Sensory Processing Disorders and Social Participation

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- human activities
- interpersonal relations
- sensory integrative dysfunction
- sensory processing
- social behavior

Participation in social aspects of daily life is crucial to children's development. Although disability status is recognized to affect children's ability to participate in social activities, little is understood about the impact of sensory processing disorders (SPD) on children's social participation. We examined the social participation patterns of 2 groups of children (ages 6–9): (1) children with SPD and (2) their typically developing peers. All children participated in a structured interview to report their social participation patterns, including activity patterns and social networks. We used parent and teacher questionnaires to triangulate the data gathered from the children. Results revealed that the 2 groups of children demonstrated generally similar patterns of activity preferences and use of free time but had significant differences in areas related to intensity and enjoyment of involvement and in their social networks. Implications for future research and interventions are discussed.

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Social participation includes opportunities to participate in formal and informal social activities at home, at school, and in the community (World Health Organization, 2001). The ability to participate in meaningful life activities helps children develop an understanding of social rules and the cognitive and physical skills needed for further development (American Occupational Therapy Association [AOTA], 2008; Bedell & Dumas, 2004; Brown & Gordon, 1987; Parham & Primeau, 1997). Among other skills, childhood social relationships are believed to help children develop the abilities to comfort, share, help, and cooperate; learn conflict resolution; and learn about adult life (see Corsaro & Eder, 1990, for a discussion). Social competence, which develops through social participation, is associated with improved peer interactions, increased school performance, and better adult outcomes (e.g., Elksnin & Elksnin, 1995). Conversely, characteristics such as immature play patterns are associated with poor peer acceptance and poor social competence (Williamson & Dorman, 2002).

Developmental Considerations of Social Participation

Although social participation involves processes that evolve throughout childhood (Corsaro & Eder, 1990; Staub, 1998), certain trends persist. Specifically, children generally prefer to interact with children who enjoy the same activities (Richardson, 2002; Staub, 1998), and they seek friends who share the same values. Children also seem to prefer playmates and friends who are at the same play level (e.g., parallel play vs. cooperative play) and demonstrate similar play styles (e.g., active or sedentary play; Rubin, Lynch, Coplan, Rose-Krasnor, & Booth, 1994).

Younger children typically play alone or in small groups, but the group relationship becomes important in middle childhood (generally considered to be ages 6–12; Florey & Greene, 1997; Staub, 1998). In middle childhood, children must learn to function as part of a larger group, which requires

flexibility, respect, and cooperation, and they increasingly engage in games with rules, which requires more self-control and awareness of others.

Many skills are necessary for social competence and peer acceptance, including identifying the demands of a social setting (e.g., appropriate verbal and nonverbal behaviors), engaging in behaviors that correspond to those demands, perceiving the reactions of others, and adjusting to feedback for application in future settings (Williamson & Dorman, 2002). A child's ability to master these skills can be affected by multiple factors such as poor self-regulation, delays in communication skills, and poor cognitive or motor skills. Middle childhood is a particularly vulnerable time for children with delayed social skills because the demands for peer interactions and peer acceptance become greater (Florey & Greene, 1997).

Social Participation and Disability

Social participation has been identified in the *International Classification of Functioning, Disability and Health* (World Health Organization, 2001) as an area that can be affected by health and disability. Children with disabilities are often isolated from social participation as a result of either the nature of their disabilities or practices that limit their access to typically developing peers (Elksnin & Elksnin, 1995; Panacek & Dunlap, 2003). Much of the research in this area has focused on children with more visible disabilities, such as cerebral palsy, spina bifida (Brown & Gordon, 1987; Richardson, 2002; Tamm & Skar, 2000), acquired brain injuries (Bedell & Dumas, 2004), and developmental delays (Lewis, Feiring, & Brooks-Gunn, 1988). However, some studies have examined the decreased social participation of children with less visible disabilities, such as autism spectrum disorder (ASD; e.g., Sigman & Ruskin, 1999), communication disorders (e.g., Fujiki, Brinton, Hart, & Fitzgerald, 1999), developmental coordination disorders (DCD; Chen & Cohn, 2003), emotional–behavioral disorders, and attention deficit hyperactivity disorder (ADHD; Cronin, 2004; Panacek & Dunlap, 2003). Because of their unclear etiology and lack of overt physical manifestations, sensory processing disorders (SPD) fall into this category of less visible disabilities.

SPD are a collection of disorders related to how the brain processes and interprets sensory information, such as visual, auditory, movement, or tactile input (Ayres, 1979; Dunn, 1997, 2001). Many assessment procedures can be used to identify children with SPD, including child and caregiver interviews, formal standardized assessments of sensory processing abilities, and clinical observations. Identification of SPD is generally through observation of behavioral difficulties such as responding to touch aggressively, withdrawing from or failing to respond to sensory input, and seeking out additional sensory input through hyperactivity (Ayres, 1979; Dunn, 1997, 1999, 2001). SPD can lead to difficulties in many areas of life, including performing daily living activities; self-confidence; and coping, social, and play skills (Ayres, 1979; Bar-Shalita, Vatine, & Parush, 2008; Bundy, 2002; Cohn, Miller, & Tickle-Degnen, 2000; Dunn, 1997, 1999, 2001).

