Facilitating Social Interactions With Peers in Specialized Early Childhood Settings for Young Children With ASD

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Abstract. Young children on the autism spectrum have minimal social interaction with their peers in inclusive preschool settings, thus limiting opportunities to build social relationships. Research indicates that explicitly training peers how to interact with classmates with autism spectrum disorder (ASD) can increase the likelihood of peer-directed behavior; however, less is known about other strategies that can be used to support the peer-related social interactions of children with ASD and how those strategies may be used in conjunction with trained peers. Video data were analyzed from 23 classrooms using the Learning Experiences and Alternative Program for Preschoolers and Their Parents model (an inclusive preschool program that emphasizes peer training and peer support) to provide a snapshot of environmental features and the role of implementation fidelity that may enhance or inhibit the social interaction of 52 children with ASD. Findings indicate that social interaction is most likely to occur when an adult is not present, during small group activities, pretend play, and large motor activities. Implications for practice are discussed.

Keywords: autism spectrum disorder, intervention, early childhood, peer-assisted learning

Children with autism spectrum disorder (ASD) often display deficits in social competence, making it a challenge to create and maintain peer relationships (Sigman et al., 1999) while also increasing their risk for social isolation in classrooms (Odom et al., 2006). Research indicates that simply placing a young child with ASD in an inclusive classroom with no supports or training for peers and classmates is not likely to increase social interactions for the child with ASD (Gutierrez et al., 2007; Koegel et al., 2001). Peer training has proven effective in facilitating social interactions (Nelson, McDonnell, Johnston, Crompton, & Nelson, 2007; Odom, 1991; Trembath, Balandin, Togher, & Stancliffe, 2009); however, less is known about the environmental features of classrooms that may further enhance or inhibit social interactions for young children with ASD. Using ecobehavioral assessment, this study examines the patterns of social interactions for young children with ASD served in a specialized, inclusive classroom environment and identifies where and when these interactions are most likely to occur, thus providing new data on how to best support social engagement for these children. Patterns of social engagement in preschool settings as well as a description of a specialized preschool model serving this population are discussed, followed by the results from our ecobehavioral assessment of social interaction and the role of environmental factors.

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Social Engagement of Children in Preschool Classrooms

The amount of time preschool children with and without disabilities, including those with ASD, spend interacting with peers, as well as where and with whom that interaction occurs, varies greatly. During classroom activities, typically developing preschool children spend about 18% of their time in peer-directed social behavior (Brown, Odom, Li, & Zercher, 1999). Children with disabilities served in inclusive preschool settings spend approximately 8%–11% of their time in peer-directed social behavior (Brown et al., 1999; Tsao et al., 2008). The proportion of time that children with ASD spend in peer-directed social behavior is even lower, with social engagement with peers occurring in approximately 1.8% of observed time intervals (Reszka, Odom, & Hume, 2012).

Typically developing children in preschool classrooms tend to show the greatest peer-directed social behaviors when participating in free play, during sociodramatic/pretend play activities (Innocenti et al., 1986; Odom, Peterson, McConnell, & Ostrosky, 1990; Sontag, 1997), and when adults are not present (Harper & McCluskey, 2003). Children with disabilities are most likely to interact with their peers when they are in small group settings rather than large group settings (Sontag, 1997), and they are more likely to socially interact with adults than with peers (Brown et al., 1999; Sontag, 1997). Adult intervention in child activities, while sometimes necessary, may decrease children's future interactions with peers because, after an interaction with an adult, children are more likely to continue interactions with the adult rather than initiating a new interaction with a peer (Harper & McCluskey, 2003; Kishida & Kemp, 2009).

Overall, children with ASD have different patterns of social engagement with peers in classrooms than their typically developing classmates. Preschool-age children with ASD are most likely to engage with peers in areas where books or food/snacks are present versus during free play and/or sociodramatic play. Additionally, preschoolers with ASD are more likely to interact with peers when participating in gross motor activities and in large groups of peers with an adult, contrasting typically developing peers who demonstrate more peer engagement without adults (Boyd, Conroy, Asmus, McKenney, & Mancil, 2008; Reszka et al., 2012).

