Playground Behaviors of Children With and Without Sensory Processing Disorders

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ABSTRACT

It has been well established that participation in social activities is essential to children's development and that disability status can affect a child's participation in everyday activities. However, little research has been done on the impact of sensory processing disorders (SPDs) on social participation and play behaviors. This study is part of a larger study examining the social participation of children with SPD and specifically compares the playground play behaviors of children with SPD and those of their typically developing peers. Both groups of children were observed over multiple sessions during unstructured recess activity and their behaviors were coded and analyzed. Statistically, results show that the play patterns of the two groups were generally similar. However, there were qualitative differences in the play behaviors of the two groups, including conflict, social play, access to play opportunities, and awareness of social cues. Implications for practice and future research are discussed.

Social participation refers to how people relate to and interact with their social surroundings (Coster, 1998; Law, 2002). Play is a critical component of social participation for children, providing opportunities for social development and a sense of competence; playgrounds provide the context for play opportunities (Pellegrini & Smith, 1993). Children tend to prefer to play with those who share activity preferences and play styles (Richardson, 2002; Rubin, Lynch, Coplan, Rose-Krasnor, & Booth, 1994), but a growing body of research suggests that the preferred play activities of children with disabilities may differ from those preferred by children without disabilities.

For example, children with developmental coordination disorder (DCD) and children with attention deficit hyperactivity disorder (ADHD) have been reported to have a general preference for more informal, sedentary, and solitary activities than their peers (Engel-Yeger & Ziv-On, 2011; Jarus, Lourie-Gelberg, Engel-Yeger, & Bart, 2011; Poulsen, Ziviani, & Cuskelley, 2008). The underlying cause of these preferences is not clear, but the nature of the disability, limited access to social opportunities, and other factors may affect activity preferences (Elksnin & Elksnin, 1995; Lightfoot, Wright, & Sloper, 1999).

In addition to preferences for play activities and limited access to opportunities for play, the play behaviors of children with disabilities tend to differ from those of their typically developing peers. As they develop, typically developing children transition from solitary play with low cognitive demands to more complex group activities (Florey & Green, 1997). By 6 to 12 years of age, children are expected to cooperate with others, demonstrate empathy, and have self-control and flexibility during their play ac-

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tivities (Florey & Greene, 1997). However, children with disabilities demonstrate a slower rate of developmental changes in play, leading to a gap between the play behaviors of the two groups of children (Case-Smith & Miller-Kuhaneck, 2008), further limiting the children's access to play opportunities.

A growing body of research indicates that specific play behaviors may be associated with different types of disabilities. For example, children with language impairments engage in less conversation and interactions on the playground (Fujiki, Brinton, Isaacson, & Summers, 2001) and children with ADHD are less skilled at social play and with interpreting social cues (Cordier, Bundy, Hocking, & Einfeld, 2010). These differences have implications for the interventions that are developed and delivered to address the children's needs.

One factor that has yet to be closely examined is the impact of sensory processing on play behaviors. Sensory processing disorders (SPDs) often occur with or share characteristics with other disabilities, such as ADHD, DCD, and autism (Dunn & Bennett, 2002; Tomchek & Dunn, 2007; Wilson & McKenzie, 1998). In addition, there is a growing body of evidence that SPDs represent a unique diagnostic category (Miller, Anzalone, Lane, Cermak, & Osten, 2007). SPD is 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, 2001). The impact of SPD is widespread, leading to difficulties in self-care, social, and play skills (Ahn, Miller, Milberger, & McIntosh, 2004; Ayres, 1979; Bar-Shalita, Vatine, & Parush, 2008; Cohn, Miller, & Tickle-Degnen, 2000; Dunn, 1999). However, the link between sensory processing and play activities has only been examined by a few researchers (Cosbey, Johnston, & Dunn, 2010; Engel-Yeger & Ziv-On, 2011).

Children with SPD may differ from their peers on many play-related behaviors, including playfulness and activity preference (Bundy, Shia, Qi, & Miller, 2007; Case-Smith & Miller-Kuhaneck, 2008; Cosbey et al., 2010), but studies have not examined school recess as a natural environment for social participation. Because children's recess play skills reflect their level of development of physical, cognitive, and social skills, and playground activities can lead to developing these skills (Pellegrini & Smith, 1993), recess is a critical environment for children's social participation.

Disability status is one of many factors that can influence children's play and social participation, and naturalistic observations of playground activities of children with disabilities are lacking. A clearer understanding of the relationship between play behaviors and SPD is necessary to begin to develop relevant interventions that will support children with SPD and their families. This study is part of a larger study examining the social participation patterns of children with SPD and their peers. The research questions guiding this study are: (1) What are the playground play behaviors of young school-aged children (ages 6 to 9 years) with SPD? and (2) Do the playground play behaviors of children with SPD vary from those of their typically developing peers?

