). The same procedure was followed in calculating the conditional probability of social engagement with an adult: the proportion of intervals containing social engagement with an adult occurring during the intervals in which a given ecological feature occurred.

A z score analysis was used to compare the conditional probability of social engagement given a specific designated activity with the base rate of social engagement across all activities. The formula for the z score analysis is:

$$z = [p(R_i/A_i) - p(R_i)]/[p(R_i)(1/m_i + 1/m_o)]^{1/2}$$

where  $p(R_i/A_i)$  = the proportion of response ( $R_i$ ) given arrangement ( $A_i$ ),  $p(R_i)$  = the proportion of response ( $R_i$ ) given all sequences (i.e., base rate level),  $m_i$  = the frequency of ( $A_i$ ), and  $m_o$  = the frequency of all sequences (Greenwood, Delquadri, Stanley, Terry, & Hall, 1985). A Bonferroni adjustment was used to minimize the type I error rate. The type I error rate increases with the number of comparisons in an analysis. Using this correction, the alpha level (.05, or .025 for a two-tailed test) is divided by the number of comparison tests. For example, the Bonferroni adjusted alpha for Group Arrangement is .0042 (i.e., the alpha

of .025 is divided by the 6 possible categories for Group Arrangement), which corresponds to a critical z score of  $\pm 2.638$ . Significance indicates that children with ASD were more likely to display the social behavior of interest in this behavioral category than the other possible behavioral categories addressed in the research question.

## CHAPTER 3: RESULTS

This study examined the relationship between the contextual features of preschool classrooms and the social behaviors of children with ASD. Overall, social engagement with peers occurred in approximately 1.84% of observed intervals. Social engagement with adults occurred in 4.96% of the intervals. Data on all social behaviors are available in Table 3.1. The specific research questions, hypotheses, and results for this study follow.

*Table 3.1: Summary of Social Engagement*

Engagement Type	Frequency	Proportion
Peer Social Engagement	204	.0184
Social Engagement with Adults	549	.0496
Can't Tell/Negative	129	.0120
No Social Engagement	10,175	.9200
<i>Total</i>	<i>11,057</i>	<i>1.0000</i>

### Question 1: Activity Area and Social Engagement

In what activity areas were children with ASD more likely to engage in social behaviors with peers or adults? The proportion of social engagement with peers in each activity area was compared to the base rate of peer social engagement across all activity areas. Using the Bonferroni adjustment with a total alpha of .025 for a two-tailed test, p-values that are greater than or less than .0038 (or .025 divided by the 13 possible categories) are considered to be significant. This alpha level corresponds to a critical z score of +/- 2.89 for a two-tailed test of significance.

Overall during the observation intervals, children were observed in the Manipulative area (33.5%), Art (9.8%), Preacademics (9.7%), Pretend/Sociodramatic (8.5%), and Large

Blocks (8.3%) areas, followed by all other areas at lower proportions. All descriptive data, ordered by frequency, for the amount of time spent in each classroom area are displayed in Table 3.2. Data coded “Can’t Tell” have been excluded from the analyses.

*Table 3.2: Descriptive Information on Activity Area Frequency*

Activity Area	Frequency	Proportion
Manipulative	3702	.335
Art	1081	.098
Preacademics	1069	.097
Pretend/Sociodramatic	939	.085
Large Blocks	920	.083
Transition	716	.065
Circle/Large Group	589	.053
Large Motor	529	.048
Sensory	413	.037
Books	378	.034
Computer	279	.025
Food/Snack	128	.012
Self Care/Self Help	138	.012

**Activity Area and Peer Social Engagement.** During a portion of the time spent in each activity area, children engaged in social behaviors directed to their peers. The first hypothesis stated that social engagement with peers would occur more often than the base rate when children were in the Pretend/Sociodramatic play area of the classroom. However, the data suggest that social engagement with peers was no different from the base rate when children were in the Pretend/Sociodramatic play area. Instead, as Figure 3.1 shows, the proportion of peer social engagement significantly exceeded the base rate in the Books area with a proportion of .098 ( $z = 11.18$ ), and in the Food/Snack area with a proportion of .102 ( $z = 6.886$ ). In the figure, the exact proportion of social engagement is shown only for categories found to be significantly different from the base rate.

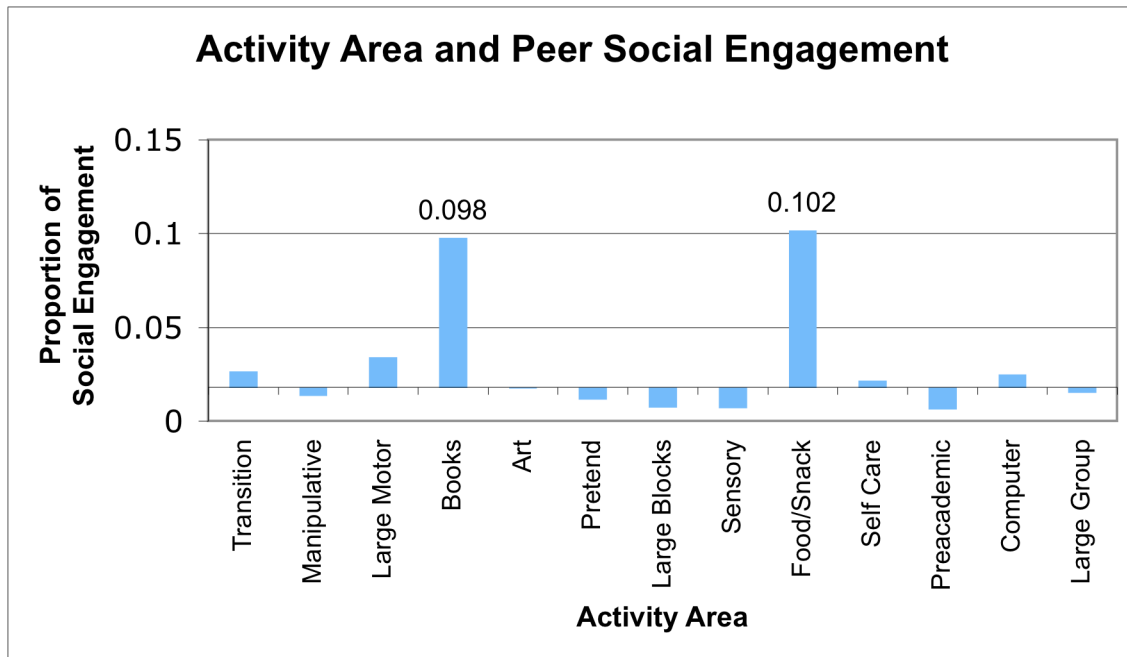


Figure 3.1: Activity Area and Peer Social Engagement

**Activity Area and Social Engagement with Adults.** The same z score analysis was conducted to examine social engagement with adults across each activity area. The second hypothesis stated that social engagement with adults would occur more often than the base rate when children were in the Preacademic area of the classroom. The proportion of social engagement with adults was not different from the base rate when children were in the Preacademic area. Rather, as shown in Figure 3.2, children engaged in significantly more social behaviors with adults when in the Large Motor area with a proportion of .191 ( $z = 14.24$ ) and Books areas with a proportion of .119 ( $z = 5.95$ ). Additionally, there were significantly fewer instances of social engagement with adults when children were in the Large Blocks area with a proportion of .026 ( $z = -3.08$ ).

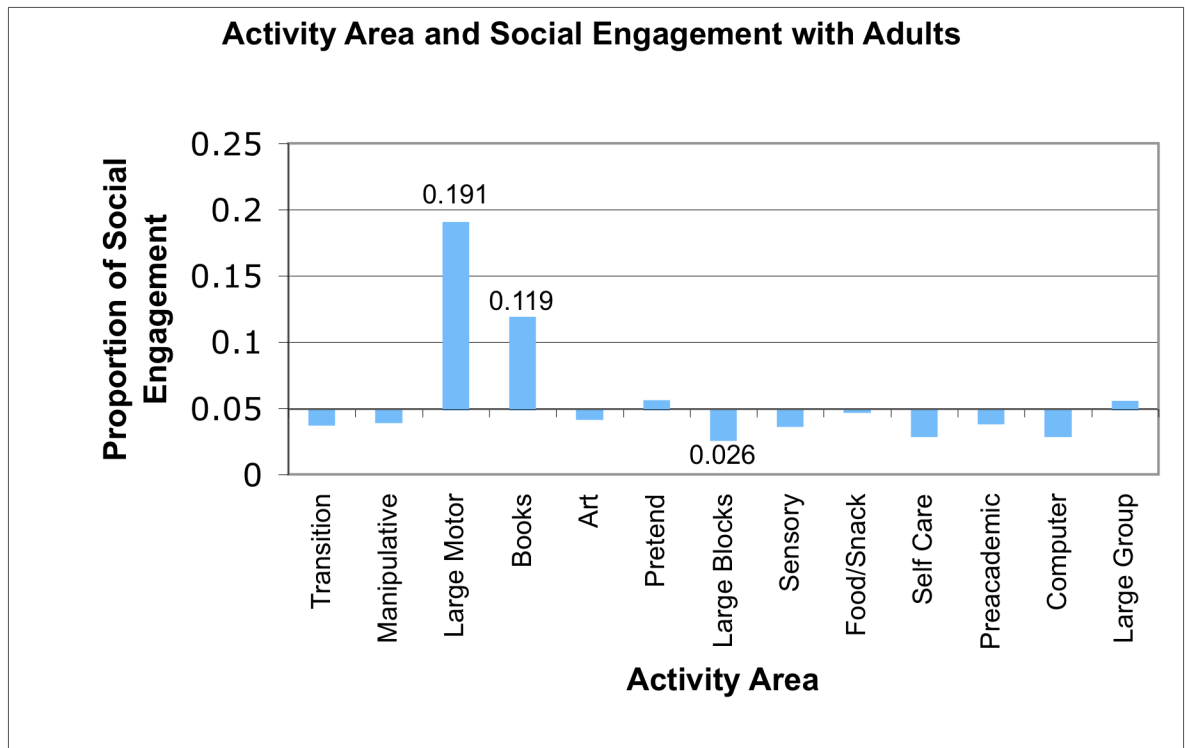


Figure 3.2: Activity Area and Social Engagement with Adults

## Question 2: Child Behavior and Social Engagement

During what types of child engagement were children with ASD more likely to engage in social behaviors with adults or peers? Using the Bonferroni adjustment with a total alpha of .025 for a two-tailed test, p-values that exceed 0.0021 (or .025 divided by the 12 possible categories) correspond to a z score of +/- 2.865 for a two-tailed test of significance.

Overall, during most intervals children were engaged in Manipulating (46.2%) or Not Engaged in activities (27.7%). All other child behaviors ranged from less than 1% to 5% of the observation time. On average, children were engaged in classroom behaviors (i.e., excluding intervals coded as Not Engaged or Stereotypic/Repetitive behaviors) about 60% of

the time. Descriptive information about the frequency of child behaviors is available in Table 3.3. Data coded as “Can’t Tell” were excluded from the analyses.

*Table 3.3: Descriptive Information on Child Behavior Frequency*

Child Behavior	Frequency	Proportion
Manipulating	5104	.462
Not Engaged	3058	.277
Art	500	.045
Preacademics	407	.037
Large Motor	351	.032
Stereotypic	343	.031
Books	312	.028
Pretend/Sociodramatic	159	.014
Clean up	156	.014
Self care	143	.013
Dance/Music/Recitation	110	.010
Games	21	.002

**Child Behavior and Peer Social Engagement.** The first hypothesis stated that social engagement with peers would occur more often than the base rate when children were engaged in Pretend/Sociodramatic play. The data analysis did not support this hypothesis, indicating that the proportion of social engagement with peers was not significantly different from the base rate of .0184 when children were engaged in Pretend/Sociodramtic behaviors, Rather, as Figure 3.3 shows, the proportion of peer social engagement exceeded the base rate when children were engaged with Books with a proportion of .109 ( $z = 4.14$ ) and when children were engaged in Large Motor behaviors with a proportion of .040 ( $z = 2.91$ ). While it appears from the figure that the Games category should be significant, it is not statistically different from the base rate. The  $z$  score formula accounts for the number of intervals in a given category, and due to the low incidence of intervals in this category, it is not significant.

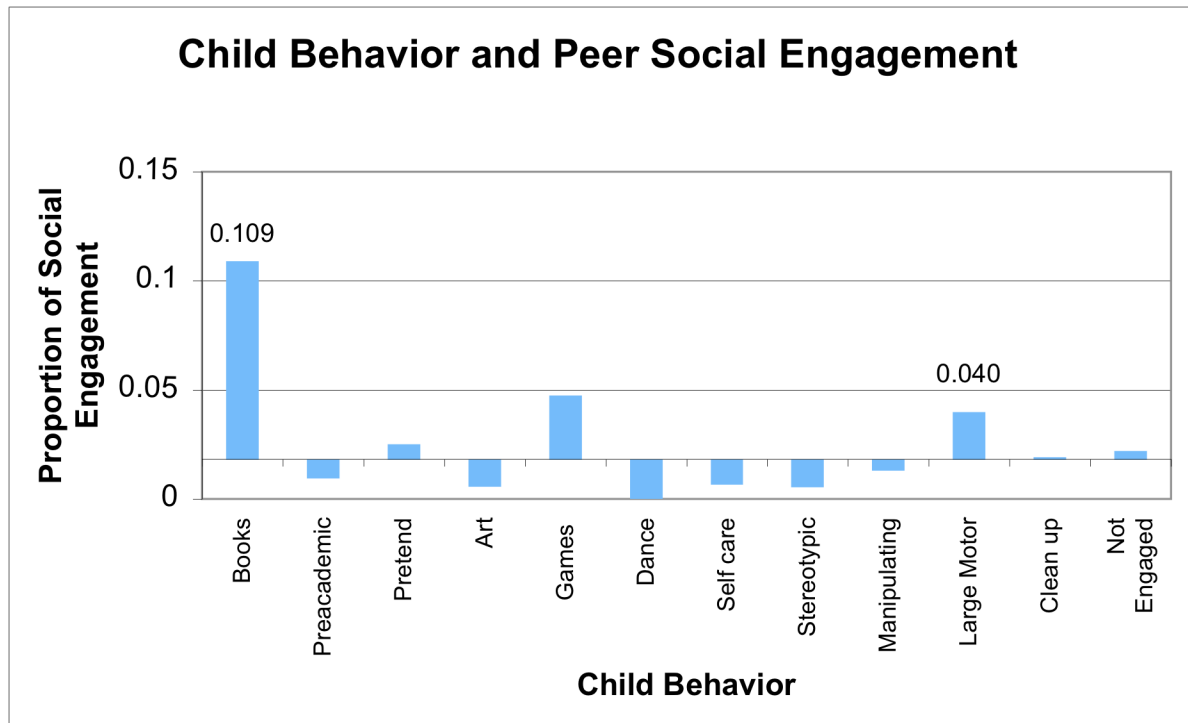


Figure 3.3: Child Behavior and Peer Social Engagement

**Child Behavior and Social Engagement with Adults.** The z score analysis was conducted to examine social engagement with adults for each child behavior category. The second hypothesis stated that social engagement with adults would occur more often than the base rate when children were engaged in Preacademic behaviors. The data analysis did support this hypothesis. As shown in Figure 3.4, children engaged in significantly more social behaviors with adults when engaged in Preacademic behaviors with a proportion of .101 ( $z = 4.54$ ). Additionally, social engagement with adults was significantly greater than the base rate when children were engaged with Books with a proportion of .103 ( $z = 4.14$ ), and when engaged in Large Motor behaviors with a proportion of .242 ( $z = 15.94$ ). Additionally, there were significantly fewer instances of social engagement with adults when



children were engaged in Stereotypic/Repetitive behaviors with a proportion of .003 ( $z = -3.83$ ), and when children were Manipulating with a proportion of .031 ( $z = -4.95$ ).