These patterns of interaction, and the adult behavior and activities that facilitate interaction, are key in understanding how to best intervene in designing a classroom environment that enhances these interactions and encourages relationships with peers. Several specific inclusive early intervention models, including the Learning Experiences and Alternative Program for Preschoolers and Their Parents (LEAP) model, are deliberate in their use of strategies to support peer interaction for and with young children with ASD, specifically focusing on peer-mediated strategies and supports to increase engagement with classmates (e.g., Project DATA, Schwartz et al., 2004; LEAP, Strain & Cordisco, 1994; Children's Toddler School, Stahmer & Carter, 2005).

While these inclusive settings have improved performance on standardized measures of social skills (Strain, 2017), little is known about social interaction patterns occurring in the classrooms or how environmental features may support these interactions. Ecobehavioral assessment includes direct observation in authentic preschool contexts, measurement of environmental features aligned with the social interaction of young children with ASD, and measurement of student behavior (i.e., social interaction). This study provides a deeper look at social interaction in the LEAP model and adds to the growing body of literature examining both the behaviors of and early childhood environments for preschool children with ASD and the staff members who serve them (Irvin, Boyd, & Odom, 2015; Reszka et al., 2012; Sam et al., 2016). A more detailed description of the LEAP model and its evidence of efficacy follows.

LEAP Model

Some preschool environments are designed to offer unique opportunities for children with ASD to interact and learn from their peers. Specifically, inclusive preschool models that include both children with ASD and their typically developing peers have the ability to use peer-mediated interventions and exposure to support the social development of children with ASD. The LEAP model is a comprehensive treatment model for preschoolers with ASD. General early childhood curriculum approaches that have been adapted to address the developmental needs of children with ASD serve as the foundation of LEAP classrooms. The specific components of the LEAP classroom model include (a) individualized learning programs, (b) typically developing children enrolled as the majority of children in the class (typical ratio 10:6), (c) individual instruction following naturalistic teaching methods, (d) parent participation in a parent education program, (e) transition planning to the next educational setting, and (f) staff members trained in the LEAP model procedures (Strain & Cordisco, 1994; Strain & Hoyson, 2000).

LEAP is an evidence-based inclusion model for children with ASD and is commonly implemented in public school preschool classrooms (Strain & Bovey, 2011). The intentional inclusion of typically developing peers allows for naturally occurring peer-directed and peer-mediated social interactions that are not possible in noninclusive classrooms. In a randomized control trial, children enrolled in LEAP classrooms showed gains in cognitive, language, and social behaviors, as well as declines in problem behaviors and autism symptoms (Strain & Bovey, 2011). Additionally, in a 4-year follow-up study, children in the LEAP condition performed marginally better in elementary school than the comparison group of children in communication, adaptive behavior, social, academic, and cognitive domains (Strain, 2017). There has been no study of the rates of social interaction in LEAP classrooms or ecobehavioral assessment of child behaviors and related classroom features.

The overall purpose of this study was to examine the pattern of social interactions for children with ASD as well

as associated classroom and adult behavior variables for children who received a specialized inclusive intervention (i.e., LEAP). Ecobehavioral assessment allows for the analysis of key factors that play a role in facilitating these interactions, such as classroom features, and these findings can be used to modify the classroom environment and adult behavior.

Research Questions

1. What are the patterns of positive and negative social interactions with peers among children with ASD who participated in the LEAP intervention model?
2. What are the contextual characteristics of classrooms that are associated with the peer-related social interactions of children with ASD? Classroom characteristics may include the following dimensions observed from the viewpoint of the focal child: adult behavior, group setting, and activity type.

METHOD

The current study was part of a larger study comparing the efficacy of two school-based comprehensive treatment models to a business-as-usual control condition, all serving preschool-age children with ASD (see Boyd et al., 2014). The two comprehensive treatment models were the TEACCH Autism Program and LEAP. The treatment models are not compared in the current study; the focus is on LEAP classrooms because LEAP is specifically designed to promote social interactions between typically developing peers and young children with ASD. For the larger study, data for LEAP classrooms were collected in the states of Florida, Colorado, and Minnesota. Data were collected across multiple time points; however, the current study used data from 23 LEAP classrooms for the first time point only.