Play and social participation are critical parts of childhood. Play has been identified as an appropriate context for occupational therapy intervention because of its important role in child development (AOTA, 2008). A study by Bundy, Shia, Qi, and Miller (2007) suggested that SPD may affect children's play behaviors. That study provided preliminary information that children with SPD may find certain types of play activities (e.g., active play) more challenging than others (e.g., sedentary play). Although the behavioral characteristics of SPD and the impact of disability status on social participation suggest that children with SPD may suffer from limited social participation, no systematic investigations have examined their social participation (Cohn et al., 2000; Dunbar, 1999).

The purpose of the current study was to answer the following question: Do the self-reported social participation patterns of children in early middle childhood (ages 6–9) differ from those reported by their typically developing peers? We compared data from the children with SPD with data from typically developing peers to identify differences and similarities between the two groups. Data gathered from the children's parents and teachers were used to triangulate the data regarding the children's social participation patterns.

Method

Research Design

This study was conducted using a nonexperimental design (Portney & Watkins, 2008). We compared the reported social participation patterns of the children with SPD with those of typically developing peers who were matched on the characteristics of grade in school, race, gender, and free-lunch status. Qualitative and quantitative data were collected as part of a larger study examining factors related to social competence and social participation, including social skills, challenging behaviors, perceived efficacy, activity preferences, and playground behaviors.

Participants

We examined the social participation patterns of 12 children with SPD and compared that information with data

collected from 12 matched typically developing peers. School-based professionals, including teachers, occupational therapists, and school counselors, participated in the recruitment of eligible students for this study. All the students attended one school district in a large metropolitan area.

The participants ranged in age from 6 to 9 (for children with SPD, mean age = 7 yr 11 mo, range = 6 yr 6 mo to 9 yr 10 mo; for typically developing children, mean age = 8 yr 0 mo, range = 6 yr 0 mo to 9 yr 10 mo). It was necessary to focus this study on a small age range to minimize the impact of age on the children's social participation patterns (e.g., Brown & Gordon, 1987; Florey & Greene, 1997). We selected this age range because of the shift during middle childhood to more involvement in self-selected and group-oriented activities that leaves children with disabilities at greater risk for difficulties in social participation (Florey & Greene, 1997).

Recruitment of participants was a two-part process, beginning with the children with SPD. The first author (Cosbey), an occupational therapist, conducted in-service presentations and individual consultations with special education teachers, general education teachers, and other school-based professionals. The consultations focused on the identification of and intervention strategies for children with SPD. The professionals were asked to give flyers to the parents of children who may have been eligible to participate in the study. Parents who contacted Cosbey signed a parental permission form and completed the Short Sensory Profile (SSP; McIntosh, Miller, Shyu, & Dunn, 1999). A child was considered to have SPD if (1) total score on the SSP was ≥3 standard deviations below the mean, (2) two subtest scores were ≥2.5 standard deviations below the mean, or (3) one subtest score was ≥4 standard deviations below the mean. Compared with other studies' definition of SPD (Mangeot et al., 2001; Yochman, Parush, & Ornoy, 2004), we used a conservative definition (Ahn, Miller, Milberger, & McIntosh 2004; Cohn et al., 2000; Schaaf, Miller, Seawell, & O'Keefe, 2003) to more clearly discriminate between the students with SPD and their typically developing peers. If a child was determined to be eligible for participation on the basis of SSP scores, we followed similar procedures to identify an appropriate matched peer.

To recruit the matched peer, the teacher of the child with SPD identified the typically developing child in the class who was closest in age to the child with SPD and was also the same gender and race, following procedures outlined by Panacek and Dunlap (2003). Attempts were also made to match the participants on free-lunch status; because this information was considered confidential, however, it was not available to the classroom teacher, so a priori matching was not possible. Post hoc comparisons revealed that 11 of the 12 pairs did match on this variable.

As with the recruitment of the child with SPD, the teacher contacted the parent of the typically developing peer to discuss the study. Parents who agreed to consider allowing their child to participate in the study contacted the first author, signed a consent form, and completed the SSP. We used the SSP scores to ensure that the children identified for the typically developing peer group did demonstrate average sensory processing abilities.

Typically developing peers who met the matching criteria were not available from the same classrooms as 5 of the 12 participants. For those children, typically developing peers were identified from other same-grade classrooms within the same school. Eleven of the 12 pairs were matched on all criteria. One child could not be matched for race, so she was matched with a peer who met the other criteria.

The final group of participants included 11 pairs of boys and 1 pair of girls. None of the participants had a disability diagnosis (e.g., autism, emotional–behavioral disorder, learning disability) or were receiving special education services. All participants demonstrated grades of at least *satisfactory* in all academic areas on their most recent report cards.

Instrumentation

Short Sensory Profile. We used the SSP, a standardized measure, to document the presence of SPD in the target group after their referral to the first author as children who demonstrated behaviors consistent with SPD (according to parent and teacher observation). The SSP, which is based on the Sensory Profile (Dunn, 1999), is a 38-item caregiver questionnaire that was specifically designed to be used as a research instrument and screening tool to identify children with SPD (ages 3–10; McIntosh et al., 1999). The SSP was designed to be completed by a child's caregiver and includes items related to the behavioral manifestations of underlying sensory processing abilities, such as sensitivity to light and response to movement activities.

The SSP's construct validity has been documented in two different ways. First, during formal assessments, occupational therapists have found SSP scores to discriminate between typically developing children and children diagnosed with SPD. Second, children who demonstrate atypical electrodermal response to repeated sensory stimulation have also been found to score lower on the SSP (McIntosh, Miller, Shyu, & Hagerman, 1999).