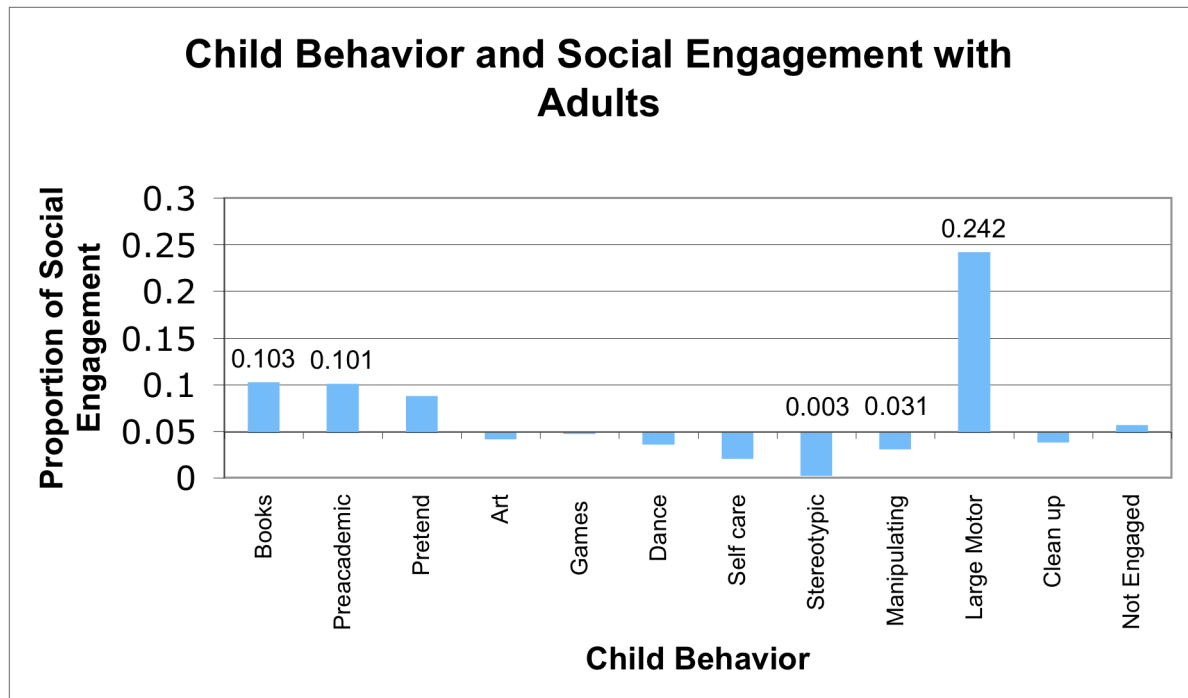


Figure 3.4: Child Behavior and Social Engagement with Adults

### Question 3: Group Arrangement and Social Engagement

In what group arrangements were children with ASD more likely to engage in social behaviors with peers or adults? Using the Bonferroni adjustment with a total alpha of .025, p-values that exceed 0.0042 (or .025 divided by the six possible categories) correspond to a critical z score of  $\pm 2.638$  for a two-tailed test of significance.

During about a third of the intervals children were in a Small Group with 1 or 2 Peers and an Adult (33.3%). During about a fifth of the intervals children were 1:1 with an Adult (18.2%). Information on the frequency of all group arrangements is available in Table 3.4. Data coded as “Can’t Tell” have been excluded from the analyses.

Table 3.4: Descriptive Information on Group Arrangement Frequency

Group Arrangement	Frequency	Proportion
Small Group with 1 or 2 Peers and an Adult	3684	.333
1:1 with an Adult	2008	.182
Large Group with 3 or More Peers and Adult	1737	.157
Solitary	1606	.145
Small Group with 1 or 2 Peers	1550	.140
Large Group with 3 or More Peers	276	.025

**Group Arrangement and Peer Social Engagement.** The first hypothesis was that social engagement with peers would occur more often than the base rate when children were in Small Group arrangements. In fact, children did show a greater proportion of social engagement with peers when in a Small Group with 1 or 2 Peers. As Figure 3.5 shows, the proportion of peer social engagement significantly exceeded the base rate when children were in a Small Group with 1 or 2 Peers with a proportion of .045 ( $z = 7.07$ ) and in a Large Group with 3 or More Peers and an Adult with a proportion of .028 ( $z = 2.78$ ). Additionally, children engaged in significantly fewer social behaviors to or from peers when Solitary with a proportion of .0019 ( $z = -4.56$ ) or when 1:1 with an Adult with a proportion of .004 ( $z = -4.39$ ). While it appears from the figure that the Large Group category should be significant, it is not statistically different from the base rate. The  $z$  score formula accounts for the number of intervals in a given category, and due to the low incidence of intervals in this category its significance cannot be determined.

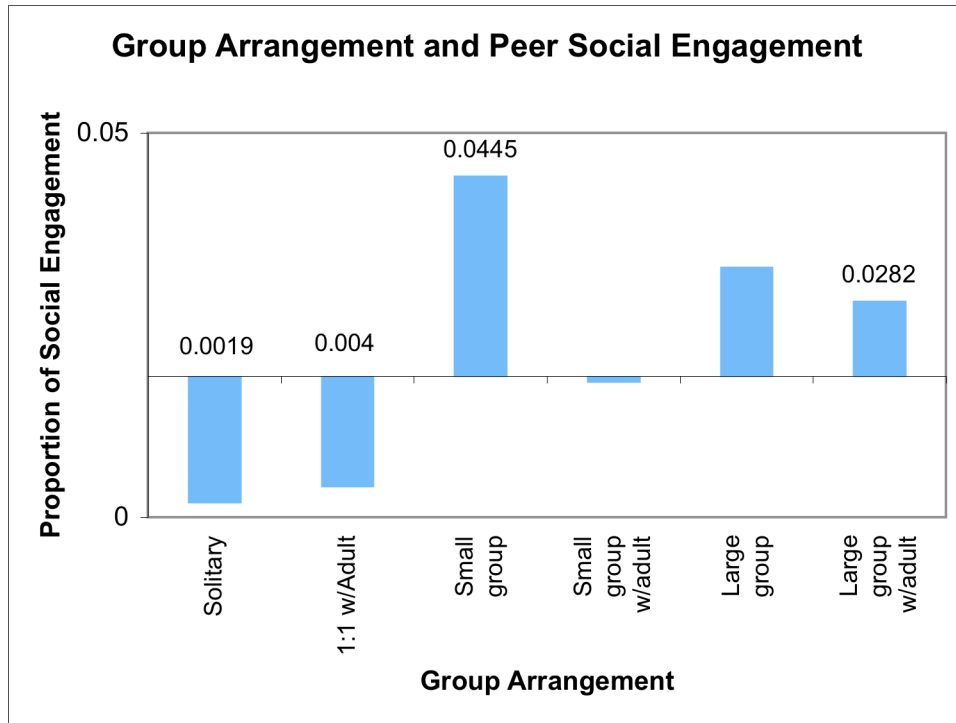


Figure 3.5: Group Arrangement and Peer Social Engagement

**Group Arrangement and Social Engagement with Adults.** The second hypothesis was that social engagement with adults would occur more often than the base rate when children were 1:1 with an Adult. The proportion of social engagement with adults was higher when children were 1:1 with an Adult. In fact, social engagement with adults was higher any time an adult was present. As shown in Figure 3.6, children engaged in significantly more social behaviors with adults when in 1:1 with an Adult with a proportion of .076 ( $z = 4.82$ ), in a Small Group with 1 or 2 Peers and an Adult with a proportion of .067 ( $z = 4.05$ ), and in a Large Group with 3 or More Peers and an Adult with a proportion of .066 ( $z = 2.77$ ). Additionally, there was a significantly lower rate of social engagement with adults when children were Solitary with a proportion of .009 ( $z = -6.88$ ) and when children were in a Small Group with 1 or 2 Peers with a proportion of .008 ( $z = -6.83$ ).

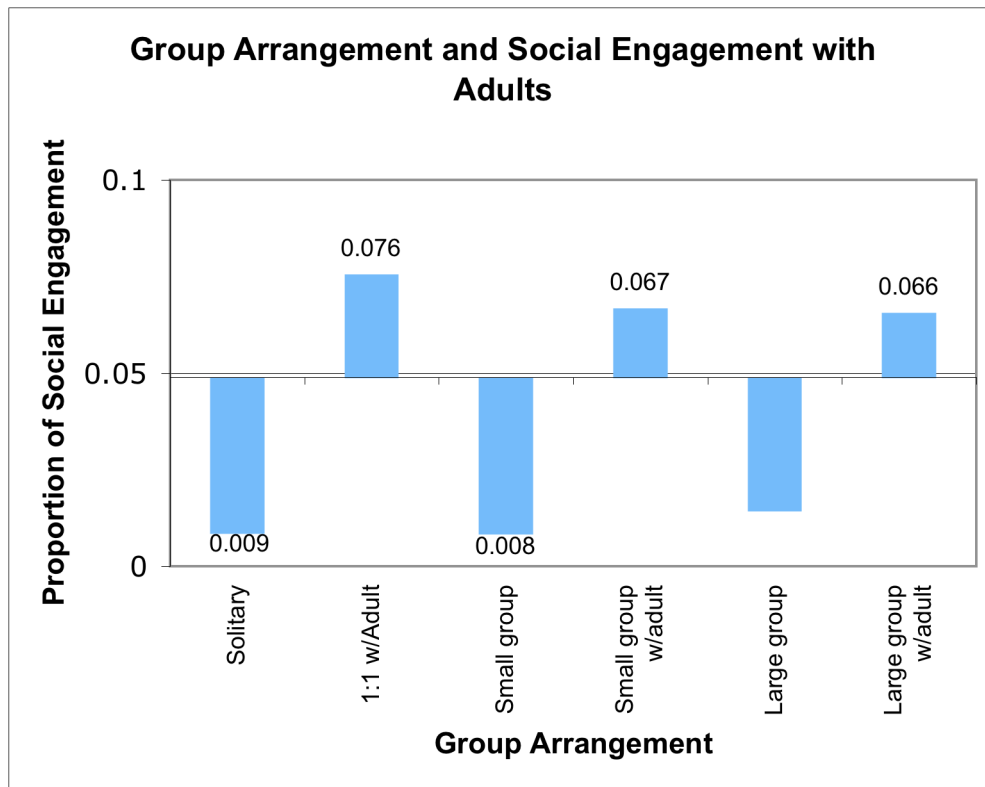


Figure 3.6: Group Arrangement and Social Engagement with Adults

#### Question 4: Adult Behavior and Social Engagement

How does social engagement with peers or adults vary in the context of different adult behaviors? Using The Bonferroni adjustment, with a total alpha of .025, p-values that exceed 0.0063 (or .025 divided by the four possible categories) correspond to a critical z score of +/- 2.498 for a two-tailed test of significance.

During the observations, in approximately 61% of the intervals there were no adult behaviors directed to the focal child. Adults provided support to the child during about 30% of the intervals. Data on the frequency of all adult behaviors are contained in Table 3.5. Data coded as “Can’t Tell” have been excluded from the analyses.

Table 3.5: Descriptive Information on Adult Behavior Frequency

Adult Behavior	Frequency	Proportion
No Adult	6746	.610
Support	3376	.305
Approval	183	.017
Comment	107	.010

**Adult Behaviors and Peer Social Engagement.** The first hypothesis was that social engagement with peers would occur less often than the base rate when adults were providing support. However, the proportion of social engagement with peers was not different from the base rate when adults were providing support. As Figure 3.7 shows, the proportion of peer social engagement did not exceed the base rate for any adult behavior.

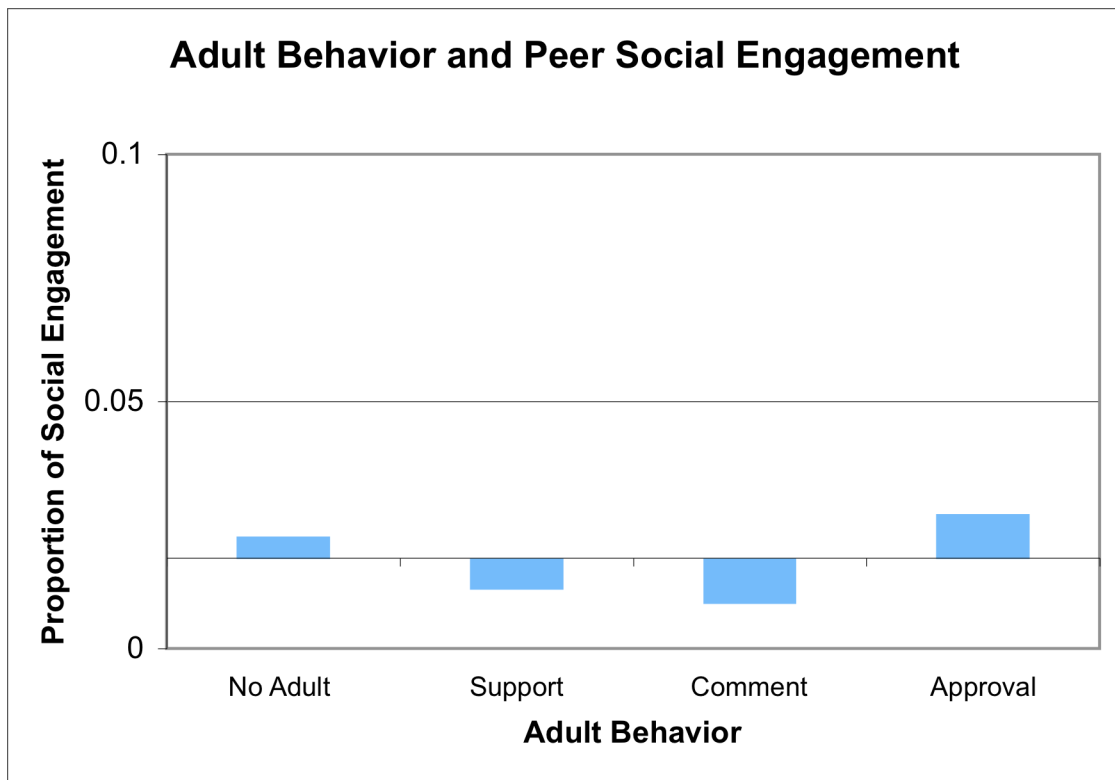


Figure 3.7: Adult Behavior and Peer Social Engagement

**Adult Behavior and Social Engagement with Adults.** The second hypothesis was that social engagement with an adult would occur more often than the base rate when adults were providing support. Data suggest that only when adults showed approval did the social engagement with adults differ from the base rate. As shown in Figure 3.8, children engaged in significantly more social behaviors when adults were providing approval with a proportion of .629 ( $z = 34.85$ ).