Participants

To be included in the study, LEAP classrooms had to meet the following criteria: (a) classroom was within a public school system; (b) teacher held a teaching license from their respective states; (c) teacher attended a formal training prior to enrolling in the study (led by a representative of the program or someone formally training in the LEAP model); (d) teacher worked in the identified LEAP classroom 2 years prior to the start of the study; and (e) classroom held an average rating (3 out of 5) on four subscales of a classroom quality measure. Children met the following criteria to be enrolled in the study: (a) between 3 and 5 years of age; (b) previous clinical diagnosis or educational level consistent with ASD or developmental delay; (c) met diagnostic criteria on Autism Diagnostic Observation Schedule (ADOS; Lord, Rutter, DiLavore, & Risi, 1999); and (d) no previous exposure to the comparison treatment model (i.e., the child could not have been enrolled previously in a TEACCH preschool classroom). Additionally, children with significant uncorrected vision or hearing impairment, uncontrolled seizure disorder, or traumatic brain injury were excluded from the study. Families had to be proficient enough in English to complete parent rating scales.

Child participants included 53 preschool children with ASD (termed "focal children" in subsequent descriptions). Seventy-nine percent ($n = 41$) were male, and the majority of children were White (84.6%), with smaller groups identifying as Black (7.7%), Asian (3.8%), or multiracial (3.8%). Forty percent identified as Hispanic. The child participants had a mean age of 3.93 years (range = 2.9–5.11 years; $SD = 0.70$). The mean Mullen (1995) standard score at pretest was 65.53 (range = 49–122; $SD = 19.61$), indicating a wide range of functioning across skill areas. Participants also included 22 teachers (1 male; note one teacher had two classrooms). Teacher participants were 95.5% White and 4.5% Black, with 18.2% Hispanic. All teachers held college degrees (bachelor's degree, 36.4%; master's degree, 59.1%; or associate's degree, 36.4%).

Measures

The Code for Active Student Participation and Engagement–Revised (CASPER III) was used to code focal children's social interactions with peers and the contextual characteristics of the classroom in which these social interactions occurred (Tsao, Odom, & Brown, 2001). CASPER III is an ecobehavioral observation system used to assess features of classrooms including adult behavior, child behavior, and social behavior of focal children (Reszka et al., 2012; Sam et al., 2016). The CASPER III variables included activity area, group arrangement, child behavior, initiator of activity, adult behavior, and social interactions. An adult variable instead of a teacher variable was used for this study due to the nature of the observational period. Children often interacted with several adults during the center time period, including teachers, paraprofessionals, a speech language pathologist, and an occupational therapist. For the present study, we used the following dimensions of the CASPER III: social interactions (the outcome of interest), adult behavior, group arrangement, and activity area. The operational definitions of the CASPER III categories used in this study are presented in Table 1.

Eight trained research staff videotaped participants, and four of them later coded each participant for a total of 30 min during center time. Center time is a common activity in preschool classrooms and involves children participating in a variety of activities located in different activity areas (e.g., art, pretend play, and blocks). PROCODER software was used to code each video using momentary time sampling at 10-s intervals (Tapp & Walden, 2000). At every interval, a code was entered for each CASPER variable. Research assistants were trained using the CASPER III training manual for observers (Tsao et al., 2001). During training, raters reached consensus with at least 80% agreement (determined by the number of agreements divided by the number of agreements plus disagreements) and a kappa coefficient of at least 0.80 for each variable. Twenty percent of the videotapes across coders were coded for interobserver agreement (see Table 2).

Table 1. Operational Definitions and Frequencies of Each Dimension and Categories Used

CASPER Dimensions/ Collapsed Categories	CASPER Original Categories	CASPER Definition	Frequency of Occurrence (%)
Social Interactions	Positive Behavior from FC to Peer	Any motor/gestural or vocal/verbal behavior to another peer	1.7%
	Negative Behavior from FC to Peer	Negative gestural/motor or vocal/verbal behavior to a peer	0.3%
	Positive Behavior from Peer to FC	Any motor/gestural or vocal/verbal behaviors to FC from peer	1.9%
	Negative Behavior from Peer to FC	Negative gestural/motor or vocal/verbal behavior to FC from peer	0.1%
Adult Behavior			
Direct Involvement With FC	Adult Approval	Adult expresses praise, appreciation, or satisfaction with FC	2.1%
	Adult Comment	Adult talks to FC without providing direct support for accomplishing a task	0.8%
	Adult Support	Adult provides instruction to FC or direct assistance in accomplishing a task	29.9%
Indirect Involvement With FC	Group Discussion/Directions	Adult reads aloud to a group of children, sings to group of children, or gives directions to group of children that includes FC	2.6%
No Involvement With FC	No Adult Behavior to FC	Adult is directing no codable behavior to FC	61.7%
Group Arrangement			
	Small Group With 1–2 Peers	Group includes FC and 1 to 2 peers	14.5%
	Small Group With an Adult and 1–2 Peers	Group includes FC, 1 to 2 peers, and an adult	29.7%
	Large Group With 3+ Peers	Group includes FC and 3 or more peers	4.7%
	Large Group With an Adult and 3+ Peers	Group includes FC, 3 or more peers, and an adult	28.3%
Activity Areas			
Daily Living Activities	Self-Care/Self-Help	FC is located in activity area for self-care (e.g., the bathroom)	1.1%
	Snack/Meals/Food	FC is located in activity area that is being used for preparation and eating of real food	1.6%
	Transition	FC is moving from one activity to another	5.6%