In addition to the SSP's strong construct validity, research has found it to be a reliable tool for identifying children with SPD. McIntosh and colleagues (1999)

estimated the SSP's internal reliability by calculating Cronbach's αs and found that the internal reliability coefficients for all the test sections ranged from .69 to .84 for typically developing children and from .70 to .93 for children with SPD. The reliability coefficients for the SSP total scores were .96 for the full sample of children (N = 117) and .93 and .91 for the typically developing children and children with SPD, respectively (McIntosh et al., 1999), indicating good internal reliability and supporting the SSP's use as an appropriate tool to qualify children for the current investigation.

Children's Assessment of Participation and Enjoyment. To obtain information about children's social participation patterns, we used the Children's Assessment of Participation and Enjoyment (CAPE; King et al., 2004) to guide interviews with the children by documenting their perceptions of their participation in a variety of activity types (social, physical, self-improvement, skill based, and recreational) across two domains (formal and informal). The questionnaire was designed to be completed by children and youth ages 6–21 and takes approximately 30–45 min to complete. It includes 55 items and asks for information regarding the frequency of participation in various activities, where the child engages in activities (e.g., at home and in the community), with whom the child engages in specific activities, and how much the child enjoys participation in activities.

To score the CAPE, a child's response on each item is converted to a point value (ranging from 0 to 1 on the Diversity scale to 1 to 7 on the Intensity scale), with lower values indicating either more restricted participation (e.g., less frequent participation) or less enjoyment. These point values are summed and used to obtain mean ratings across scales (Diversity, Intensity, With Whom, Where, and Enjoyment) for each of the five activity types (social, physical, self-improvement, skill-based, and recreational) as well as the two domains (formal and informal; King et al., 2004).

Normative data are not provided; rather, the assessment is designed to show current levels of participation, to describe current participation patterns, and to document changes over time. The CAPE is a relatively new assessment, so the validation process is ongoing. However, King et al. (2004) provided information that indicates good internal reliability and construct validity for this measure.

Parent and Teacher Perceptions About Children's Activity Participation

Researcher-developed questionnaires designed to elicit information about the adults' perceptions of (1) children's participation in activities and (2) children's closest friends in and outside of school were completed by the children's parents and teachers. This information was used to triangulate the information gathered during the child interviews and to obtain additional information about the participants' social lives, as reported by teachers and parents.

Procedures

After the participants were identified, the first author (Cosbey) distributed questionnaires to each participant's parents and teachers, and interviews were scheduled with the children. The parents and teachers were provided with an addressed, stamped envelope in which to return the questionnaires. The first author offered to meet with the parents to complete the assessments in an interview format, in case there were literacy concerns, but none of the parents requested this interview. If the questionnaires were not returned within 2 wk, the first author made follow-up phone calls to parents and teachers. Data were obtained from all the teachers and 23 of the 24 parents.

All the children completed the CAPE during an interview session with Cosbey. The length of the interview session ranged from 45 min to 1.5 hr. At the beginning of each interview, the study's purpose and procedures were explained to the child. Each child was given the opportunity to sign an assent form, and all of the children who were initially selected for the study agreed to participate. During the interview, each child was given the opportunity to fill out the pages in the CAPE response booklet, but Cosbey assisted in reading the questions and asking for clarification and additional information as appropriate. To minimize the amount of instructional time that the child missed during the school day as a result of participating in this study, parents and children were given the opportunity to decide whether the interview sessions were conducted with the child at his or her school or in scheduled appointments at the child's home. Two of the children with SPD completed the assessments outside of school hours. To keep the conditions similar to the other participants, the families were not present during these two interviews. Steps were taken to help the children with and without SPD maintain appropriate alertness levels throughout the interview, including (1) providing access to a variety of manipulatives (e.g., putty, small toys, and other fidgets) and (2) allowing and encouraging the children to move around the room or take movement breaks.

Data Analysis

All data entry and data analysis were conducted by Joanna Cosbey, and an independent research assistant verified the accuracy of the data.

Social participation patterns. To make the scores commensurate before data analysis, all the Diversity scale scores were converted to a percentage of maximum possible score by dividing the Diversity scale raw score by the total possible scores for the activity type or domain and then multiplying by 100 (Cohen, Cohen, Aiken, & West, 1999). No other data transformations were necessary.

A series of profile analyses (Tabachnick & Fidell, 2001) was used to analyze the participants' responses on the five CAPE scales (i.e., Diversity, Intensity, With Whom, Where, and Enjoyment) across the five activity types (i.e., recreational, physical, social, skill based, and self-improvement) and the two domains (i.e., formal and informal). One of the primary ways to conduct a profile analysis is to analyze a graph of the data, looking for differences between these two groups, including the shape of the lines (parallelism) and the mean scores for each group (levels; Tabachnick & Fidell, 2001). Differences in parallelism indicate different patterns of the response, and differences in levels suggest that one group reports an overall higher rating across the variables. Results from the profile analyses are presented as graphs, with each group's mean ratings plotted on each of the scales across activity types and domains. In addition, as part of the profile analysis for each scale, a multivariate analysis of variance was calculated to determine the degree of the relationships between the independent variable (SPD) and each of the dependent variables (i.e., diversity, intensity, with whom, where, and enjoyment).