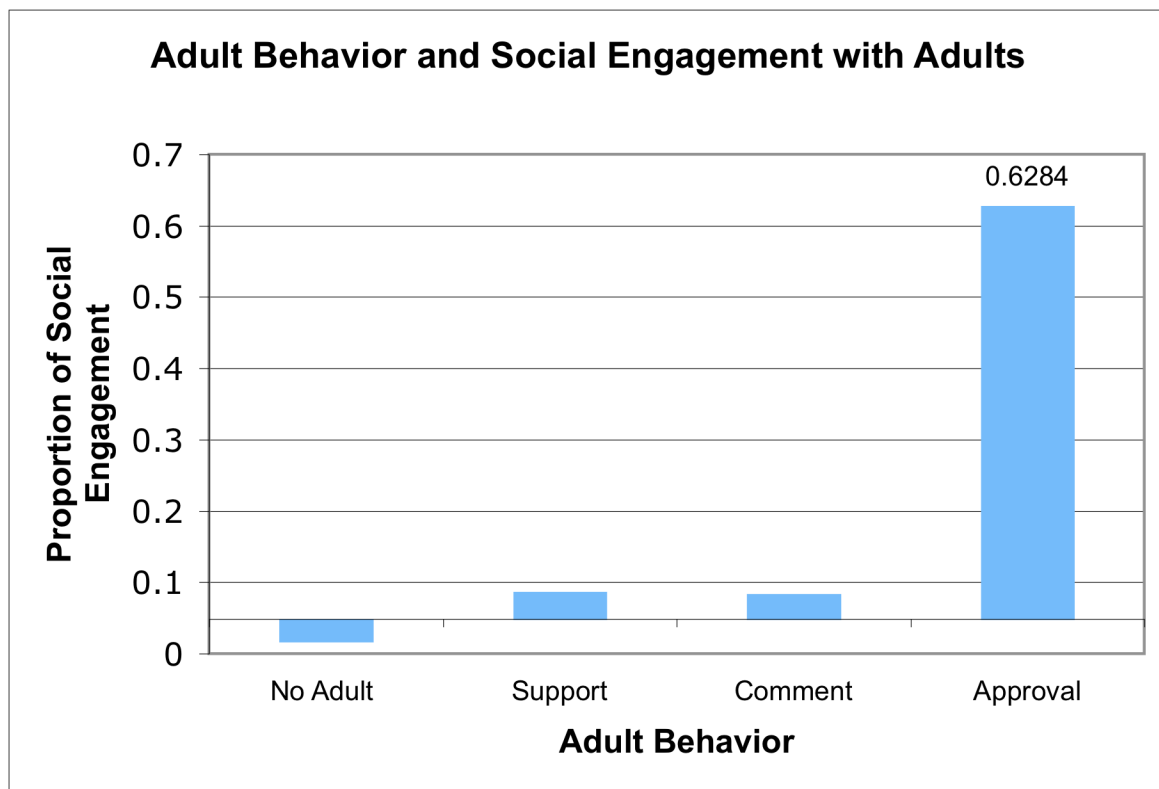


Figure 3.8: Adult Behavior and Social Engagement with Adults

#### Question 5: Activity Initiator and Social Engagement

The final question was: Are children more likely to be socially engaged with peers during Child-initiated or Adult-initiated activities? Using the Bonferroni adjustment, with a

total alpha of .025, p-values that exceed 0.0125 (or .025 divided by the two possible categories) correspond to a z score of +/- 2.39 for a two-tailed test of significance.

Adults initiated the activities during over half of the intervals (52.4%), while children initiated activities in almost 19% of the intervals (see Table 3.6). Data coded as “Can’t Tell” have been excluded from the analyses. In this case, approximately 28% of the intervals were coded as “Can’t Tell.” Even though these intervals comprised a large section of the data, they were excluded from analyses because any patterns found in these data would be impossible to interpret.

*Table 3.6: Descriptive Information on Initiator of Activity Frequency*

Initiator of Activity	Frequency	Proportion
Adult-Initiated	5797	.524
Child-Initiated	2064	.187

**Initiator of Activity and Peer Social Engagement.** The first hypothesis was that social engagement with peers would occur more often than the base rate when the child initiates the activity. The data analysis supported this hypothesis. As Figure 3.9 shows, the proportion of peer social engagement exceeded the base rate during Child-Initiated activities with a proportion of .034 ( $z=4.90$ ).

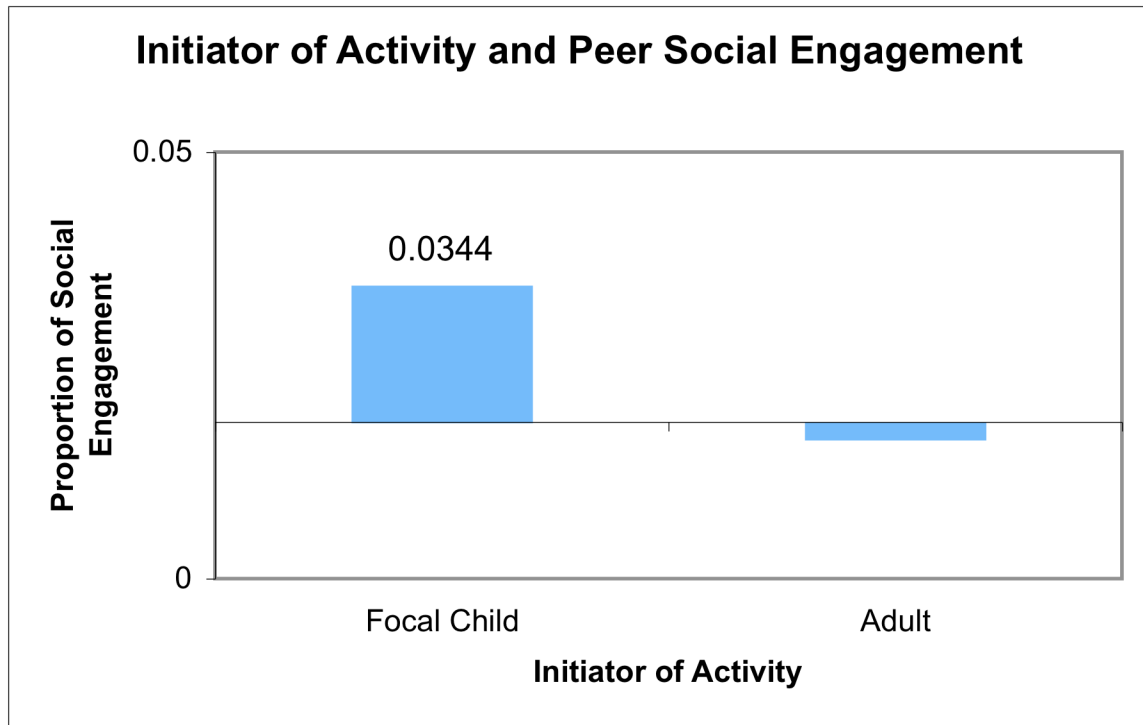
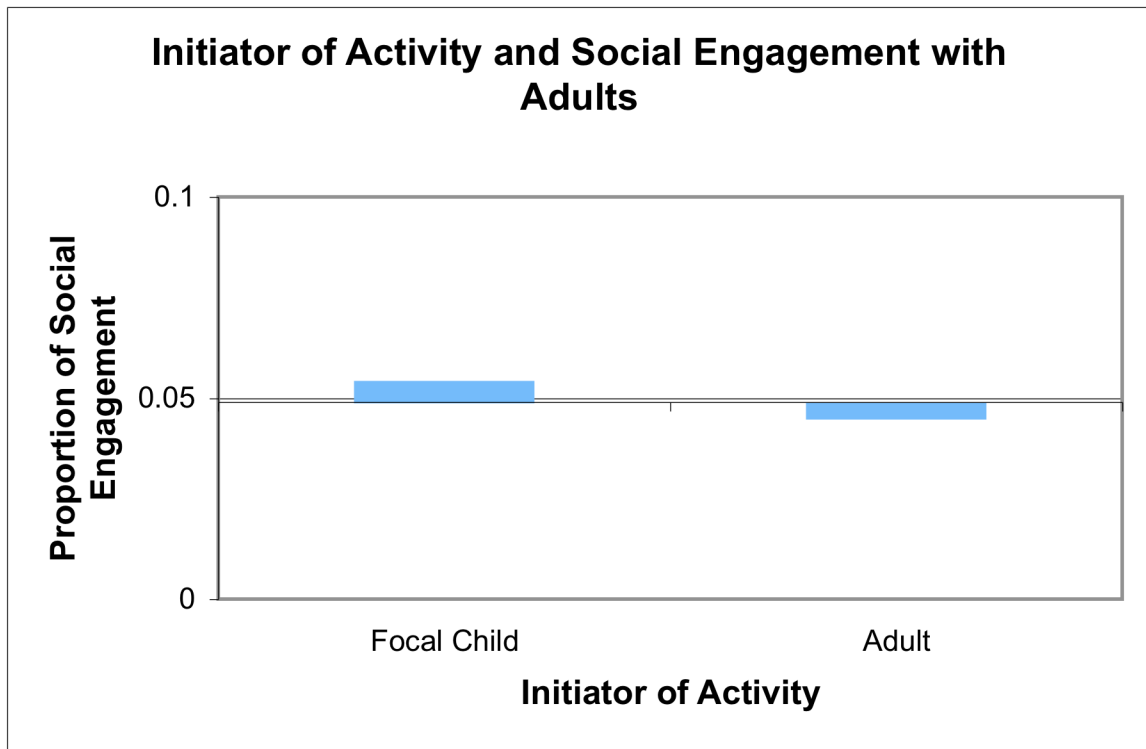


Figure 3.9: Initiator of Activity and Peer Social Engagement

**Initiator of Activity and Social Engagement with Adults.** The second hypothesis was that social engagement with adults would occur more often than the base rate when the child initiates the activity. However, data suggest that there were no differences in the proportion of social engagement with adults, regardless of the initiator of the activity. As shown in Figure 3.10, children were no more likely than the base rate to be socially engaged with adults during either Child- or Adult-Initiated activities.





*Figure 3.10:* Initiator of Activity and Social Engagement with Adults

## **CHAPTER 4: DISCUSSION**

One of the primary goals of early childhood intervention programs for children with ASD is the development of social interaction skills that can be used in future social engagements with peers and adults. Interactions with others may be particularly important for the social development of children with ASD. According to ecobehavioral theory, children's development interacts with characteristics of the environment, thus the features of early childhood settings are important factors in the social development of children with ASD.

According to previous research, several features of early childhood environments may be influential in children's social development. Several specific classroom features may facilitate social development, as evident by social initiations and responses by children with ASD in the presence of these features in a preschool environment. The features of interest in this study included: a) the Activity Area, b) Child Behavior, c) Group Arrangement, d) Adult Behavior, and e) the Initiator of the Activity. The relationship between each of these features and the social engagement of children with ASD and peers and adults were explored.

Previous research has indicated that children with disabilities tend to interact socially with adults more often than with their peers (Brown, et al., 1999; Sontag, 1997). Similarly in this study, which focused only on children with ASD, social engagement with peers occurred in approximately 1.8% of observed intervals while social engagement with adults occurred in about 5.0% of the intervals. These proportions are considerably lower than expected based on previous research involving children with disabilities. Children with disabilities in

inclusive preschool classrooms spend approximately 8-11% of their time in peer-directed social behavior (Brown, et al., 1999; Tsao, et al., 2008). In contrast, typically developing children spend about 18% of their time in peer-directed social behavior (Brown, et al., 1999). However, given that the children in this study all had an ASD diagnosis, lower levels of social engagement with peers and adults would be expected because of the characteristic deficits in social engagement among children with ASD. This study confirms previous research that indicates that children with ASD tend to be less socially oriented than children with other disabilities or typically developing children. The small proportions of social engagement make understanding the conditions under which these behaviors occur even more important. Some features of the classroom environments appear to be related to the levels of children's social engagement. Each of these features and their relationships to children's social engagement with peers and adults will be discussed in the following sections.

### **Social Engagement with Peers**

Data from the current study suggest that features of the classroom are related to patterns of children's social engagement with peers. Results from each question related to social engagement with peers, as well as connections with previous research will be discussed below. Results from the activity area and child behavior questions will be addressed together, as the two questions are related. A summary of the supported and unsupported hypotheses related to social engagement with peers is available in Table 4.1.

*Table 4.1.* Hypothesis Summary for Social Engagement with Peers

Classroom Feature	Hypothesis	Supported?
Activity Area	Pretend/Sociodramatic area	No
Child Behavior	Pretend/Sociodramatic behaviors	No
Group Arrangement	Small Group arrangement	Yes, but only when adult was not present
Adult Behavior	LESS likely when Adult Support	No
Initiator of Activity	Child-initiated	Yes

**Activity area and child behaviors.** The first two questions addressed in this study were whether children with ASD showed higher rates of social engagement in some activity areas and during certain child behaviors or activities when compared to the base rate of social engagement with peers across all areas and behaviors. Based on previous research, it was hypothesized that areas in which children were encouraged to play with one another would assist children in initiating and sustaining social interactions with peers. Materials associated with Pretend/Sociodramatic play (e.g., dress-up clothes, housekeeping materials) tend to be used in shared or cooperative play by typically developing children (Hendrickson, et al., 1981) and one of the most common areas for cooperative, social play among typically developing children is the pretend play area (Odom & Peterson, 1990; Sontag, 1997).

Data in this study did not support the hypothesis that social engagement with peers would occur more often than the base rate when children were in the Pretend/Sociodramatic play area of the classroom or when engaged in Pretend/Sociodramatic play. The previous findings suggesting that pretend play may facilitate social engagement for children with disabilities and typically developing children may not extend to children with ASD. Children with ASD may not participate in pretend play as easily or as frequently as typically

developing children (Chawarska & Volkmar, 2005; Loveland & Kotoski, 2005), so the context of pretend play itself may serve as a barrier for social engagement for this population.

Rather, data indicate that children with ASD engaged in significantly more social behaviors to/from a peer when they were in the Books area and engaged in Book-related activities. Books may provide a more concrete basis for initiating and sustaining interactions (e.g., showing pictures, or discussing topics from a book) than materials requiring more imaginative play. Books and book materials often are used in shared or cooperative play by typically developing children (Hendrickson, et al., 1981).

Additionally, social engagement with peers was greater when children were in the Food/Snack area of the classroom than the expected base rate of peer social engagement across all areas of the classroom. Moreover, while typically developing preschoolers engage in fewer peer interactions during structured activities like meal times (Innocenti, et al., 1986), meal times may be a prime opportunity for children with ASD to sit with their peers and adults, allowing for more potential time for interactions and creating a social atmosphere with all children routinely seated together with fewer distractions. Furthermore, adults at the table may create a social atmosphere and encourage and support interactions among the children during meal times.