Creative Arts	Art	FC is located in activity areas for painting, drawing, coloring, writing, or sculpting to create an art product	10.1%
	Sensory	FC is located in activity areas where children might use and play with materials designed to elicit a specific sensation (e.g., touching, feeling, scooping)	5.5%
	Dance/Music/Recitation	FC is located in activity areas that contain instruments for making music or are meant for general activities that include singing, dancing, listening to music, clapping and moving to music, doing finger plays, and reciting poems	0.3%
Preacademic Activities	Preacademics	FC is located in activity area with the explicit objective of practicing or teaching skills related to traditional preacademics and academic information	2.7%
	Story Time/Books	FC is located in an activity area that has materials for reading, listening to, and telling a story	6.3%
	Computer Activities	FC is located in an activity area where computers are used	1.2%
Large Motor Activities	Large Motor	FC is located in an activity area with large motor equipment or in which large motor behavior is being exhibited (e.g., running and jumping)	5.2%
	Large Blocks	FC is located in activity areas with large building or construction materials	16.5%
Group Time Activities	Circle Time/Group Time	FC is located in an activity area that involves sitting in a group in which the adult is discussing or presenting information	3.8%
Manipulatives	Manipulatives	FC is located in an activity area that focuses on the small motor movements of the hand, fingers, wrists, and hand-eye coordination	20.9%
Pretend Play	Pretend Play/Sociodramatic	FC is located in activity areas with materials that are typically used in a symbolic manner or that support activities with other children that involve make-believe roles or themes	18.3%

Note. N = 9,344 total observed intervals. Total frequencies of original CASPER categories may not add up to 100% within each dimension, as several original categories that are not relevant to social interactions were omitted. FC = focal child.

Table 2. Interobserver Agreement

	A/(A + D)		Kappa	
	Mean	Range	Mean	Range
Group Arrangement	0.95	0.82–0.95	0.91	0.70–1
Activity Area	0.97	0.74–1	0.92	0.14–0.92
Child Behavior	0.90	0.64–0.97	0.82	0.18–0.96
Social Behavior	0.97	0.85–1	0.79	0.32–1
Adult Behavior	0.94	0.49–0.99	0.84	0.01–0.98

Note. A/(A + D) = Agreements/Agreements + Disagreements.

Data Analysis Strategy

To answer the first research question, descriptive statistics were used to identify frequencies of observed positive and negative social interactions between focal children with ASD and their peers. The frequencies of types of adult behavior, group arrangement, and activity area were examined. Given the focus of this paper, the substantive analyses were limited only to the categories within each dimension that are at least hypothetically relevant to social interactions between children with ASD and their peers. For example, we excluded the solitary and one-on-one with an adult categories from the group arrangement dimension, as social interactions with peers do not take place in these situations by definition. Additionally, to reduce the number of pairwise comparisons and to somewhat increase power due to the extremely low frequency of observed social interactions, some original CASPER III categories were collapsed into larger categories. These larger categories and the original CASPER III categories that comprised them are presented in Table 1.

To address the second question, odds ratio tests were used to examine whether certain types of contextual characteristics of the classroom coincided with higher or lower levels of occurrence of social interactions between children with ASD and their peers. Given that children with ASD have very few interactions with peers, we did not differentiate whether these interactions were positive or negative or whether they were initiated by children with ASD or by their peers. Thus, a single binary variable representing occurrence of social interactions was computed, where 1 = any social interaction with peers and 0 = no social interaction with peers.