To look for differences in parallelism, three steps were followed: (1) the difference scores among adjacent segments of the plotted mean scores for each group were calculated and compared using Wilks' λ; (2) the percentage of variance that could be explained by group difference was calculated; and (3) for scales demonstrating statistically significant differences between the groups, *t* tests were conducted across individual activity types, domains, or both to evaluate the significance of those differences (Tabachnick & Fidell, 2001). To conduct an analysis of levels, the mean responses for each activity type or domain for each group were averaged and these averages (across each scale) were compared using *F* tests.

Data were analyzed to examine whether the self-reported social participation patterns of children with SPD differed from those reported by their typically developing peers. An α level of .05 was used for all statistical tests.

Additional information from teachers and parents. The Teacher and Parent Questionnaires were reviewed to verify demographic information and to gather qualitative information on the social participation patterns of each participant, including any parent–teacher concerns about the participant's social participation. In addition, parents and teachers were asked for information about the friends the child had at home and at school. This information was used to examine potential differences in friendship patterns between the two groups of participants. To examine the agreement between parents and their children, the parents' perceptions of the participants' participation in activities were compared with the participants' responses.

Results

Figures 1 and 2 illustrate the response patterns of the two groups of children across activity types and domains. These figures present the mean scores for each group of children on each scale (by activity type and domain), represented by horizontal bars, with the standard deviations for each data point represented by vertical bars. The data in this study indicate that the two groups of children reported generally similar response patterns (parallelism), although differences in the areas of intensity and with whom exist (ps = .03 and .05, respectively). We found a significant difference between the two groups in their mean scores (levels) on the Enjoyment scale by activity types (p = .03, see Table 1 and Figure 1), with the children with SPD reporting overall greater enjoyment of activities than their typically developing peers. We found no significant differences in the mean scores (levels) of the two groups across any of the other scales (see Table 1 and Figures 1 and 2).

Group Differences in Response Patterns (Parallelism)

Figures 1 and 2 show the groups' responses across activity types and illustrate that the profiles of the two groups were similar on the Diversity, Where, and Enjoyment scales (p > .05; see Table 1) but differed significantly on the Intensity and With Whom scales (ps = .03 and .05, respectively; Table 1 and Figure 1). The *t*-test results suggest significant differences between the two groups on the With Whom ratings of social activities and the Enjoyment ratings of skill-based and recreational activities, as well as differences that approach statistical significance on the Enjoyment ratings of social activities (Table 1). On the basis of these data, the typically developing peers reported significantly more diverse social networks than the children with SPD for social activities, $t(22) = -2.04$, $p = .05$, indicating that they participate in these activities that include people outside of their immediate family more than do the children with SPD. Also, the children with SPD reported greater enjoyment of skill-based and recreational activities than did their peers, $t(22) = 2.35$, $p = .03$, and $t(22) = 2.08$, $p = .05$,