Social engagement was more common when children were engaged in Large Motor behaviors, as well. Large Motor behaviors include activities such as playing on playground equipment (e.g., swinging on swings, riding tricycles, pushing and pulling wagons and other wheel toys). While this was an unexpected finding, previous research offers a few possible explanations. Some studies have shown that inappropriate play behaviors can be reduced when using playground and large motor activities with children with ASD (Schlelen, Heyne,

& Berken, 1988). Adaptations to the playground environment to meet the needs of children with ASD (e.g., appropriate physical challenges, boundaries, and supports for social and imaginative play) have been linked to increased social play and social initiations (Yuill, Strieth, Roake, Aspden, & Todd, 2007). Research has demonstrated that such modifications can be made within the physical structure of TEACCH playground environments through modifications in the physical structure (e.g., clear boundaries, multiple options for play areas, removing obstacles) and task organization (e.g., schedules available, timers used for clear transitions, equipment ready for children and set up to provide a clear beginning and end to activities) (Schultheis, Boswell, & Decker, 2000). Furthermore, interventions such as Pivotal Response Training have been successfully implemented on the playground with the effects of increasing social initiations and turn taking behaviors of children with ASD (Harper, Symon, & Frea, 2008). While data from this study do not allow observation of whether such interventions took place on the playground and in other large motor areas, the use of these types of interventions and adaptations to the physical environment in these areas is entirely plausible.

On average, children were engaged in classroom behaviors (i.e., excluding intervals coded as Not Engaged or Stereotypic/Repetitive behaviors) during about 60% of the observation time. This level of engagement in activities was only slightly higher than observed in other studies of children with and without disabilities (e.g., Brown, et al., 1999). Observations of child engagement ranged from 54% of the time for children with disabilities to 58% of the time for typically developing children according to one study which used similar methods of observation (Brown, et al., 1999).

**Group arrangement.** Based on previous research that posited that preschool aged children with ASD tend to engage in more social initiations and interactions with peers when in small group settings rather than larger group settings (Boyd, et al., 2008), the first hypothesis was that social engagement with peers would occur more often than the base rate when children were in Small Group arrangements. In fact, children did show a greater proportion of social engagement with peers when in a Small Group with 1 or 2 Peers. Contrary to previous research, children also showed greater social engagement with peers when in a Large Group with an Adult and 3 or More Peers. This discrepancy may be explained by the presence of the adult, who may have actively facilitated or arranged for children to interact with one another during large group or whole classroom activities. Logically, fewer instances of social engagement with peers were observed when children were Solitary or 1:1 with an adult, as there were no peers nearby.

**Adult behaviors.** Previous research has demonstrated that the rate of initiations and interactions with peers for preschoolers with ASD was higher when adults are not engaged in activities, and lower when adults were passively or actively engaged (Shores, et al., 1976). Contrary to the first hypothesis and previous research, the proportion of social engagement with peers was not different from the base rate when adults were actively engaged by providing support or passively engaged.

**Initiator of activity.** Data from the current study support the hypothesis that social engagement with peers would occur more often than the base rate during child-initiated activities. This finding is in agreement with previous research stating that social initiations and social interactions tend to occur at higher rates for preschool children with ASD, and other disabilities, when they are engaged in child-directed (child or peer selected and

structured activities) rather than adult-directed activities (adult selected and structured activities) (Boyd, et al., 2008). Allowing children to chose their activities and providing opportunities for self-direction may be especially important in promoting both the development of independence for children with disabilities (Hauser-Cram, et al., 1993) and social interactions among children with disabilities and their peers (Tsao, et al., 2008).

**Summary.** Overall, the rate of social engagement with peers was higher when the children with ASD were in the Books area and engaged with Book materials, in the Food/Snack area, and when children were engaged in Large Motor activities. Additionally, the rate was higher when children were in a small group with peers, or when in a large group with an adult and peers, and when the focal child initiated the activity. Social engagement with peers was significantly below the base rate when children were alone or 1:1 with an adult, as no peers were present. While many of these patterns are unique to social engagement with peers, several of these findings also extend to social engagement with adults in the classroom.

### **Social Engagement with Adults**

The second set of hypotheses addressed the relationship between features of the classroom environment and children's social engagement with adults. Each of these relationships and comparisons with previous research will be discussed in the following section. A summary of the hypotheses related to social engagement with adults is available in Table 4.2.



*Table 4.2. Hypothesis Summary for Social Engagement with Adults*

Classroom Feature	Hypothesis	Supported?
Activity Area	Preacademic area	No
Child Behavior	Preacademic behaviors	Yes
Group Arrangement	1:1 with an Adult	Yes
Adult Behavior	Adult Support	No
Initiator of Activity	Child-initiated	No

**Activity area and child behavior.** Generally, children with disabilities receive more help from adults in the classroom than their typically developing peers (Brown, et al., 1999). It follows that these children may need even more adult support when completing tasks that are more challenging, such as those completed in the Preacademic area, raising the possibility that engagement with adults would be more common in Preacademic areas. It was hypothesized that social engagement with adults would occur more often than the base rate when children were in the Preacademic area of the classroom, and when engaged in Preacademic behaviors.

The data analyses suggest that the proportion of social engagement with adults was not different from the base rate when children were in the Preacademic area. However, social engagement with adults did occur more often than the base rate when children were engaged in Preacademic behaviors. In other words, while social engagement was not different from the base rate in the Preacademic activity area, when children were actually engaged in Preacademic behaviors (regardless of classroom area), they engaged more frequently with adults. It is possible that children were not always engaged in Preacademic behaviors when they were in the Preacademic area. The presence of an adult to provide support during more difficult tasks could have the effect of increasing child engagement in the Preacademic task as well as provide the opportunity for the child to be socially engaged with an adult.

Furthermore, social engagement with adults was more common when children were in the Books and Large Motor areas and participating in both of these behaviors. While social engagement with adults may be more common in the Books area, for the same potential reasons as with peers (e.g., easier to engage a child with ASD using a favorite book as a topic, participating in shared reading activities, concrete topics for discussion rather than imaginative play), the higher rates of social engagement with adults in the Large Motor area is more surprising. Reasons for the increase in social engagement with adults may be the same as with peers (e.g., Large Motor environments may be arranged to support interactions and needs of children with ASD, interventions may take place in these areas). Alternately, the increased rates of social engagement with adults may be explained by the fact that when children are in Large Motor areas, adults must be present to supervise these activities, whereas they may or may not be present in other classroom areas. Simply the increased presence and availability of adults in an area may provide more opportunities for interactions between children and adults. Children showed lower rates of social engagement with adults in Large Blocks areas and during Manipulative behaviors. While blocks are often associated with social play activities, other fine motor materials are associated with solitary play (Stoneman, et al., 1983). The results of this study may be indicative of the tendency for children with ASD to fixate on objects rather than interacting with people in the environment (Cunningham & Schreibman, 2008; Swettenham, et al., 1998).

Children with ASD may display stereotypic behaviors in the form of fixation on objects or part of objects to the exclusion of everything else in their surroundings (Cunningham & Schreibman, 2008). Furthermore, these stereotypical behaviors may interfere with appropriate play behaviors (Koegel, Firestone, Kramme, & Dunlap, 1974), and

by extension, the opportunity to interact with others during play. Even beginning in infancy, children with autism focus more on objects than on people, and have difficulty switching between nonsocial and social stimuli (Swettenham, et al., 1998). These tendencies may explain the finding that children with ASD were less likely to be socially engaged with adults when the children were participating in Stereotypic/Repetitive behaviors. The children may simply become too absorbed in the object or stereotypic behavior to attend to other people, or objects, in the environment.

**Group arrangement.** The proportion of social engagement with adults was higher when children were 1:1 with an Adult, providing support for the hypothesis. In fact, social engagement with adults was higher any time an adult was present (i.e., Small Group with 1 or 2 Peers and an Adult, Large Group with 3 or More Peers and an Adult). Logically, the proportion of social engagement with adults was below the base rate when no adult was present (i.e., focal child was Solitary or in a Small Group with 1 or 2 Peers). These findings suggest that adults may be making a concerted effort to engage with children to build relationships with the children and provide opportunities for children to practice social engagement skills.

**Adult behaviors.** Contrary to the hypothesis related to the relationship between adult behaviors and social engagement with adults, children engaged in significantly more social behaviors with adults when the adults were showing approval. Furthermore, when adults showed approval, social engagement with adults was much higher than the base rate (62.9%). While Adult Approval was relatively rare, when it did occur, children were more likely to be socially engaged with adults than the base rate. Adult Approval could include not only adult praise to the focal child, but also approval in the form of holding hands while walking or the

child sitting on the adult's lap while reading a story. It is possible that children with ASD who tolerate and enjoy physical contact and proximity with the adults may have milder symptoms of ASD and may be more likely to initiate social interactions with adults. In other words, children that participate in activities coded as Adult Approval also may be children who are inherently more social. The question of symptom severity and child social behaviors is beyond the scope of this study, but would merit further investigation.

Additionally, and logically, there were significantly fewer instances of social engagement with adults when adults show no behaviors toward the child. In many cases, adults are not in close proximity to the child and thus cannot interact with the child when this code is used.

**Initiator of activity.** Finally, research suggests that during adult-initiated activities, children with disabilities tend to interact more with adults than with their peers (Tsao, et al., 2008), leading to the hypothesis that social engagement with adults would occur more often than the base rate during child-initiated activities. However, data from the current study suggest that there were no differences in the proportion of social engagement with adults, regardless of the initiator of the activity.

**Summary.** Overall, instances of social engagement with adults were more likely when children were in Large Motor areas, engaged in Large Motor behaviors, in Book areas, engaged in Book behaviors, and when engaged in Preacademic behaviors. Furthermore, rates were higher any time an adult was in the same classroom area as the focal child, and whenever adults were expressing approval to the focal child. Social engagement was lower when children were in the Large Blocks area, and when children were engaged in Manipulating activities and during Stereotypic/repetitive behaviors. Finally, social

engagement with adults was less likely when children were alone or in a small group with other peers, but no adult was present. Findings represent the patterns found in this set of data, however, there are several cautions with regard to interpretations and conclusions, as well as limitations to this study that should be considered.

### **Limitations**

While this was a relatively large sample, particularly for research involving children with ASD, these findings should be examined across other settings and time points. All data used in this study were from the pretest of the first year of data collection of the Autism Treatment Comparison study. These data were compared to data from the same children at posttest, but the amount of social engagement was different at the two time points (and greater overall at posttest). Data with higher levels of social engagement may reveal other patterns that are not apparent with lower rates of social engagement as seen in the pretest data. However, pretest data were used rather than posttest to minimize the potential effects of differences due to treatment effects (although selection bias cannot be minimized even for the pretest data). These questions should be addressed through analysis of data at other time points, and potentially across other classroom settings (e.g., rather than just TEACCH, LEAP, and BAU classrooms).

The inclusion of classrooms of different types can be seen as both a strength and limitation of this study. Examining data across multiple classroom types is a strength in that the patterns in the data are apparent across various programs with various environmental conditions. This type of data is also a limitation in that teasing apart these effects of the specific classroom models can be difficult. Future examinations of this data will examine the

differences and similarities across classroom models, but such an examination was beyond the scope of this study.

There are a few limitations due to the method of data collection. The first limitation is related to missing data. All data were coded using videotaped samples of the focal children. However, in some categories, and especially in the activity initiator category, it was impossible to determine the correct code at times because of the videotaped format. Because these data were coded from videos, it was not always possible to know who initiated the activity at the beginning of the tape, as children often were already engaged in activities when the observation began. In this case, data were coded “Can’t Tell” until a clear initiator could be identified (i.e., a new activity began with a clear initiator, or the data collector announced the initiator of the activity). In the Initiator of Activity analysis, approximately 28% of the intervals were coded as “Can’t Tell,” and were excluded from the analyses. Even though these intervals comprised a large section of the data, they were excluded because any patterns present could not be interpreted.

Next, using the CASPER-III coding system, social behaviors with adults were not captured as being two-directional because only child social behaviors were recorded in the child social behavior category while Adult Support, etc. were coded separately in the Adult Behavior category. Although it would be possible to combine these codes into a format similar to the social behavior to/from a peer category, data would have been lost in this combination. If combined, it would not have been possible to ask the question about whether, and which, adult behaviors were associated with social engagement with adults because this category would have been collapsed into the child social behavior category.

The last limitation due to the data collection method is the issue of using momentary time sampling methods to collect data on low incidence behaviors. Social engagement is a low incidence behavior for most children with ASD. As such, by only capturing data using a momentary time sampling method, it is possible that some of these engagements were missed and uncoded because they did not occur at the exact moment when data were coded (i.e., they occurred some time in between the 10 second observation intervals). Momentary time sampling is useful in providing a sampling of behavioral patterns, but may under-represent patterns in low incidence behaviors (Odom & Ogawa, 1992; Sackett, 1978).

Finally, it is important to note that the activity area does not necessarily reflect the child's behaviors. Theoretically, children could be participating in any activity while in a particular area, not just those for which the area was designed. For example, the teacher may use the Food/Snack tables for other activities that require a level surface, like puzzles or art. The activity area would still be coded as Food/Snack even if the activity shifted to manipulatives or art simply because of the location of the activity in the classroom. Alternately, the child may be physically in an activity area, but may be unengaged from activities.

Each of these limitations could be addressed by future studies, some of which are already planned as part of the Autism Treatment Comparison study. Other questions raised by these findings that should be addressed in future research will be discussed in the next section.

### **Future Research**

The purpose of this study was to provide a broad picture of the relationships between features of preschool classroom environments and the social engagement of children with

ASD. However, future research should examine possible relationships among child characteristics and social behaviors across other environmental features (academic skills, social skills, age, other developmental characteristics). It is possible that the patterns found in this study are representative of the social behaviors of only some of the children and may not extend to children with different characteristics. It is also possible that patterns for some of these children may have been masked in the data because data were examined at the group level rather than at the individual child level. Just as there is no perfect intervention that is effective for all children, there may be different classroom features that can be used to facilitate social engagement for different children based on their personal preferences and developmental levels. One example would be a follow-up examination of the language and communication abilities of children with ASD and their social engagement across the ecological features. Language abilities are related to children's functional and symbolic play (Sigman & Ruskin, 1999), and may, by extension, have an impact on children's social engagement during these activities.

Furthermore, research should examine the more complex patterns across multiple classroom features as well as the relationships between features of the classroom and social engagement and possible sequences of behaviors. For example, are there specific classroom areas, behaviors, and group arrangements that, in combination, are associated with higher rates of social engagement (e.g., when children are in the Book area, participating in Book behaviors, and in small groups, is social engagement higher)?

Finally, future research should examine the reasons for higher rates of social engagement that are associated with the specific classroom features examined in the current study. For example, inferences can be made that Large Motor areas may be set up to



promote social engagement for children with ASD, but these are simply inferences. Future research could examine whether these explanations are, in fact, the reasons behind these relationships, or whether there are other factors that have not been considered (e.g., perhaps the sensory input during Large Motor activities is optimal for promoting social engagement for children with ASD).

## **Implications**

This study explored the relationships between features of preschool environments and the social engagement of children with ASD in those settings. Previous research suggests that there are key factors of the environment that may be especially influential in the development of social behaviors for typically developing children, as well as children with disabilities. By examining the contextual features of the environment that are in place when children with ASD are most likely to demonstrate social behaviors toward their peers and adults, it may be possible to help teachers to identify times when social engagement is most likely to occur, allowing them to arrange situations to promote interactions and to ensure that these interactions are positive. Alternately, it is possible to identify situations in which social behaviors are less likely to occur, which would allow teachers to look for ways to facilitate positive social interactions in these features by making adaptations to the environment that can promote social engagements.