RESULTS

The results for each research question are described in the following sections.

Question 1

Overall, we found that only a very small proportion (3%) of all observed CASPER III intervals contained social interactions between children with ASD and their peers. For the majority of the time observed (61.7%), adults were not involved with the focal children. When adults were involved with the focal children, they were most likely providing a form of adult support (29.9%). Adults provided approval (2.1%), comments (0.8%), and group discussions or directions (2.6%) less often. Children spent most of their time in small groups with an adult (29.7%) or large groups with an adult (28.3%). Children spent less time in both small groups (14.5%) and large groups (4.7%) without an adult present. Children spent more time in activity areas related to manipulatives (20.9%), pretend and sociodramatic play (18.3%), and large blocks (16.5%). They spent less time in activity areas related to self-care/self-help (1.1%), computer activities, (1.2%) and snack/meals/food (1.6%). The exact frequencies of social interactions, types of adult behavior, group arrangements, and types of activities are presented in Table 1.

Question 2

Odds ratios (ORs) were used to examine the association between peer social interactions and adult behaviors. Table 3 displays the comparisons of odds ratios with corresponding confidence intervals, p values, and z statistics. Due to the large number of contrasts, Bonferroni adjustment was used, and the significant p value was capped at $p < .002$.

Adult Behavior

Among the three types of adult behavior with focal children, only the situations with direct adult involvement compared to the situations with no adult involvement were significantly different from one another in terms of occurrence of social interactions, OR = .46, 95% CI [0.35, 0.61], $p < .001$. Social interactions between children with ASD and their peers are twice as likely to occur when an adult is not directly involved with the focal child compared to situations when an adult is directly involved with the focal child.

Group Arrangements

Of the four types of group arrangements that were examined in this study, social interactions were consistently and significantly more likely to occur in small group settings with one or two peers and without an adult. Social interactions in this small group arrangement were about three times more likely to occur when compared to any other group setting examined, OR = 3.04, 95% CI [2.29, 4.02], $p < .001$ compared to small group of one to two peers and an adult; OR = 2.93, 95% CI [1.67, 5.15], $p < .001$ compared to large groups of three or more peers; and OR = 3.12, 95% CI [2.34, 4.16], $p < .001$ compared to large groups of three or more peers and an adult. No other types of group arrangements were different from one another in terms of the likelihood of social interactions taking place.

Activities Areas

Of the seven categories of activities that were conceptually established a priori, two activity areas—pretend play

Table 3. Odds of Social Interactions With Peers Compared Using Contextual Classroom Characteristics

Groups	Odds Ratio	95% CI	p Level	z Score
Adult Behaviors				
Direct Involvement vs. Indirect Involvement	0.81	[0.34, 1.89]	.6268	0.48
Direct Involvement vs. No Involvement	0.46	[0.34, 0.61]	<.0001*	5.32
Indirect Involvement vs. No Involvement	0.57	[0.25, 1.29]	.1808	1.33
Group Arrangements				
Small Group vs. Small Group With Adult	3.03	[2.29, 4.02]	<.0001*	7.75
Small Group vs. Large Group	2.93	[1.67, 5.14]	.0002	3.75
Small Group vs. Large Group With Adult	3.11	[2.34, 4.15]	<.0001	7.77
Small Group With Adult vs. Large Group	0.96	[0.54, 1.71]	.9036	0.12
Small Group With Adult vs. Large Group With Adult	1.02	[0.75, 1.39]	.8698	0.16
Large Group vs. Large Group With Adult	1.06	[0.59, 1.89]	.8349	0.20
Activities				
Daily Living vs. Creative Arts	1.55	[0.83, 2.92]	.1662	1.38
Daily Living vs. Preacademics	1.10	[0.58, 2.10]	.7581	0.30
Daily Living vs. Large Motor	0.55	[0.33, 0.93]	.0267	2.21
Daily Living vs. Circle Time	0.74	[0.34, 1.60]	.4555	0.74
Daily Living vs. Manipulatives	1.19	[0.67, 2.09]	.5470	0.60
Daily Living vs. Pretend Play	0.32	[0.19, 0.53]	<.0001*	4.38
Creative Arts vs. Preacademics	0.70	[0.38, 1.30]	.2710	1.10
Creative Arts vs. Large Motor	0.35	[0.22, 0.57]	<.0001*	4.24
Creative Arts vs. Circle Time	0.48	[0.23, 0.99]	.0497	1.96
Creative Arts vs. Manipulatives	0.74	[0.43, 1.25]	.2708	1.10
Creative Arts vs. Pretend Play	0.20	[0.13, 0.33]	<.0001*	6.68
Preacademics vs. Large Motor	0.50	[0.30, 0.82]	.0066	2.71
Preacademics vs. Circle Time	0.67	[0.32, 1.42]	.3045	1.02
Preacademics vs. Manipulatives	1.04	[0.60, 1.80]	.8654	0.16
Preacademics vs. Pretend Play	0.29	[0.18, 0.47]	<.0001*	5.00
Large Motor vs. Circle Time	1.34	[0.70, 2.54]	.3673	0.90
Large Motor vs. Manipulatives	2.13	[1.44, 3.14]	.0001*	3.82
Large Motor vs. Pretend Play	0.58	[0.43, 0.77]	.0002*	3.70
Circle Time vs. Manipulatives	1.59	[0.80, 3.14]	.1816	1.33
Circle Time vs. Pretend Play	0.43	[0.23, 0.81]	.0093	2.60
Manipulatives vs. Pretend Play	0.27	[0.18, 0.39]	<.0001*	6.87