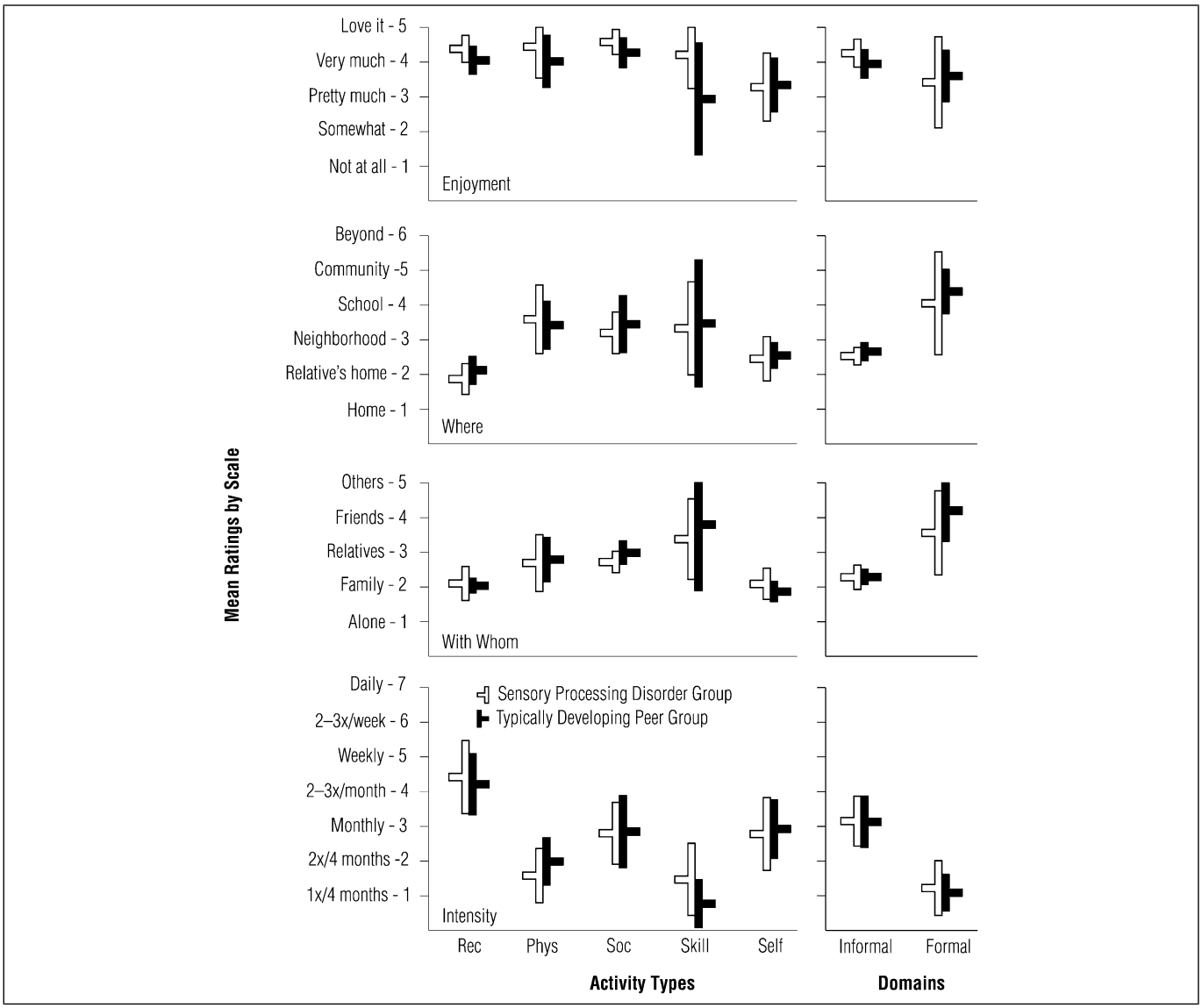

Figure 1. Mean Children's Assessment of Participation and Enjoyment ratings by activity type, domain, and scale (with standard deviations represented by vertical bars).

Note. SD = standard deviation; Rec = Recreational; Phys = Physical; Soc = Social; Skill = Skill-based; Self = Self-improvement.

respectively. In addition to these statistically significant differences, the ratings of enjoyment of social activities by the two groups approached statistical significance, $t(22) = 1.88$, $p = .07$, with the children with SPD reporting greater enjoyment than their typically developing peers (see Table 1 and Figure 1). Finally, the *t*-test results suggest that the children with SPD may have more frequent participation in skill-based activities than do their typically developing peers, and ratings approach significance, $t(22) = 1.94$, $p = .07$. We found no significant differences between the groups on the Diversity scale across activity types or domains (see Table 1 and Figure 2).

Group Differences in Overall Ratings (Levels)

When scores for each group were averaged across activity types or domains, the levels of the Enjoyment scale across activity types were statistically significant, with the children with SPD generally reporting greater enjoyment of activities than their typically developing peers ($p = .03$). We found no significant differences between the mean ratings of the two groups on any of the other activity types or domains ($p > .05$; Table 1 and Figures 1 and 2).

Additional Information From Parents and Teachers

In addition to the data obtained during the participant interviews, the teachers and parents completed questionnaires that provided demographic information and information about their views on the participants' social participation patterns. The adults were also asked to indicate any concerns they had about the participant that might be relevant for this study and to provide any other information they thought might be important for this study.

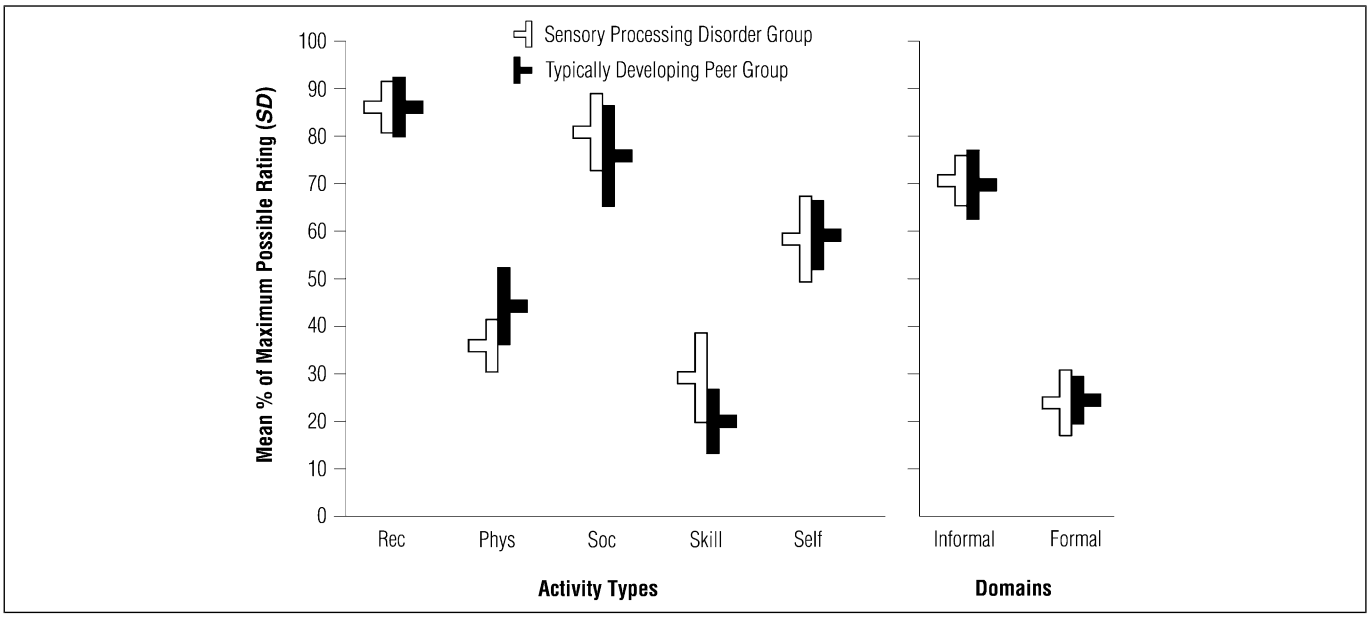

Figure 2. Mean Children's Assessment of Participation and Enjoyment "Diversity" scale percentage of maximum possible ratings by activity type and domain (with standard deviations represented by vertical bars).
Note. SD = standard deviation; Rec = Recreational; Phys = Physical; Soc = Social; Skill = Skill-based; Self = Self-improvement.