In a preschool setting, teachers can help to promote social behaviors between children with ASD and their peers by arranging the environment to support these interactions. For example, by allowing children with ASD to be in the Book area or Food/Snack areas with peers, or encouraging them to engage in Book and Large Motor behaviors with peers, teachers can ensure that social interactions are more likely. Then, as children develop

relationships, teachers can arrange other situations (e.g., in other classroom areas, with other activities) that can expand the play and interaction opportunities for children with ASD and their peers. Furthermore, teachers can allow children with ASD to initiate activities based on their own interests, as child-initiated activities appear to be related to children's willingness to socially engage with peers. Alternately, given that social engagement with peers was significantly below the base rate when children with ASD were alone or 1:1 with an adult, teachers can minimize situations in which these group arrangements occur to allow more potential opportunities for interactions.

If teachers want to increase the social engagement of children with ASD and adults in the classroom, they can encourage children with ASD to participate in Large Motor and Book behaviors, as these behaviors were related to social engagement with both peers and adults. Simply being in the same area as the children with ASD increased the likelihood of social engagement with adults. By situating themselves near the children with ASD as they engage in activities, adults can observe the children's behaviors and interests and use these interests as a means of initiating and sustaining interactions with the children.

## **Conclusion**

There are many potential features of the environment that have an impact on children's social behaviors and overall social development. Included in these features are: activity areas, group arrangements, child behaviors, adult behaviors, and the initiator of activities. This study offered a preliminary investigation of the relationship between these features and the social behaviors of children with ASD.

Information from this study can make a significant contribution to the knowledge base surrounding the social development of young children with ASD. This study explored

the relationships between ecological features of a preschool environment and children's social engagement. It began an investigation of the possible influences of these environments on the social development of children with ASD in these environments, and provided a summary of the features of an environment that are in place when these children were most likely to demonstrate social behaviors. There have been several similar studies of the relationship between the ecological features of an environment and social development of children with disabilities (Brown, et al., 1996; Brown, et al., 1999; Sontag, 1997; Tsao, et al., 2008), but to date, no studies have focused exclusively on the relationship between ecological features and social development of children with ASD. Given that children with ASD may be especially at risk for difficulties in the social development, this study may be especially important. Findings from this study can be used to inform future research questions as well as to provide teachers with information about key features of classroom environments that are related to the social engagement of children with ASD, allowing them to adapt the environment to facilitate the social development of these children.

## Appendix A. CASPER-III Videotaping Instructions

### CASPER Instructions

- Plan to videotape for a **full 30 minutes of center time**. If necessary you can include *several (no more than 5) minutes* of another activity. Once you have started the camera, start filming the focal child right away and **run the tape continuously**. Please identify the focal child right away (“*Student in red shirt is student 6037*”)
- As soon as you start videotaping please say out loud WHO initiated the activity the child is engaged in. You may have to ask the teacher for this information. Did the focal child choose the center, did the adult choose the center or did a peer choose the center?
- Videotape the child, AS WELL AS the context of the environment. It is important to capture on tape WHERE the child is, WHAT the child is doing, WHO the child is with, and if possible HOW the ADULT is responding. We need to see how many children are in the activity area with the focal child.
- We need to be able to hear as much as possible (from adults and children) so please get as close as you can (while keeping some of the context in the picture).
- If student has to go to the bathroom, keep camera rolling outside the door- do not stop the camera (and do not film the child in the bathroom!)

### Tips from Coders:

- Avoid filming the back of the focal child. Try to position camera at the front of the child. This helps us code what the child is doing and saying.
- Film close enough to the focal child that the microphone can pick up what the focal child and others with the focal child are saying.
- Try to avoid filming close to another group of children/adults. This creates a lot of background noise making it difficult to hear what is being said with focal child.

## Appendix B. CASPER-III Manual

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### Code for Active Student Participation and Engagement Revised

#### (CASPER III)

#### CASPER Training Manual for Observers

Ling-Ling Tsao and Samuel L. Odom

Indiana University

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The CASPER Coding System was initially developed in 1992 by Patty C. Favazza, Samuel L. Odom, and Eva Horn for Project BLEND, an Early Education Programs for Children with Disabilities (EEPCD) model demonstration grant at the John F. Kennedy Center for Research and Department of Special Education at Peabody College of Vanderbilt University. The CASPER II coding system was revised in October of 1994 by William H. Brown, Samuel L. Odom, Ariane Holcombe, and Grant Youngquist for the Early Childhood Research Institute on Inclusion (ECRII) which is funded by the Early Education Programs for Children with Disabilities (EEPCD) of the U. S. Department of Education (Grant # H024K40004). The CASPER III coding system was revised in December, 2001 for use in the Cost, Quality, and Outcome of Inclusion study, also funded by the U.S. Department of Education (Grant # H324C010037). Jon Tapp, at Vanderbilt University, developed the Interval Manager System for Computers and Grant Youngquist wrote the initial draft of the Interval Manager System Instructions for this manual.

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Codes for CASPER are based on the ESCAPE coding system (Carta, Greenwood, & Atwater, 1985). CASPER observers' training is based on procedures recommended by Hartmann and Wood (1990). We would like to acknowledge the following people who made contributions during the development of CASPER: Paulo Alcantara, Lisa Ferguson, Susan Janko, Shouming Li, Jules Marquart, Patti McKenna, Pam Pallas, Gary Sturgill, Ling-Ling Tsao, Katie Thompson, and Pamela Wolfberg.

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## I. INTRODUCTION

The Code for Active Student Participation and Engagement Revised (CASPER) is a direct observational system designed to collect information about preschool environments (e.g., classrooms, child care settings) and behavior of participants in those environments (e.g., children, adults). The CASPER is called a focal child system because a single child serves as the focus of the observations and all decisions about categories to be coded are made in reference to that focal child. The CASPER consists of two types of coding categories: (a) those that give information about the focal child's environmental context (i.e., group arrangement, group composition, activity area and activity, initiator of the activity) and (b) those that give information about the behavior of the focal child or peers' and adults' behavior in reference to the focal child (i.e., child behavior, child social behavior, adult behavior).

No The CASPER system incorporates a momentary time sample procedure for collecting observational information. Using this procedure, observers watch a child for a brief period of time (i.e., a two-second observation interval), and then during the next 28 seconds, record one category for each of the seven environmental and behavioral variables. Because the activity area and the initiator of an activity may change frequently during an observation, observers may need to use contextual information from the time period between a two-second observation interval and the subsequent two-second observation interval to determine the category to be recorded. The remaining five environmental and behavioral codes, (i.e., group arrangement, group composition, child behavior, child social behavior, and adult behavior) are determined by what happens during the two-second observation interval. Two-second observation intervals are repeated across a specific period of time to create an individual session for a focal child (e.g., 30 minutes, 1 hour). Observational data are collected on laptop computers and later downloaded to a database. The data obtained from the CASPER can provide information about children's preschool environments and the behavior of focal children, their peers, and adults in those environments. In addition, the temporal relationships among environmental and behavioral events can be analyzed.

### Observer Training for The CASPER II Manual

The CASPER Training Manual has been designed to prepare observers to become reliable in collecting observational data for the seven environmental and behavioral codes. Training is arranged to move observers from initial memorization of



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environmental and behavioral categories to reliable use of the coding system for collecting information about children and their preschool environments. Observer training for the seven codes will be performed in a two-step sequence that parallels the environmental and behavioral dimensions of the CASPER coding system. That is, first observers will learn the environmental codes of group arrangement, group composition, activity area and activity, and initiator of the activity. Second, observers will learn behavioral codes of child behavior, child social behavior, and adult behavior. Before in situ observer training (i.e., actually using CASPER II in classroom and child care settings), a criterion of 100% should be obtained for code definition quizzes to ensure that observers understand the environmental and behavioral codes and their definitions. After this training criterion is achieved on the code definition quizzes, in situ observer training for the four environmental codes will begin. When observers reach the interobserver agreement training criterion on each of the environmental codes, in situ observer training on the three behavioral codes should begin and continue until the interobserver agreement training criterion is achieved.

During in situ observer training (i.e., practice coding in classrooms and child care centers) to establish satisfactory interobserver agreement, a criterion of 85% interobserver agreement should be obtained for each environmental and behavioral code. After in situ CASPER Training, to assist in maintaining satisfactory interobserver agreement and to obtain a sufficient number of interobserver agreement measures across observations, one of every five observations for each focal child should be observed and recorded by two observers concurrently (i.e., 20% per focal child). After observations, interobserver agreement scores should be determined by calculating the total number of agreements divided by number of agreements plus number of disagreements multiplied by 100 (i.e.,  $\text{agreements} / (\text{agreements} + \text{disagreements}) \times 100$ ) for each of the environmental and behavioral codes.

### Contents of The CASPER Manual

The CASPER Manual begins with an INTRODUCTION and then a section (i.e., II. CODING SYMBOLS) that provides the seven environmental and behavioral codes and their respective acronyms arranged by contextual and behavioral dimensions. For example, the first environmental category is Group Arrangement and this code has seven possible group arrangement options (i.e., solitary, one-to-one, small group, small group with adult, large group, large group with adult, can't tell). The seven

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environmental and behavioral variables and their respective coding options and acronyms are listed on pages 6 and 7. The next section (i.e., III. CODING DEFINITIONS) delineates the operational definitions for the seven environmental and behavioral categories and their respective codes (pp. 8-28). The next section (i.e., IV. QUIZZES) provides sample forms of quizzes, which can be copied for taking tests to memorize codes, for each environmental and behavioral category and their respective codes (pp. 29-45). The next section (i.e., V. OBSERVER TRAINING) describes a process with five training phases for systematic observer training (pp. 47-57). The observer training includes initial orientation, code memorization, quizzes, and in situ training sessions in field settings. The proposed training process is suggested for observer training but may need to be adapted for local research site circumstances. Orientation, code memorization, and in situ practice are all essential elements for high-quality observer and interobserver agreement training and must be conducted on a regular schedule (cf. Hartmann & Wood, 1990). The next section (i.e., VI. COLLECTING OBSERVATIONAL DATA USING INTERVAL MANAGER) provides information on using the CASPER II Coding System with Interval Manager, a flexible software program for laptop computers (pp. 58-72). This section includes information on: (a) installing Interval Manager; (b) collecting data with Interval Manager; (c) editing, saving, backing-up, and printing data files; and (d) computing interobserver agreement scores between two observers. Finally, REFERENCES and two APPENDICES, which contain forms that will assist trainers in organizing observer training as well as monitoring progress on interobserver agreement scores across time, are provided in the last two sections.

## II. ENVIRONMENTAL AND BEHAVIORAL CODING SYMBOLS

### ACTIVITY AREA AND ACTIVITY CODES

T	Transition
M	Manipulative
LM	Large Motor
B	Story-time (Books)
A	Art
P	Pretend Play/Sociodramatic Play
L	Large Blocks
S	Sensory
D	Dance/Music/Recitation
F	Snack/Meals (Food)
H	Self Care (Self Help)
R	Pre-Academic/3 Rs
CP	Computer Activities
G	Circle Time (Group)
?	Can't Tell

### INITIATOR OF ACTIVITY CODES

AD	Adult
CH	Focal Child
TP	Typical Peer
DP	Peer with Developmental Delays
?	Can't Tell

### Group Arrangement

Solitary

1:1 w/ Adult

Small group w/ 1-2 peers

Small group w/ adult + 1-2 peers

Lg. group w/ 3+ peers

Lg. group w/ 3+ peers + adult

Can't tell

code as solitary  
if alone in center  
area, even if talking  
w/ adult & another  
center.

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**ENVIRONMENTAL AND BEHAVIORAL CODING SYMBOLS  
(continued)**

**CHILD BEHAVIOR** (Hierarchy for the following codes)

B	Books
R	Pre-academics/3 Rs
P	Pretending/Sociodramatic Play
A	Art
GR	Games with Rules
D	Singing/Reciting/Dancing
H	Self Help or Self Care
CP	Computer
M	Manipulating
LM	Large Motor
C	Clean-up
W	Walkabout
FA	Focused Attention
NE	Not Engaged
?	Can't Tell

**CHILD SOCIAL BEHAVIOR** (Hierarchy for the following codes)

SA	Social Behavior Directed to Adult
NA	Negative Social Behavior to Adult
SPT	Social Behavior Directed to a Typical Peer
NPT	Negative Social Behavior to a Typical Peer
SPD	Social Behavior Directed to a Peer with Disabilities
NPD	Negative Social Behavior to a Peer with Disabilities
PFT	Social Behavior Directed from a Typical Peer
NFT	Negative Social Behavior from a Typical Peer
PFD	Social Behavior Directed from a Peer with Disabilities
NFD	Negative Social Behavior from a Peer with Disabilities
NO	No Social Behavior
?	Can't Tell

**ADULT BEHAVIOR** (Hierarchy for the following codes)

AS	Adult Support
AA	Adult Approval
AC	Adult Comment
GD	Group Discussion/Directions
NO	None
?	Can't Tell

### III. CODING DEFINITIONS

#### A. ACTIVITY AREA AND ACTIVITY CODES

Activity Area codes represent information about the location of the focal child within the physical ecology of an early childhood setting (i.e., activity areas, ongoing activity). In general, activity area codes will be determined by where the child is within an early childhood setting rather than what the child is doing (the exception to this rule is the transition and large motor category). An activity area may be a relatively permanent area (e.g., toy play area, kitchen area, book area) or a temporary area or activity (e.g., a moveable water table, easels put up for painting, musical instruments brought out from a storage area). Observers should code the activity area that occurs during the two-second observation interval, but may use information obtained outside of this two-second observation window to interpret the immediate context of the activity. For example, the teacher may have signaled a transition by saying it is time to line up, but the observer only sees children standing in line during the two-second window. In this case, observers should use the contextual information from the teacher's instruction in making a decision about which code to employ (i.e., **Transition**). **If a child is moving among activities, the context should be coded as transition until the child has stopped in an activity area or in proximity to an activity long enough to potentially become involved in the activity (please note that the child does not have to be engaged, but the clear opportunity to participate exists).**

The decision about the activity area should reflect where the focal child is in relation to activity materials (e.g., Large Blocks, Snack/Meals/Food, Circle/Large Group) and ongoing activities (e.g., motor, Music/Dance activities) during the two-second observational interval. As an example, the focal child is in the large block area and then walks to the housekeeping area and sits down. Depending when the two-second observation window occurred, the activity area or activity might have been coded as **L** (for Large Blocks) when in the focal child was in the block area, **T** (for Transition) when he or she was moving from the block area to the housekeeping area, and **P** (for Pretend/Sociodramatic Play) when she stopped in the housekeeping area. A method of making a separate determination of who initiated the activity will be described in subsequent sections on the Activity Initiator Codes. The following fifteen activity area and activity codes may be coded.

when child transitioning mark child behavior as Not Engaged unless child is holding a schedule card then mark child behavior manipulating

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1. **Transition (T)** - Transition is coded when the focal child is moving from one activity to another. Transition begins when the focal child leaves the current activity area or activity. Transition ends when the focal child enters another activity. Passing through an activity or area without stopping (i.e., if the pass through takes the two-second observation interval) should be counted as transition and not the activity through which the focal child is passing. When outside at play or in the gym, the transition code should be used conservatively and the focal child must clearly be waiting to participate in a new activity (e.g., waiting to ride a bike, waiting to swing, waiting to go for a walk).