Note. After Bonferroni adjustment, only $p < .002$ were considered statistically significant (indicated by asterisks).

and large motor—consistently differed from others in terms of the frequency of social interactions. The context of pretend play was the most likely to coincide with social interactions between children with ASD and their peers. More specifically, social interactions were twice as likely to occur during pretend play as during large motor activities; about three times as likely as during preacademics, manipulatives, or daily living; and about five times as likely when compared to creative arts activities (see Table 3).

The second context in which social interactions had higher likelihood of occurring was large motor activities. More specifically, social interactions were twice as likely to

occur during large motor activities as during manipulatives and about three times as likely as during creative arts activities (see Table 3).

DISCUSSION

The purpose of this study was to describe social interactions of students with ASD in specialized inclusive preschool classrooms. Specifically, we were interested in identifying associations between social interactions with peers and environmental variables, as well as adult behavior. The results indicated that social interaction between students with ASD and peers in inclusive classrooms occurred in very few of the observed intervals. Although higher than some previous reports of preschoolers with autism interacting with their peers (Reszka et al, 2012; Sam, Reszka, Odom, Hume, & Boyd, 2015), this is far lower than what has been found for children with other types of disabilities (Brown et al., 1999; Tsao et al., 2008). Given the low rates of social interactions for children with ASD, it is important to explore contextual factors that potentially facilitate peer social engagement. One of the factors that could be important to consider is adult involvement with the children.

For the majority of observation intervals (61.7% of observed intervals), adults were not directly engaged with the focal children. However, when they were directly involved with the children, they were most likely to provide some form of adult support (e.g., assisting a child in completing a task or providing instruction). Compared to prior studies, adults in our sample provided somewhat higher levels of support to preschoolers with disabilities in inclusive classrooms (Brown et al., 1999; Tsao et al., 2008). This difference could be related to the fact that our sample was only comprised of high-fidelity LEAP classrooms that had highly trained adult staff, with specific training around facilitating the inclusion of children with ASD. We also examined where children spent their time, as prior research has suggested that specific classroom activity areas can facilitate peer-related social interactions (Reszka et al., 2012). Preschoolers with ASD in LEAP classrooms spent most of their time in centers with manipulatives, followed by pretend play/sociodramatic activities, and the large blocks area. In comparison, Brown et al. (1999) found preschoolers with disabilities spent their time in circle time activities, followed by large motor activities, and snack/meal times. The discrepancies between this study and the Brown et al. (1999) study could be the observational period. For this study we used a 30-min observational window during center time, whereas Brown et al. (1999) observed for a total of 3 hr across daily activities. Of course, we also must acknowledge that the discrepancy between the two studies could be an artifact of the amount of time that has elapsed since the Brown et al. study was conducted, which may reflect more general changes in how preschool centers are arranged, particularly for LEAP classrooms.