Parents' perceptions. The parents and their children agreed on the child's involvement for 84.9% of the activities (range = 66.7%–100%), with 82.3% agreement for children with SPD (range = 66.7%–92.9%) and 85.4% agreement for children who were typically developing (range = 71.4%–100%). Most of the items that the children and parents reported differently were activities such as drawing and dancing, which might be considered more private activities.

Teachers' perceptions. The teachers were asked to provide information regarding each child's preferred activities at school. The responses were consistent across the two groups, with teachers reporting that children in both groups enjoyed reading, drawing, and active play (e.g., soccer and kickball). The teachers reported that the children in both groups enjoyed the same types of activities during free time, including board games, talking to others, and reading. Exceptions were the teacher responses for 3 boys with SPD. According to teacher reports, 2 of these boys spent their free time alone unless directed into a group by an adult. The teacher of the third boy listed a variety of activities that he engaged in during free time, including wandering, making vocal noises, and making percussion sounds with materials.

Discussion

We used outcomes from the CAPE to examine the social participation patterns of children with SPD and their typically developing peers to begin identifying information that will be useful in developing interventions. The two groups of children demonstrated similar patterns in many aspects of social participation, including diversity of activities, intensity of participation, people involved in activities, location of activities, and enjoyment. This information is encouraging for parents and therapists because it suggests that the social

Table 1. *F* Values for Group Differences in Response Patterns (Parallelism) and Overall Mean Ratings (Levels)

	Response Patterns (Parallelism)								Mean Ratings (Levels)			
	Activity Type				Domain				Activity Type		Domain	
Scale	λ	*F*(4, 19)	*p*	Partial η^2	λ	*F*(1, 22)	*p*	Partial η^2	*F*(4, 19)	*p*	*F*(1, 22)	*p*
Diversity	.84	0.93	.47	.16	.99	0.14	.71	.00	0.06	.81	0.00	.98
Intensity	.59	3.32	.03*	.41	.99	0.29	.60	.01	0.06	.82	0.07	.79
With whom	.62	2.87	.05**	.38	.89	2.75	.11	.11	0.27	.61	1.57	.22
Where	.94	0.31	.87	.06	.99	0.21	.65	.05	0.46	.50	0.82	.38
Enjoyment	.81	1.13	.37	.19	.95	1.25	.28	.06	5.20	.03*	0.07	.79

$*p < .05$. $**p = .05$.

participation of children with SPD may not be significantly affected by their SPD. More important, on the basis of these data, both groups of children reported essentially the same degree of participation in activities in community-based locations, suggesting that children with SPD may not experience limited community access, which is a positive finding that bodes well for children with SPD.

However, despite the general similarities and the similarities in community-based participation, differences between the two groups were evident and provide preliminary information for parents and therapists concerning potential areas that may be affected by SPD, particularly in children who may demonstrate more significant sensory processing challenges than those who participated in this investigation. To provide relevant information for therapists and parents, the following discussion is organized on the basis of different types of activities (e.g., physical vs. skill based) rather than the specific scales, which allows for analysis of the results presented within the context of the relevant features of the activities.

The first activity type on the CAPE is *recreational activities,* which are informal. Although the category includes active items (e.g., going for a walk or playing on playground equipment), most of the items in this category are quiet activities, like doing puzzles and watching television. Involvement in these activities has been found to be related to the (1) child's family's activity orientation and (2) child's physical functioning (King et al., 2007). In this study, the two groups of children reported comparable participation in each of the different activities, but the children with SPD reported greater enjoyment than their peers for almost every activity within this category ($p = .05$). A qualitative examination of the response patterns revealed that the typically developing peers reported some of their lowest enjoyment ratings for three activities: quiet table-top activities (i.e., crafts, drawing, or coloring), pretend play, and computer or video games. Conversely, these three areas were among the most enjoyed by the children with SPD, with puzzles and board or card games among their least preferred.

It appears that the activities that the children with SPD enjoyed least were those that have clear expectations and formal rules (e.g., predetermined outcomes or a process to be followed). It is possible that the children with SPD found those activities more difficult and therefore less enjoyable. Their reported relatively lower enjoyment of puzzles and board or card games may also be because of the nature of these activities, which require visual-processing skills, the ability to sequence tasks, and frustration tolerance; these areas can all be affected by SPD (e.g., Ayres, 1979). Although the high enjoyment rating for the quiet table-top activities seems to contradict this finding, this item on the CAPE included three different activities (crafts, drawing, and coloring), so it is possible that the children's interpretation of this particular item reflected a view of the activities that was not product oriented. This interpretation would be consistent with the high enjoyment rating of pretend play by the children with SPD because pretend play is generally not highly structured and does not have formal rules.

Parents and therapists should consider the features of recreational tasks when assisting children with SPD in activity selection and encourage them to participate in activities that are appropriate given the child's specific needs (e.g., sensory, motor, visual) while respecting and encouraging individual child preferences (Dunn, 2001). Because school-age children spend much of their time engaged in product-oriented activities, such as homework and classroom activities, it is important to ensure that they have time to learn and explore while minimizing the risk of frustration and failure. When children are permitted to explore materials and activities without an emphasis on outcomes, they will have the opportunity to develop in a variety of areas, including motor skills, visual–perceptual skills, and self-confidence.