2. **Manipulative Play (M)** - Manipulative Play is coded when the focal child is located in activity areas or activities that focus on the small motor movements of the hand, fingers, wrists, and hand-eye coordination. Manipulative Play activities include playing with playdough, putting together puzzles, stacking rings, stringing beads, sewing, placing pegs in a pegboard, and fitting Tinkertoys. Manipulative play activities also includes pushing and pulling small toys or buttons on toys and playing with cars and trucks. If while playing with playdough in a manipulative play activity area or activity, a child or adult arranges a pretend play activity (e.g., passes out plates and candles to pretend making a birthday cake; uses playdough in eating area to make hamburgers), the activity is coded as **P** (Pretend). Legos and play at the lego table are also coded **M** (Manipulative Play).

3. **Large Motor (LM)** - Large Motor is coded when the focal child is located in an activity area with large motor equipment (e.g., bikes, wagon, swings, slides, see-saws, monkey bars, obstacle course) or in an activity in which large motor behavior is being exhibited (e.g., children can or are running, jumping, climbing). Large Motor is typically coded as the activity context during outdoor play activities unless adults, peers, or the focal child initiates a more specific activity such as Sensory by scooping in the sandbox or Group Games with Rules by playing "Duck-Duck-Goose." Examples of large motor activities include: swinging, climbing, running, hopping, skipping, chasing another child, riding tricycles, walking, being pulled in a wagon, and being pushed in a wheelchair. Large motor activities typically occur in the gym or during outdoor play, but may also occur in classrooms and other settings. Examples of other indoor large motor activities include: playing on or using an obstacle course, sliding down a slide, rolling or climbing on large wedges, pushing large rolling equipment, climbing in or out of plastic crates,

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rough and tumble play, and pillow fights. In addition, large motor activities should be coded when a teacher (or physical therapist) has clearly set up a structured large motor activity (e.g., working on walking, teaching stair climbing).

**4. Storytime/Books (B)** - Storytime (**B** for Books) is coded when the focal child is located in an activity area that has materials for reading, listening, and telling a story. Storytime materials often involve books, puppets, flannel board, or other media materials (e.g., story records, story videotapes). Storytime should be coded if the focal child is located in an activity area arranged for reading books and listening to stories. In addition, the focal child may be located in a group activity in which reading, telling, or listening to a story is occurring. Playing instruments with a book or singing along with a book or flannel board is also coded as **B** (storytime). If the focal child is watching a video or movie, the activity is coded as storytime.

**5. Art (A)** - Art is coded when the focal child is located in activity areas for painting, drawing, coloring, writing, or sculpting to create an art product. In these areas, children typically may use materials such as crayons, paints, markers, brushes, finger-paints, coloring, pipe cleaners, clothes pins, glue, paste, cut out shapes, tape, scissors, and stamps.

**6. Pretend/Sociodramatic Play (P)** - Pretend is coded when the focal child is located in areas with materials that are typically used in a symbolic manner (e.g., dress up clothes, kitchen utensils) or that support activities with other children that contain make-believe roles or themes (e.g., fireperson hat, doctor's kit). Examples include: dressing-up clothes, cooking in kitchen area, washing babies, pretending to have a birthday party, and going to the grocery store. Symbolic play may occur in other activities also, but this code should only be used if the activity materials were specifically designed to support pretend play.

**7. Large Blocks (L)** - Large **B**locks is coded when the focal child is located in activity areas with large building or construction materials. Large Blocks is differentiated from manipulative play in that the play materials are typically larger and used on the floor rather than on a table.

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8. **Sensory (S)** - **Sensory** is coded when the focal child is located in activity areas where children might use and play with materials designed to elicit a specific sensation (e.g., touching, feeling, scooping, pouring, burying). Examples of these activities include sensory tables or sand boxes filled with materials such as water, sand, rice, beans, birdseed, and noodles. In addition, an activity area or activity of blowing bubbles should be coded as sensory. If touching, petting or playing with a real animal (e.g., rabbit, kittens, puppy) is the focus of the general activity, the activity area is coded as **S** for sensory.

9. **Dance/Music/Recitation (D)** - **Dance/Music/Recitation** is coded when the focal child is located in activity areas that contains instruments (e.g., bells, drums, flutes) for making music or general activities that include singing, dancing, listening to music, clapping and moving to music, doing fingerplays, and reciting poems. Examples of this activity include children sitting with the entire group singing "EENSY-WEENSY SPIDER", reciting the poem "FIVE LITTLE PUMPKINS", several children doing the actions to a rhythmic aerobics record or a child listening to music on the headphones. Dance/Music/Recitation is coded when instrument play is led by a teacher during a group music time or when the focal child selects and uses a musical instrument from a shelf of many different type toys (e.g., trucks, books, blocks). If instrument play occurs during another group activity (i.e., during story time, while on a walk), the larger context is used to code the activity (**B** for story time or **LM** for the walk) and the actual instrument play is coded under child behavior behavioral code Dance/Music/Recitation **D**).

10. **Snack/Meals/Food (F)** - **Snack/Meals/Food** is coded when the focal child is located in an activity area that is being used for the preparation and the eating of real food. Snack/Meals/Food is coded when children are involved in activities that include setting the table, passing out food, cooking and preparing food stuffs (e.g., measuring ingredients, slicing foods, pouring liquids, stirring ingredients). Pretending at setting the table or preparing or eating food is considered **P** (See # 6).



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**11. Self Care/Self Help (H)** - Self Care/Self Help is coded when the focal child is located in an activity area for self-care (e.g., bathroom) or is engaged in self-care activities which children practice skills to meet their general personal needs (e.g., toileting, washing hands, dressing, brushing teeth, putting on eye glasses, undressing, and combing hair). Self-care activities are also coded when they are the focus of direct instruction (e.g., the child is learning to pull up his pants in a toileting program) or when they are a functional part of the classroom events (e.g., the child is putting on her coat before going outside).

**12. Pre-academic/3 Rs (R)** - Pre-academics/3Rs is coded when the focal child is located in an activity with the explicit objective of practicing or teaching skills related to traditional pre-academic and academic information (e.g., matching or naming colors, shapes, and common objects, reading, writing, copying letters, reciting the alphabet, naming letters, counting, identifying numbers). Designated science and writing centers are considered preacademic activity areas.

**13. Computer Activities (CP)** - Computer Activities is coded when the focal child is located in an activity area or activity in which computers are used irrespective of how the computers are used (i.e., for instruction, viewing, or fun).

**14. Circle/Large Group Time (G)** - Circle/Large Group Time is coded when the focal child is located in an activity area or activity that involves sitting in a group in which the adult is discussing or presenting information. The children may be sitting in chairs or on the floor. The adult may be discussing various topics including: the weather, holidays, who is present or absent, and past or future events. If the adult is reading a story, **B** should be coded. If the teacher and the group is singing a song, **D** should be coded. Similarly, if the teacher begins to teach pre-academic information in group (e.g., counting the days during calendar time), **R** should be coded.

**15. Can't Tell (?)** - Can't tell (?) is coded when the above listed activity areas or activities do not apply or seem to fit the situation or if two or more of the definitions stated above seem to fit equally as well. If you code Can't Tell, see your coordinator after the observation to discuss the event. If a focal child is placed in Time Out, the activity is coded '?'. If a child goes to an area designated as a Quiet Time Area, the activity is coded as '?'. This does not include the focal child lying down in the middle of the classroom or lying down while in another activity is being conducted (e.g., story time, transition).

## B. INITIATOR OF ACTIVITY CODES

Activity initiator is defined by the person (or persons) who selected the activity area where the child is located or the activity in which the focal child is involved. Although observers watch the focal child during the two-second observation interval, they should remember that information about who started the activity may be obtained from adult or child behavior before any specific two-second observation window. For example, a teacher may initiate a painting activity during the 28-second recording time period before a two-second observation interval. If the child is involved in that adult initiated painting activity or is located in the activity area for painting, then the activity initiator is coded as adult initiated even though the activity was started prior to the two-second observation interval. In addition, the activity may last for a relatively long period of time (e.g., 15 minutes) and the initiator will still be an adult if the teacher had initially arranged the area for art activities and the focal child continued to paint during that time period without becoming involved in another activity. The following six activity initiator options may be coded.

1. **Adult (AD) - ADult (AD)** is coded when the activity area or the activity in which the focal child is observed was selected or clearly started by an adult. Adult selected activities must clearly be started by gestural (e.g., pointing to an activity, motioning the focal child to come to an area) or verbal cues (e.g., "Let's paint now", "You guys go over to the kitchen area") to enter an activity area or become involved in an activity. **Placement of materials in an area without an accompanying gestural or verbal cue to use them does not constitute an adult initiated activity.** Examples to be coded AD include: a volunteer tells the focal child to go to the sink and wash his or her hands and the focal child complies; an aide has selected a story and is reading it to the focal child and other children; a teacher is leading a group of children (including the focal child) in singing; and the teacher says "It's time to go outside", and all of the children begin moving towards the door. If, while the adult is arranging an activity (e.g., art, snack), the focal child starts the activity before the adult calls the child or peers to the area, the activity initiator is the child.

\* ~~code~~ <sup>code</sup> adult initiated activity if adult chooses center child is playing in. Continue to code as adult initiated as long as child is in the center (even if child selects activity in center).

\* code as child initiated activity if child chooses center.  
Continue to code as child initiated as long as child is in  
center (even if adult selects activity in center).

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2. **Child (CH)** - **CH**ild (CH) is coded when the activity area or the activity in which the focal child is observed was selected by the focal child. Examples include: the focal child finishes snack and walks to the sink with his or her dirty dishes; during freeplay the focal child moves from a center where the teacher is leading a group in water play to an area where climbing equipment is located; and the focal child continues to play with trucks following a teacher request to clean up.

3. **Typical Peer (TP)** - **TP**ypical **TP**eer (TP) is coded when the activity area or the activity in which the focal child is observed was selected by a peer or peers without developmental delays. Typical peer selected activities must clearly be started by gestural/motor cues (e.g., pointing to an activity, motioning the focal child to come to an area) or vocal/verbal cues (e.g., "Let's play doctor", "You guys following me") to enter an activity area or become involved in an activity. Examples include: peer or peers without developmental delays are engaged in pretend play (dress-up) and invite the focal child to join in the pretend play activity; a peer without developmental delays pours out the blocks on the floor and calls the focal child to join him or her in building; and peers without developmental delays take the focal child's hands to play "ring around the roses."

4. **Peer with Developmental Delays (DP)** - **DP**eer with Developmental **DP**elays (DP) is coded when the activity area or the activity in which the focal child is observed was selected by a peer or peers with developmental delays. Activities selected by peers with developmental delays must clearly be started by gestural/motor cues (e.g., pointing to an activity, motioning the focal child to come to an area) or vocal/verbal cues (e.g., "Let's play doctor", "You guys following me") to enter an activity area or become involved in an activity. Examples: a peer with developmental delays calls the focal child over to do puzzles; a peer with developmental delays tells the focal child to follow him to tricycles and the focal child joins him in riding; and peers with developmental delays take the focal child's hands to play "ring around the roses."

5. **Can't Tell (?)** - **Can't tell (?)** is coded when it is impossible to determine the initiator of the activity in which the focal child is engaged. Example: the observer arrives and begins coding after an activity has begun and cannot tell who initiated the activity. If you code Can't Tell, see your coordinator after the observation to discuss the event.

### C. CHILD BEHAVIOR CODES

Child behavior is coded when the focal child is attending to, engaging in, or involved in an activity during the two-second observation interval. If more than one child behavior occurs during the two-second observation window, code the focal child behavior that is highest in the hierarchy delineated below (e.g., 3.

Pretending/Sociodramatic Play before 8. Manipulating). The following fourteen child behavior options may be coded.

1. **Books (B)** - **Books (B)** is coded when the focal child is actively involved with books (e.g., pointing, looking at pictures, vocalizing about the book, turning the pages of a book). Again, simply carrying a book around the room is not sufficient to code books B.

2. **Pre-academic/3 Rs (R)** - **Pre-academic/3Rs (R)** is coded when the focal child engages in behavior related specifically to pre-academic skills (e.g., matching or naming colors, shapes, and common objects, writing, copying letters, reciting the alphabet, naming letters, counting, identifying numbers). An exception to this rule is that reading a book should be coded as B.

3. **Pretending/Sociodramatic Play (P)** - **Pretending/Sociodramatic Play (P)** is coded when the focal child uses objects or materials in a symbolic manner or performs a role in a play theme with other children. Pretend play should include pretending with inanimate objects (blocks, toys in sand table, "cooking" toys) if the inanimate objects are used in a clearly symbolic manner (e.g., a large block is treated as a baby, a car is pushed with accompanying motor noises). Barking or other types of animal imitation is also considered pretend behavior. Playing with dolls or stuffed animals is considered pretend if the child clearly appears to be using the doll (or stuffed toy) as if it were an animate object (e.g., as a baby). This could include talking to it, feeding it, dressing it, rocking it, having it imitate people. If the child is simply carrying a stuffed animal around the room without symbolic or a pretend element to their behavior, the child behavior should reflect whatever else is happening (i.e., **W** walkabout).

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4. **Art (A)** - **Art (A)** is coded when the focal child is involved in creating an object of art (e.g., drawing a picture, making a collage, painting at an easel, pasting paper, making a picture on a drawing program on a computer). Typically, the focal child's activity should be designed to produce a permanent product (e.g., a picture to be sent home). Rolling or shaping play dough should be coded as Manipulative **M** unless there is a clear purpose of producing a permanent figure.

5. **Games with Rules (GR)** - **Games with Rules (GR)** is coded when the focal child engages in games that have established and defined rules. Examples include board games (e.g., Candyland), social games organized by adults or peers (e.g., "Duck-Duck-Goose," "Musical Chairs," "London Bridge"), or games that are played at a computer. Informal and loosely organized play (e.g., chase, tag) should be coded as Large Motor **LM**. Games that consist of pretending, role assignment, and a consistent play theme should be coded as Pretend **P**.

6. **Dance/Music/Recitation (D)** - **Dance/Music/Recitation (D)** is coded when the focal child performs songs, poems, nursery rhymes, and dances. Singing, playing with musical instruments, doing fingerplays with poems, singing songs and moving to music would all be coded as Dance/Music/Recitation. Listening to music or records would be coded as Focused Attention **FA** (See # 12).

7. **Self-Care/Self Help Behavior (H)** - **Self-Care/Self Help Behavior (H)** is coded when the focal child is actively involved with or partially participating in caring for his or her personal needs. Personal needs include: eating; toileting; dressing, putting on eye glasses; tying shoes; and grooming (e.g., combing hair, washing hands; brushing teeth). Examples of involvement in self-care include feeding self with or without partial assistance from the teacher, washing or drying hands, and holding hands and arms up for teacher to wash or dry. If child is clearly passive while an adult washes them, the child behavior will be coded as Not Engaged **NE**. While eating, child behavior is coded **H** (self help) if the focal child is exhibiting some motoric behavior (e.g., raising cup or food to mouth, chewing, swallowing, sucking on food, reaching for food) or he or she has food or drink in mouth. If the focal child is clearly playing with food, drink, or utensils, child behavior is Manipulative Behavior **M**. If walking occurs as part of self-care (e.g., walking to throw Kleenex away, put wash cloth in basket, throwing away paper towels after washing and drying hands), child behavior is still coded Self-Care/Self Help **H**.