The second research question explored what environmental factors were associated with the increased likelihood of children with ASD in inclusive classrooms engaging in social interactions with their peers. Social interactions were twice as likely to occur between preschoolers with ASD and their peers when no adults were involved. This finding is consistent with other research demonstrating that children with disabilities are less likely to interact with peers when adults are present (Harper & McCluskey, 2003). In fact, when adults are present, children are more likely to interact with the adult instead of the peers (Brown et al., 1999; Sontag, 1997). This suggests that a focus on peer-mediated interventions may be a better strategy than adult-mediated interventions for promoting social interactions between children with disabilities and their typically developing peers. Relatedly, social interactions between preschoolers with ASD and peers in this study were three times more likely to occur in small group settings with one or two peers and no adults. Perhaps it is not surprising that peers likely serve as better social models than adults (Battaglia & Radley, 2014; Katz & Girolametto, 2013; Thiemann-Bourque, Brady, McGuff, Stump, & Naylor, 2016), but our study further suggests that small, mixed groupings of peers are more conducive to facilitating peer social interactions than an adult-mediated approach.

In regard to activity or center area, pretend play was associated with a higher frequency of social interactions. This finding is somewhat expected, given that the sociodramatic/pretend play area encourages cooperative, social play with materials (Hendrickson, Tremblay, Strain, & Shores, 1981; Odom et al., 1990; Sontag, 1997). Additionally, when preschoolers with ASD participated in the large, gross motor center, they had an increased likelihood of interacting with peers. Large motor activities are typically fun and naturally reinforcing, such as swinging, pulling wagons, and riding tricycles, and, thus, they are likely to have some built-in social-motivational opportunities. Past research indicates that when children with ASD participate in motor play, they in fact have increased social play and initiations (Yuill, Streith, Roake, Aspden, & Todd, 2007).

Limitations

Several limitations should be noted for this study. First, videotapes were used to code behavior and environmental variables. The quality of the video impacted the variables that could be coded. For example, if peers were not in the video frame, the coder was unable to determine if the focal child was in a group setting or a solitary setting. A second limitation was the use of momentary-time sampling methods to collect data on social behaviors, which is already a low-incidence behavior for learners with ASD. Some social behaviors may have been missed using a 10-s observational interval, thus potentially underrepresenting the behavior. However, when coding low-frequency behaviors for preschool-age children with ASD, momentary-time sampling, partial-interval recording, and event coding have been found to be highly correlated (Sam et al., 2015). Finally, our sample only included high quality LEAP classrooms; thus, our results are

not generalizable to other types of inclusive programs serving preschoolers with ASD.

Implications for Practice and Research

Overall, findings from this study indicate that preschoolers with ASD have few social interactions with peers in inclusive settings that are designed to promote these interactions. Unfortunately, the low occurrence of social interactions with peers has been consistently reported for preschoolers with ASD (Reszka et al., 2012). However, environmental arrangements or modifications can be made to promote these interactions (Boyd et al., 2008; Reszka et al., 2012; Tsao et al., 2008), such as providing more opportunities for children with ASD to interact in small group settings with appropriately trained peer models, as research indicates that peers can be successfully trained on how to initiate or respond to interactions with preschoolers with ASD (Katz & Girolametto, 2013; Nelson et al., 2007; Trembath et al., 2009).

There are a number of implications for school psychology professionals, particularly in their role of training and consulting with classroom teachers. School psychologists are uniquely positioned within schools to help teachers implement evidence-based practices, and there is a call in the field to expand the role of school psychologists beyond evaluation and eligibility determination into teacher consultation and intervention (Shernoff et al., 2016). Although the focus of consultation is typically related to challenging behavior, supporting increased social interaction for this population is well warranted. Providing classroom consultation related to peer-mediated instruction, as well as modification of environmental factors (e.g., supporting small group arrangements, providing ideas for pretend play and gross motor activities, and offering training on how adults can best mediate social interactions without interfering), could maximize the reach and impact of the school psychologist (Kratochwill, 2007).

Future research should continue to focus on how environmental factors impact child outcomes in classrooms, such as social interactions, including those that have more variable quality, as we know that all children with ASD do not attend high quality, inclusive preschools. In addition, the roles of other variables, such as fidelity of implementation and child characteristics, should be examined in relation to social interaction with peers. Finally, research investigating the role of the school psychologist in supporting the social interaction of young children with ASD through training and consultation of classroom teachers is needed, as their expanded role in schools is emerging.

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