The second activity type on the CAPE is *physical activities,* which are all active tasks that require a varying degree of motor coordination and athletic ability (King et al., 2004). They include both formal (e.g., martial arts and team sports) and informal (e.g., bicycling and gardening) activities. Participation in these activities has been found to be related to a variety of factors, including family variables (e.g., income and activity orientation) and child variables (King et al., 2007). Although the two groups of children in the current study did not show statistically significant differences on any of the scales for physical activities, qualitative examination of the data revealed that the typically developing peers demonstrated involvement in more different types of activities than did the children with SPD. The most notable difference was in the children's participation in team sports: Participation was reported by 11 of the typically developing peers (92%) but by only 6 of the children with SPD (50%). Because the two groups were matched for income, it is unlikely that financial constraints were the primary cause of this difference. It is more likely that the difference was caused by time constraints that may be related to having a child with sensory or behavioral needs, to family orientation, or to child variables.

Involvement in physical activity has been found to be related to at least two child variables: athletic competence

and physical ability (King et al., 2007). Because it has been established that children with other diagnoses that involve sensory processing concerns (e.g., ASD, DCD, and ADHD) also have motor planning deficits (e.g., Baranek, 2002; Barkley, 1997; Cummins, Piek, & Dyck, 2005; Pitcher, Piek, & Hay, 2002, it is likely that some children with SPD demonstrate at least mild motor planning deficits that may affect their ability to be successful in physical activities. In this study, the children with SPD did report a higher level of enjoyment of physical activities than did their peers, but note that only the children who were currently participating in the activities were asked to indicate their level of enjoyment. It is possible that the children who were participating in physical activities were those who had less significant motor challenges and were thereby more successful with the physical tasks. More research in this area is necessary to further examine the relationship between the possible motor difficulties faced by children with SPD and their participation in physical activities. In the meantime, parents and therapists should be aware of the impact of even subtle motor planning deficits on athletic competence and participation in and enjoyment of physical activities. Interventions directed at developing motor skills and participation in activities that may be less affected by motor planning problems, such as swimming and bicycling, may be appropriate targets for therapists and parents. These activities would allow children with SPD to participate in physical activities with a higher likelihood of success and enjoyment.

The third activity type on the CAPE is *social activities,* which are informal activities that often involve other people (King et al., 2004). These activities include talking on the phone and listening to music. Participation in social activities has been found to be related to variables such as the support of classmates and close friends, family activity orientation, and child variables (e.g., social competence, prosocial behavior, and communication skills; King et al., 2007). In this study, the children with SPD reported a less diverse social network for social activities ($p = .05$), with the same or less diversity in their social networks than their peers for every activity in this category. They reported that most of their social activities took place with immediate family or alone, unlike their peers, who reported more involvement with extended family and friends. These reports were supported by information provided by the children's parents and teachers and are consistent with the findings of Brown and Gordon (1987), who found that social networks of children with disabilities tend to be more limited than those for children without disabilities.

Children in Brown and Gordon's (1987) study were younger and had disabilities that may be considered more significant, but the current study suggests that children with SPD may not show the same shift from time with family and adults to time with peers as do typically developing children. Because participation in social activities can be affected by social skills, prosocial behavior, communication skills, and so forth, more information is needed about the impact of SPD on these areas. We should note, however, that these data were collected as part of a larger study that included measures of social skills and challenging behavior, and the children with SPD were found to have both poorer social skills and more challenging behaviors than their typically developing peers (Cosbey, Johnston, & Dunn, 2008).

Although more information is needed regarding SPD's degree of impact on social skills and prosocial behavior, parents and therapists recognize the need to provide support in these areas (e.g., Bundy et al., 2007; Dunbar, 1999). In addition, children with motor difficulties (e.g., DCD) have been documented to be at a disadvantage in social situations because of difficulty recognizing nonverbal social cues (Cummins, Piek, & Dyck, 2005). Therefore, interventions should include a variety of strategies to ensure a comprehensive approach to addressing the potential social difficulties faced by children with SPD. First, the children may require explicit social skills instruction and interventions directed at developing prosocial behaviors. Second, to promote positive and successful social interactions, therapists and parents should help children with SPD identify their areas of strength and plan social activities around those strengths. For example, children who have difficulty sitting still for long periods of time might be more successful if they plan activities with peers that include movement (e.g., outings to the zoo) rather than ones that do not (e.g., going to the movies). Finally, children with SPD should be encouraged to identify peers who demonstrate similar play preferences (e.g., active vs. sedentary play) and similar activity preferences to facilitate positive interactions by minimizing the differences between the children's play behaviors.

The fourth activity type on the CAPE, *skill-based activities,* includes activities that "require knowledge and involve practice and instruction or learning" (King et al., 2004, p. 77). These activities primarily include formal activities like lessons (e.g., swimming, music, or dance), but the scale also includes one informal activity: dancing without an instructor present. Although both groups of children reported involvement in a variety of these activities and the diversity differences between the groups

were not quantitatively significant, the data reveal that the children with SPD appeared to be involved in a wider variety of activities than their peers, and they were more likely to participate in multiple different activities than their peers. For example, children with SPD reported involvement in singing lessons, art lessons, and dance lessons, three areas in which the typically developing peers did not report any participation. In addition, 75% of the children with SPD reported participating in dancing (informal, without an instructor present), compared with only 25% of the peers. The higher number of children with SPD participating in this particular activity may be related to the previously suggested reasons for their higher reported enjoyment for activities such as drawing and pretend play: Informal dancing is not product oriented and does not have clear rules or expectations. It is also possible that this activity was preferred because it helps some of the children meet their sensory needs.