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8. **Comuter (CP) – ComPuter (CP)** is coded when the focal child actively use the computer. For example, this child may move the mouse, point to the screen, touch the keyboard, or talk about the program on the computer. If the child simply watches the screen without any eye-hand coordination, the child's behavior should be coded as Not Engaged **NE**.

9. **Manipulating (M) - Manipulating (M)** is coded when the focal child employs coordinated eye-hand movements to interact in a meaningful manner with materials and objects. Manipulating usually involves holding, moving, grasping, and releasing objects and materials. Manipulating also includes functional play with objects (e.g., pushing a match box car, flying a toy plane, dialing a telephone). **If the focal child emits clear cues (e.g., car sounds, plane sounds, pretend conversation with a friend on a phone) during the two-second observation window, however, child behavior should be coded as Pretend Play P.** If the focal child gives to or receives objects or materials from another child, the child behavior should be coded Manipulating **M**. If stereotypic behavior (i.e., repetitive movements that are not apparently functional) such as arm flapping, spinning plates, watching a piece of string, mouthing an inedible object) is observed, child behavior is coded as Not Engaged **NE**. If child is mouthing pretend food or pretending to eat, however, child behavior is coded as Pretending **P**.

→ remember  
to code  
manipulating  
if transition  
w/ visual  
schedule

\* No

10. **Large Motor Behavior (LM) - Large Motor Behavior (LM)** is coded when the focal child employs large muscles movements (e.g., crawling, running, climbing, hopping, skipping, throwing, rolling, kicking, and catching). Large motor behavior may occur during structured classroom activities (e.g., focal child is learning to walk on a balance beam) or during gym, inside, and outdoor play (e.g., focal child is riding a tricycle on the playground, shooting, and throwing a ball). If the focal child is climbing in and out of a chair for the entire two-second interval, child behavior is coded Large Motor **LM**. When a focal child is swinging on a swing, riding in a wagon, or being pushed in a wheelchair, child behavior is coded Large Motor **LM**, if he or she is using large muscles (e.g., by holding on to swing ropes, moving arms or legs to push a wagon, pushing her own wheelchair). If while on a swing or in a wagon or while being pushed in a wheelchair, the focal child is motorically passive but shows signs of enjoying the activity (e.g., smiles, laughs, anticipates being pushed), child behavior is coded Focused Attention **FA**. If while on a swing or in a wagon, or while being pushed

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in their wheelchair, the focal child shows no interest in the activity (e.g., no smiles, no laughter, is crying) and is not motorically involved, child behavior is coded Not Engaged NE.

**11. Clean-Up (C)** - Clean-Up (C) is coded when the focal child is putting away toys, instructional materials, play equipment, furniture, food, and dishes. If the child begins washing his or her hands after cleaning up (e.g., to remove paint or food), the child behavior is coded Self-Care/Self Help H. If walking occurs as part of clean-up (e.g., walking to throw away trash), child behavior is coded Clean Up C.

**12. Not Engaged (NE)** - Not Engaged (NE) is coded when the focal child is not actively engaged in any of the child behavior categories delineated above. The child's behavior is characterized by lack of focused attention (e.g., looking all around the room during the two-second interval, looking out the window). Also, if the child is engaged in disruptive behavior, crying, or stereotypic behavior, child behavior is considered Not Engaged NE.

**13. Can't Tell (?)** - Can't Tell (?) is coded when the focal child has not been observed because he or she is temporarily out of view or because his or her behavior does not fit any of the above codes.

if a child  
puts materials  
away in 1:1  
setting code  
as manipulating

not  
1:1

\* centers -  
act of  
putting on  
shelf -  
stand up  
putting  
shelf  
\*

## D. CHILD SOCIAL BEHAVIOR CODES

Child social behavior is defined as any socially directed motor/gestural or vocal/verbal behavior that the child directs to a person (or persons) during the two-second observation interval. The following twelve child social behavior options may be coded.

**Social Behaviors** are actions made toward another child. Such direction may be identified by physical orientation of a child, the use of a child's name, or a phrase within a verbalization that indicates the words are directed toward another child. These actions may be vocal/verbal or gestural/motor. They should have a communicative intent. Examples include: talking to a peer, greeting (waving good-bye to another child), sharing (giving an object), clearly laughing at or with a peer, touching (giving a hug, kiss, pat on the arm, holding hands), or calling a child's name. If the child is talking what he/she is doing without clearly calling other child's name for attention, then it is coded as No Social Behavior **NO**.

**Negative Social Behaviors** include nonverbal behaviors such as hitting, pushing, grabbing away toys from another child, and other aggressive behaviors. They also include vocal or verbal behaviors such as shouting at another child, talking to another child in a crying or whining voice, saying derogatory words to another child, or telling another child "No" or "Stop" (i.e., the pragmatic function is to request another child to stop their actions or rejection). For example, the child may hit, push, kick, or bite a peer, then, negative social behavior should be coded. However, pulling on a toy or object with another child (i.e., without negative social behavior from the child or the peer) is not considered as negative social behavior.

**1. Social Behavior Directed To Adult (SA)** Social Behavior Directed to Adult (SA) is coded when the focal child clearly directs any gestural/motor or vocal/verbal behavior to an adult. Examples include: talking to adults; greeting (waving good-bye to the teacher); sharing (giving an object); touching (giving a hug, kiss, pat on the arm); calling the adult's name; or any other socially directed behavior. Responding to an adult is also considered **SA**. For example, if an adult asks a question and the focal child provides an answer or raises his/her hand, child social behavior is coded **SA**. If the focal child takes an object from the teacher or adult, child social behavior is coded **SA**. Sitting in an adult's lap is coded **SA** for the duration of the behavior.

**2. Negative Social Behavior Directed To Adult (NA)** -Negative Social Behavior Directed to Adult (NA) is coded when the focal child clearly directs negative motor/gestural or vocal/verbal behavior to an adult. Examples include: the focal child



hitting, pushing, kicking, biting, making negative remarks to an adult; and crying and fussing that is clearly directed at an adult.

**3. Social Behavior Directed to a Typical Peer (SPT)** Social Behavior Directed to a Typical Peer is coded when the focal child clearly directs any motor/gestural or vocal/verbal behavior to another typically developing child.

**4. Negative Behavior Directed to a Typical Peer (NPT)** Negative Behavior Directed to a Typical Peer is coded when the focal child clearly directs negative gestural/motor or vocal/verbal behaviors to a typically developing peer or peers.

**5. Social Behavior Directed to a Peer with Disabilities (SPD)** Social Behavior Directed to a Peer with Disabilities is coded when the focal child clearly directs any motor/gestural or vocal/verbal behavior to another child with disabilities.

**6. Negative Behavior Directed to a Peer with Disabilities (NPD)** Negative Behavior Directed to a Peer with Disabilities is coded when the focal child clearly directs negative gestural/motor or vocal/verbal behaviors to a peer or peers with disabilities.

**7. Social Behavior from a Typical Peer (PFT)** Positive Behavior From a Typical Peer is coded when a typically developing peer clearly directs any motor/gestural or vocal/verbal behaviors to the focal child and the focal child does not overtly respond (beyond looking, smiling, or observing).

**8. Negative Behavior from a Typical Peer (NFT)** Negative Behavior From a Typical Peer is coded when a typically developing peer clearly directs any negative motor/gestural or verbal/vocal behaviors to the focal child and the focal child does not overtly respond (beyond looking or observing).

**9. Social Behavior from a Peer with Disabilities (PFD)** Positive Behavior From a Peer with Disabilities is coded when a peer with disabilities clearly directs any motor/gestural or vocal/verbal behaviors to the focal child and the focal child does not overtly respond (beyond looking, smiling, or observing).

**10. Negative Behavior from a Peer with Disabilities (NFD)** Negative Behavior From a Peer with Disabilities is coded when a peer with disabilities clearly directs any negative motor/gestural or verbal/vocal behaviors to the focal child and the focal child does not overtly respond (beyond looking or observing).

**11. No Social Behavior (NO)** NO Social Behavior (NO) is coded when the focal child is not directing any motor/gestural or vocal/verbal behavior to adults or peers.

Examples include: the teacher and the focal child are wiping the table during clean-up together without talking; an aide is telling a group of children to put their coats on for outdoor play; sitting at a table working on an art project with peers but without any interaction with others, listening to the teacher while she reads a story to a large group without interactions with peers or adults; and the focal child is washing his or her hands in the bathroom with the teacher and others present but the focal child is not speaking or gesturing to anyone.

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**12. Can't Tell (?)** - Can't Tell (?) is coded when it is unclear whether a socially directed behavior was emitted. Examples include: the observer could not see the focal child. If you code Can't Tell, see your coordinator after the observation to discuss the event.

**E. ADULT BEHAVIOR CODES**

Adult behavior is defined as behavior directed toward the focal child during the two-second observation interval. If more than one adult behavior occurs during the two-second observation window, code the adult behavior that is highest in the hierarchy delineated below (e.g., 1. Direct Adult Support before 2. Adult Approval, 3. Adult Comment before 4. Group Discussion/Directions). Teacher is defined as any adult working in a preschool setting (e.g., classroom teacher, assistant teacher, a student teacher, a parent volunteer, a high school volunteer). **REMEMBER, if an adult's behavior is clearly directed to the focal child during the 2-second observation window, use the Direct Adult Support AS, Adult Approval AA, or Adult Comment AC codes. If, however, the adult's behavior is directed toward the group (i.e., not clearly directed at the focal child), then Group Discussion/Directions GD should be coded.** The following six adult behavior options may be coded.

1. **Direct Adult Support (AS)** - Direct Addult Support (AS) is coded when an adult provides instruction to the focal child or direct assistance in accomplishing a task or performing an activity. Direct adult support might include instructions, verbal reminders, models, verbal and visual cues, physical prompts, and physical support. Adult support is also coded when an adult makes directive statements that are obligatory in nature (e.g., require the focal child to respond) or ask test-like questions that the adult knows the answers to such as "What color is your belt?" and "How many children are in your tea party?". Examples of obligatory statements include: "Give me your cup"; "Say more"; "Tell me about this ball"; and "Go away from the sensory bin." Adult support is also coded if an adult is helping the child dress (e.g., putting on shoes, pulling up pants). Other examples of adult directives include: "put on your shoes"; "look at this"; "finish chewing before you eat more"; and "use your words." Giving an object or materials to the focal child is considered nonverbal adult support. If an adult is holding the child to restrain him or her, the adult behavior is coded as AS and if the child behavior is negative then Negative Social Behavior Directed To Adult NA should be coded.

\* Code direct adult support if adult is handling the materials.  
If ~~two~~ two or more children are with adult (ex. playing game),  
and materials on table between children and adult directing attention  
toward non-focus child then code as No Adult Behavior to focal child.

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**2. Adult Approval (AA) - Adult Approval (AA)** is coded when an adult expresses praise, appreciation, or satisfaction with the focal child or his or her behavior. Adult approval may be expressed verbally (e.g., "that's a great pumpkin", "cool -- you made a snake", "great you found your name") or expressed nonverbally with physical affection for the child (e.g., pats on the back, hugs) or gestures (e.g., a wink with a smile, thumbs up gesture). If the focal child is sitting in the teacher's lap or being held by the teacher, regardless of who initiated this behavior, the teacher behavior is coded as Adult Approval **AA**.

**3. Adult Comment (AC) - Adult Comment (AC)** is coded when an adult talks or gestures to the focal child without providing direct support for accomplishing or performing a task or providing approval. Adult verbalizations may be about the school curriculum or events occurring outside of the curriculum (e.g., what the child had for breakfast, what the child did the day before). Adult comment is also recorded when the teacher imitates sounds that the focal child has made or provides non-word sounds such as "Mmmmm" when commenting on the taste of food. Adult verbalizations may be in the form of general questions (e.g., "How are you?"). If an adult's question precedes the two-second observation interval, but she extends the communication sequence nonverbally by holding out choices for the focal child to make, adult behavior is coded as Adult Comment **AC**. If the adult is reading only to the focal child, adult behavior is coded **AC**. If the adult answers or responds to the focal child, adult behavior is coded Adult Comment **AC**. Waving to a focal child is considered a nonverbal adult comment and should be coded as **AC**.

**4. Group Discussion/Directions (GD) - Group Discussion/Directions (GD)** is coded when an adult reads aloud to a group of children, sings to the group of children, or gives directions to a group of children which includes the focal child. For example, the adult might be telling a story, reciting a poem or fingerplay, telling the group that it is time for snack, or performing a song with several children and not just the focal child. If the adult's verbalization is not clearly directed to the focal child, Group Discussion/Directions **GD** is coded.

**5. No Adult Behavior to Focal Child (NO)** Adult is directing no codeable behavior to the focal child or a group of children in which the focal child is located or involved in the activity.

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**6. Can't Tell (?)** - Can't Tell (?) is coded when adult behavior could not be observed because he or she was temporarily out of sight.

## V. OBSERVER TRAINING

The first training meeting may be up to two hours in length. All other training sessions will take approximately one hour (perhaps slightly more). Prior to the first meeting, observers who are to be trained should read through the entire manual and focus their attention on the definitions of the first four environmental categories (i.e., Group Arrangement, Peer Group Composition, Activity Area and Activity, and Initiator of Activity). Observer training has been proposed with five sequential phases (e.g., environmental codes first, then behavioral codes; 10-minute coding sessions then 20-minute or 30-minute coding sessions depending on progress). Individual trainers at each research site will be responsible for CASPER training and for monitoring progress toward learning the four environmental and three behavioral codes. During all phases of observer training, to establish and maintain high levels of interobserver agreement within and between research sites, systematic and frequent in situ practice with a trainer (i.e., training at least 3 times per week) and communication with other trainers is necessary. Moreover, as proposed for Phase 5, a high level of interobserver agreement will be needed before initiating any investigations in which CASPER II is used as a ecobehavioral measure of young children's classroom environments (i.e., 85% interobserver agreement scores on individual codes for three consecutive training sessions).

The following suggested training format should provide a systematic framework for training observers. CASPER trainers at individual research sites may need to make modifications of their training schedule to meet observers' and trainers' individual needs. Nevertheless, mastery of the seven environmental and behavioral categories and the definitions of their respective codes and frequent in situ practice are necessary components for achieving acceptable interobserver agreement scores for the CASPER II Coding System and other similar direct observation systems. Trainers will discover that some observers in training may move through training phases at a more rapid pace than other observers. Trainers should adjust the proposed training to meet the individual needs of observers (e.g., more frequent quizzes if an observer is not scoring 100% on a category, more frequent observation training sessions if progress toward high percentage agreements for interobserver agreement scores is not forthcoming). In addition, breaks in training of several days (i.e., "lay offs" in training) may necessitate

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systematic review of the seven categories and their respective definitions (e.g., re-taking tests, discussion of codes that have been problematic).

### Phase 1

#### Orientation and Overview

1. Provide an overview of training and stress the importance of regular weekly meetings and observations (at least three sessions a week and more often if possible), particularly during early training or if progress toward high percentage agreement for interobserver agreement scores is not forthcoming
2. Provide an explanation of the four environmental and three behavioral categories and their respective codes and demonstrate the CASPER II Coding System format on the computer screen
3. Provide an explanation and demonstration of the 30-second observation cycle
4. Read through and discuss the first four environmental categories (i.e., Group Arrangement, Peer Group Composition, Activity Area and Activity, and Initiator of Activity)
5. Distribute the four environmental quizzes (i.e., Group Arrangement Quiz, Peer Group Composition Quiz, Activity Area and Activity Quiz, and Initiator of Activity Quiz)
6. Schedule a group meeting for the next week
7. Schedule at least 3 observations with the trainer and each observer for the upcoming week

Criteria: Attendance

#### Assignments:

a) Study the four environmental categories and their respective definitions in preparation for the four quizzes (i.e., Group Arrangement Quiz, Peer Group Composition Quiz, Activity Area and Activity Quiz, and Initiator of Activity Quiz) and subsequent observations

b) Observe children in preschool settings with the trainer

Each training session will involve at least a 45- to 50-minute observation period with the trainer. Prior to each observation, the trainer and observer should take time to reconnoiter the classroom and discuss its environmental arrangement (e.g., block areas, food areas, large group, art areas). It should be noted that some environmental

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arrangements are relatively permanent (e.g., bathrooms, block areas) whereas some arrangements may change from day to day or even during a day (e.g., art area with easels and art materials, manipulative toys brought out from a closet). The trainer and the observer should select a focal child to observe. For a brief "warm up period," they should then observe the selected focal child and discuss how the focal child would be coded using the first four categories (i.e., Group Arrangement, Peer Group Composition, Activity Area and Activity, and Initiator of Activity). For the next 10 minutes, the trainer and the observer will code the child's behavior on the first four categories (i.e., Group Arrangement, Peer Group Composition, Activity Area and Activity, and Initiator of Activity). During this 10-minute observation, either the observer or trainer should quietly call out the codes while the other member of the training dyad records the codes on the Interval Manager System and a laptop computer. If time allows, it is sometimes helpful to jot down brief notes about situations that are ambiguous or difficult to code. **As disagreements are noted, or if clarification is needed, the observers should first refer directly to the Training Manual and re-read the relevant coding definitions. If significant ambiguity continues to exist after re-reading the codes, the trainer should write anecdotal notes describing the coding problem for later discussion in a conference call that will focus on the CASPER II training.** These notes may be extremely useful and enable the observers to recall what was happening in a particular situation and why it didn't correspond to existing codes and their definitions. During the last 10 minutes of the training session, the trainer and observer should code independently and determine interobserver agreement scores by comparing how they coded the child's behavior on the first four categories with two laptop computers. The procedures for computing and running interobserver agreement scores are delineated in the Interval Manager Section (i.e., VI. COLLECTING OBSERVATIONAL DATA USING INTERVAL MANAGER). Questions should be noted and brought to the next weekly meeting or saved for the next conference call that focuses on CASPER II training. Interobserver agreement scores are determined for individual codes for every category using the following formula: Number of Agreements/ Number of Agreements + Number of Disagreements X 100.



**Phase 2**

1. Review codes and definitions for the four environmental categories
2. Discuss any questions concerning training on the CASPER II Coding System and from previous observations
3. Distribute the four environmental quizzes (i.e., Group Arrangement Quiz, Peer Group Composition Quiz, Activity Area and Activity Quiz, and Initiator of Activity Quiz)
4. Discuss any problems noted on the four environmental quizzes and score and record scores on the SUMMARY OF QUIZ SCORES FORM before the next training session
5. Schedule or confirm at least 3 observations with the trainer for the next week and schedule or confirm the next weekly meeting
6. Review the previous observations and progress, particularly any interobserver agreement scores that were computed. Progress can be systematically noted on the SUMMARY OF INTEROBSERVER AGREEMENT FORM. These forms may be helpful in monitoring progress on learning the codes and becoming reliable with the trainer.

Criteria: Attendance and discussion of questions about codes, definitions, and the general use of CASPER II  
100% on the four quizzes for the environmental categories and their respective codes  
85% interobserver agreement scores for the four environmental codes

Assignments:

- a) Take the four environmental quizzes (i.e., Group Arrangement Quiz, Group Composition Quiz, Activity Area and Activity Quiz, and Initiator of Activity Quiz). Turn in the four quizzes before the next group meeting. These will be scored and recorded on the SUMMARY OF QUIZ SCORES FORM before the next group meeting.
- b) Observe at least 3 times with trainer
- c) Read the codes and definitions for the three behavioral categories (i.e., Child Behavior, Child Social Behavior, Adult Behavior). Make a note of any questions that arise as you read these new definitions.

Each observation training session will involve a 45- to 50-minute training session with the trainer. The trainer and the observer should select a focal child to observe.

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For the first few minutes the trainer and observer should survey the classroom and discuss its environmental arrangements. They will then observe the focal child and discuss how the child's behavior would be coded on the four environmental categories (i.e., Group Arrangement, Peer Group Composition, Activity Area and Activity, and Initiator of Activity). During the next 10 minutes of the training session, the trainer and the observer will code the focal child using the first four categories (i.e., Group Arrangement, Peer Group Composition, Activity Area and Activity, and Initiator of Activity) with either the observer or trainer quietly calling out the codes while the other member of the training dyad records the codes on a laptop computer. If time allows, writing notes about disagreements and unclear situations may be helpful. **As disagreements are noted, or if clarification is needed, the observers should first refer directly to the Training Manual and re-read the relevant definitions. If significant ambiguity continues to exist after re-reading the codes, the trainer should write anecdotal notes describing the coding problem for later discussion in conference calls that will focus on the CASPER II Training.** The last 10 minutes the trainer and observer should code independently on laptops and then save their observations to a floppy disk for comparison and calculation of interobserver agreement scores. Direct comparisons of interval-by-interval coding (i.e., comparing interval 1 of the observer with interval 1 of the trainer, interval 2 of the observer with interval 2 of the trainer, and so on) can be conducted by re-opening a saved data file from observer training and systematically going through each interval to see where any disagreements occurred between the two observers. Although the observer and trainer may not recall all the information that was used in coding an interval, frequent disagreements on particular codes strongly suggests that they should review the definitions of those codes and discuss the troublesome codes more often. After finding and discussing coded disagreements (but not changing the independently coded intervals), the trainer can calculate interobserver agreement scores, save the file, and bring results to the next meeting. Interobserver agreement scores should be recorded and maintained on the SUMMARY OF INTEROBSERVER AGREEMENT FORMS to monitor progress on learning the codes and becoming reliable with the trainer. In addition, once training sessions are saved, file print outs (i.e., "hard copy" ) can be obtained for "tracking down" problematic codes and systematic sources of disagreement (see subsection VI. Subsection H. PRINTING OUT FILES, p. 72). Data files from training sessions and

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interobserver agreement files and resultant print outs should be saved and maintained by the trainer. Interobserver agreement scores and progress toward reliable coding should be recorded and discussed at the next group meeting.

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### **Phase 3**

1. Review codes and definitions for the four environmental categories and the three behavioral categories
2. Discuss any questions concerning the CASPER II Coding System and previous observations
3. Re-administer the four environmental quizzes (i.e., Group Arrangement Quiz, Peer Group Composition Quiz, Activity Area and Activity Quiz, and Initiator of Activity Quiz) as needed, and administer the three behavior quizzes (i.e., Child Behavior Quiz, Child Social Behavior Quiz, and Adult Behavior Quiz)
4. Schedule or confirm the next group meeting and schedule or confirm subsequent observation training sessions with the trainer
5. Review the previous observations and progress, particularly any interobserver agreement scores that were computed. Progress can be systematically noted on the SUMMARY OF INTEROBSERVER AGREEMENT FORM.

**Criteria:** Attendance and discussion of questions about codes, definitions, and the general use of CASPER II  
100% on four environmental quizzes (i.e., Group Arrangement Quiz, Peer Group Composition Quiz, Activity Area and Activity Quiz, and Initiator of Activity Quiz) and the three behavioral quizzes (i.e., Child Behavior Quiz, Child Social Behavior Quiz, and Adult Behavior Quiz)  
85% interobserver agreement scores for the four environmental codes

### **Assignments:**

- a) Re-take the four environmental quizzes (i.e., Group Arrangement Quiz, Peer Group Composition Quiz, Activity Area and Activity Quiz, and Initiator of Activity Quiz) and the three behavioral quizzes (i.e., Child Behavior Quiz, Child Social Behavior Quiz, and Adult Behavior Quiz) as needed
- b) Re-read the codes and definitions for the three behavioral categories (i.e., Child Behavior, Child Social Behavior, Adult Behavior). Make a note of any questions that arise as you read these new definitions.
- c) Observe at least 3 times with trainer

Each training session will involve at least a 45- to 50-minute training session with the trainer. The trainer and the observer should select a focal child to observe. For the

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first few minutes of the session, the trainer and observer should discuss the environmental arrangement of the classroom and observe the selected focal child and discuss how the child's behavior would be coded on the four environmental categories (i.e., Group Arrangement, Peer Group Composition, Activity Area and Activity, and Initiator of Activity) and the three behavioral categories (i.e., Child Behavior, Child Social Behavior, and Adult Behavior). During the next 10 minutes (or 20 or 30 minutes depending on progress in training), using their laptop computers, the trainer and the observer should independently code the focal child using the four environmental categories (i.e., Group Arrangement, Peer Group Composition, Activity Area and Activity, and Initiator of Activity) and the three behavioral categories (i.e., Child Behavior, Child Social Behavior, and Adult Behavior). The observer and trainer should not confer with one another during this part of the training sessions. The trainer and observer should save their data files for the training session to a floppy disk for direct comparison and calculation of interobserver agreement scores. After finding and discussing disagreements (but not changing the independently coded intervals), the trainer can calculate interobserver agreement scores, re-save the file, and bring results to the next meeting. Interobserver agreement scores should be recorded and maintained on the SUMMARY OF INTEROBSERVER AGREEMENT FORMS to monitor progress on learning the codes and becoming reliable on coding the CASPER II System. The trainer and observer should move to longer sessions (e.g., 10 minutes, 20 minutes, and finally 30 minutes) as training progresses and interobserver agreement scores improve. If significant disagreements continue, the observers may want to discuss the problematic codes before subsequent training sessions. In addition, they may want to discuss classroom situations that are similar to those in which the problematic codes were scored during several future training session. In future training phases, however, the observers and the trainer will need to code training sessions independently. As mentioned before, the problematic codes can be determined by systematic review of each interval of a training session to determine which codes are resulting in disagreements.

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### **Phase 4**

1. Discuss any questions from the previous week of observations
2. Review and discuss the definitions and codes for all seven categories, particularly the three behavioral categories (i.e., Child Behavior, Child Social Behavior, Adult Behavior)
3. Distribute the three behavioral quizzes (i.e., Child Behavior Quiz, Child Social Behavior Quiz, Adult Behavior Quiz) and the four environmental quizzes (i.e., Group Arrangement Quiz, Peer Group Composition Quiz, Activity Area and Activity Quiz, and Initiator of Activity Quiz) as needed (e.g., if long periods of time elapse between training sessions, as reminders for observers in training)
4. Schedule or confirm the next group meeting and schedule or confirm at least 3 observations with the trainer for the next week
5. Review the previous observations and progress, particularly any interobserver agreement scores that were computed. Progress should be noted systematically on the SUMMARY OF INTEROBSERVER AGREEMENT FORM. Observers in training and the trainer should focus on those codes and definitions that have been particularly problematic.

**Criteria:** Attendance and discussion of questions about codes, definitions, and the general use of CASPER II

100% on four environmental quizzes (i.e., Group Arrangement Quiz, Peer Group Composition Quiz, Activity Area and Activity Quiz, and Initiator of Activity Quiz) and the three behavioral quizzes (i.e., Child Behavior Quiz, Child Social Behavior Quiz, and Adult Behavior Quiz)

85% interobserver agreement scores for the four environmental and the three behavioral codes for at least one **thirty-minute training session**

### **Assignments:**

- a) Re-take the three behavioral quizzes (i.e., Child Behavior Quiz, Child Social Behavior Quiz, Adult Behavior Quiz) and the four environmental quizzes as needed
- b) Observe at least 3 times with trainer. These observations will involve coding on all seven categories. Observation time for sessions should increase from 10 minutes to 20 minutes and then to 30 minutes depending on progress

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Each observation will involve at least a 45- to 50-minute training session with the trainer. For the first few minutes of the observation training session, the trainer and observer should discuss the environmental arrangement of the classroom and observe the selected focal child and discuss how the child's behavior would be coded on the four environmental categories (i.e., Group Arrangement, Peer Group Composition, Activity Area and Activity, and Initiator of Activity) and the three behavioral codes (Child Behavior, Child Social Behavior, Adult Behavior). During the training session (i.e., 10-, 20-, or 30-minute observation period), the trainer and the observer will independently code the focal child using the four environmental categories (i.e., Group Arrangement, Peer Group Composition, Activity Area and Activity, and Initiator of Activity) and the three behavioral codes (Child Behavior, Child Social Behavior, Adult Behavior). During the observation period, the observer and trainer should not confer with one another. After coding independently on laptops, the trainer and observer should save their observations to a floppy disk for comparison and calculation of interobserver agreement scores. The trainer and the observer can compare their coding for the session by systematically reviewing each interval of the training session or by reviewing the printouts of the training session. After finding and discussing disagreements (but not changing the independently coded intervals), the trainer can calculate interobserver agreement scores, re-save the file, and bring results to the next meeting. The resultant interobserver agreement scores can provide the observer and trainer with another comparison of their coding for training sessions. Interobserver agreement scores should be recorded and maintained on the SUMMARY OF INTEROBSERVER AGREEMENT FORMS to monitor progress on learning the codes and becoming reliable with the trainer. If significant disagreements on particular codes continue, the observers and trainer may want to discuss those problematic codes before the subsequent training sessions. As mentioned above, problematic codes can be determined by systematic review of intervals after a session is over or by reviewing interobserver agreement scores for a particular code in which disagreements have occurred during previous training sessions. By the end of this phase of observer training, 85% interobserver agreement scores for the four environmental and the three behavioral codes should be obtained for an entire thirty-minute observation and coding session.

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### Phase 5

1. Discuss any questions from the previous week of observations
2. Review and discuss the definitions and codes for all seven categories
3. Distribute the three behavioral quizzes (i.e., Child Behavior Quiz, Child Social Behavior Quiz, Adult Behavior Quiz) and the four environmental quizzes (i.e., Group Arrangement Quiz, Peer Group Composition Quiz, Activity Area and Activity Quiz, and Initiator of Activity Quiz) as needed (e.g., if long periods of time elapse between training sessions, as reminders for observers in training)
4. Schedule or confirm the next group meeting and schedule or confirm observations with the trainer for the next week
5. Review the previous observations and progress, particularly any interobserver agreement scores that were computed and codes that have been problematic. Progress can be systematically noted on the SUMMARY OF INTEROBSERVER AGREEMENT FORM. Observers in training and the trainer should focus on those codes and definitions that have been particularly problematic.

Criteria: Attendance and discussion of questions about codes and definitions  
100% on four environmental quizzes (i.e., Group Arrangement Quiz, Peer Group Composition Quiz, Activity Area and Activity Quiz, and Initiator of Activity Quiz) and the three behavioral quizzes (i.e., Child Behavior Quiz, Child Social Behavior Quiz, and Adult Behavior Quiz)  
85% interobserver agreement scores for the four environmental and the three behavioral codes for three consecutive thirty-minute training sessions



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