All the other activities in this category are formal and generally involve adult support. Because participation in skill-based activities has been found to possibly be influenced by family orientation (King et al., 2007), it is possible that the observed differences between the groups may be the result of inherent familial differences. An alternative explanation is that the higher intensity of participation of the children with SPD could be a reflection of their parents' efforts to identify activities in which the children could be successful and find enjoyment. In fact, for all of the skill-based activities, the children with SPD reported enjoyment that was essentially equal to or greater than that of their peers, suggesting that the children with SPD may find enjoyment in the relatively highly structured and predictable nature of many of the skill-based activities. In addition, many of these activities provide a high degree of adult-directed assistance to support the children's participation, which may facilitate learning and a sense of success for the children with SPD.

Finally, *self-improvement activities* are informal activities such as reading and completing chores, as well as two formal activities (receiving tutoring and engaging in a religious activity; King et al., 2004). Participation in self-improvement activities has been found to be related to both family variables (i.e., income and activity orientation) and child variables (i.e., cognitive functioning and communication skills), and enjoyment of these activities has been found to be positively correlated with academic competence (King et al., 2007). The two groups of children in this study reported generally similar profiles. The only apparent qualitative difference was found in the With Whom ratings of the two groups because the children with SPD reported slightly more diverse social networks than their peers in many of the activities, particularly for the homework rating. Although these differences may indicate that the children with SPD required greater support to complete tasks successfully, more information is needed this area.

Limitations

The current study suggests that children with SPD may demonstrate social participation patterns that differ from those of their typically developing peers. When considering the generalizability of these results, however, note that the participants were primarily White boys with little cultural or socioeconomic diversity. Factors such as level of parental involvement and cultural and socioeconomic factors may have affected the intensity and diversity of the children's interactions apparent in this study, so the children's relatively high degree of participation may not reflect the social participation patterns of children in general. In addition, although the children with SPD who participated in this study demonstrated a range of significant behavioral manifestations of SPD, only children who were performing at or above grade level academically were included in the sample. These selection criteria excluded consideration of a large group of children with SPD: those who have less significant difficulties with sensory processing and those who may have learning or cognitive difficulties in addition to SPD. Finally, these data primarily reflect the social participation patterns of boys, so it is important to use caution when applying the findings of this study to girls with SPD because boys and girls are known to have different participation patterns (e.g., King et al., 2007).

Implications for Practice and Future Research

This study has implications for future research that are linked to the way in which services for children with SPD are delivered. First, more research needs to be conducted to further define the impact of SPD on social participation. Second, research on the efficacy of intervention strategies is needed to determine the most appropriate, effective, and efficient ways to support these children and their families. Finally, these studies should include more diverse populations of children with SPD, including diversity related to gender and cultural and socioeconomic backgrounds, as well as diversity related to the learning, cognitive, and behavioral characteristics of children with SPD.

Occupational therapists, educators, and other adults who work with children with SPD should recognize that such children are at risk for isolation from social activities and work to support childhood play as a significant

developmental context (AOTA, 2008). Possible intervention strategies should not be limited solely to addressing the underlying SPD but should also include strategies to promote access to social opportunities and to help the children, their families, and their peers identify activities that may be mutually enjoyable to promote positive, successful interactions. These activities can provide the framework for opportunities for supported social interaction with peers, including explicit social skills instruction and assistance developing the skills necessary to be successful in the chosen activities.

The specific needs of children with SPD may vary depending on factors such as the severity and nature of their SPD and any coexisting disabilities (e.g., ASD, learning disabilities, or ADHD). However, therapists should recognize that children with SPD may be at risk for social isolation and include assessment elements related to the child's social networks because social interaction and play with peers are crucial for ongoing development (e.g., AOTA, 2008; Corsaro & Eder, 1990). In addition, practitioners and parents should closely examine the sensory, physical, and cognitive demands of activities to identify activities that will provide appropriate contexts for supporting children with SPD. They can assist the children in participating in a variety of activities to ensure that they have opportunities for success in both independent activities and more challenging activities that promote skill development.

The ultimate goal of intervention for children with SPD is to give them the ability to lead a satisfying, meaningful life (Dunn, 2001). To support children to that end, it is essential that parents and therapists recognize and respect individual child differences and focus intervention on helping children identify tasks and activities that they find enjoyable. This process should include efforts to help children understand their sensory needs, identify the salient features of activities, and develop strategies that can facilitate participation in activities.

In conclusion, we found that although the social participation patterns of children with SPD are generally similar to those of their typically developing peers, notable differences exist between the two groups. Parents and professionals who work with children with SPD should recognize the potential impact of SPD on social participation. Intervention should target three areas: (1) identification of personally meaningful and enjoyable activities for children with SPD, (2) development of effective strategies to facilitate their participation in these activities, and (3) expansion of their social networks, as appropriate. Further research should seek to identify the salient features of activities in relation to children with SPD and to develop effective interventions that are responsive to familial, cultural, and child needs. ▲

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