Methods

Participants

Two groups of children participated in this study, with 11 boys and 1 girl in each group. The mean age of the SPD group was 7 years, 11 months (range = 6 years, 6 months to 9 years, 6 months) and the mean age of the typically developing peer group was 8 years, 0 months (range = 6 years, 0 months to 9 years, 10 months). The two groups of children were systematically matched on age, gender, grade in school, and race to attempt to control for variables that may affect social participation (Florey & Greene, 1997; Panacek & Dunlap, 2003). Group 1 comprised 12 children with SPD, as defined by one or more of the following Short Sensory Profile (SSP) scores: (1) a total score 3 standard deviations or more below the mean, (2) two subtest scores 2.5 standard deviations or more below the mean, or (3) one subtest score 4 standard deviations or more below the mean based on the normative data provided by the authors of the SSP (Table 1; McIntosh, Miller, Shyu, & Dunn, 1999). These scores are consistent with other studies involving children with SPD (Ahn, Miller, Milberger, & McIntosh, 2004; Cohn, Miller, & Tickle-Degnen, 2000; Schaaf, Miller, Seawell, & O'Keefe, 2003). Group 2 comprised 12 children who were typically developing. These children had scores on the SSP that were within the average range and had no reported concerns with sensory processing or motor coordination.

The children all attended general education classrooms in public elementary schools in one school district in a large metropolitan area. Children were excluded from participation if they were receiving special education services or demonstrated below average performance in any academic area (based on report cards).

Classroom teachers recruited children with suspected SPD for participation. After being informed about the study by the first author, including the risks and benefits, interested parents provided informed consent and completed a caregiver ques-

Table 1
No. of Participants in the Sensory Processing Disorder Group With Low Short Sensory Profile Scores

	Short Sensory Profile Subtests							
Child's Score	**TS**	**TSS**	**MS**	**USS**	**AF**	**LEW**	**VAS**	**Total Score**
⩾ -2.5 SD	3	1	1	8	5	2	3	–
⩾ -3 SD	–	–	–	–	–	–	–	3
⩾ -4 SD	1	0	3	3	4	1	1	–

TS = Tactile Sensitivity; TSS = Taste/Smell Sensitivity; MS = Movement Sensitivity; USS = Underresponsive/Seeks Sensation; AF = Auditory Filtering; LEW = Low Energy/Weak; VAS = Visual/Auditory Sensitivity.

Table 2
Definitions of Category of Play and Levels of Social Play

	Definition
Category of play	
Practice play	Activities that involve the use of motor skills and sensation to master physical skills or simply for enjoyment of the physical activity
Constructive play	Play with objects with a goal to make an end product, including the use of blocks, art materials, or other manipulatives
Dramatic play	Games and activities that involve imagination and make-believe
Games with rules	Activities where a group of children establish the standards of behavior for a game (loose or formal), with sanctions for violating the rules
Level of social play	
Solitary	Playing alone, usually with objects, and with limited awareness of others
Parallel	Playing alongside other children, using similar toys or play equipment, but without playing together
Associative	Children playing together with little organization to their play and little influence on each other during the play activity
Rough	Play with little organization that involves behaviors done in a playful manner (e.g., hopping, tickling, and playful rough-housing)
Cooperative	Children playing together in an organized manner to achieve a purpose

tionnaire, the SSP (McIntosh, Miller, Shyu, & Dunn, 1999), to identify the children with SPD. Following the identification of the children with SPD, typically developing peers who met the matching criteria outlined above were identified using the same procedures. These peers were recruited from the same school and, if possible, the same classroom as the child with SPD.

After the children were identified, each child met individually with the first author, who described the study. The children were then given an opportunity to either give or decline assent to participate in the study. All of the children who were identified for participation gave their assent to participate.

Measures

SSP. The SSP is a 38-item caregiver questionnaire designed as a screening and research tool to identify children with SPD. It provides information on seven specific areas of sensory processing and a total score. The SSP has been found to be a valid and reliable tool for identifying children with SPD (McIntosh, Miller, Shyu, & Dunn, 1999; McIntosh, Miller, Shyu, & Hagerman, 1999).

Playground Observation Forms. The children's playground behaviors were documented on researcher-developed coding forms that were based on recommendations from the literature on the social skills of children (Florey & Greene, 1997; Rubin et al., 1994; Williamson & Dorman, 2002). The forms allowed for documentation of quantitative data, including play behaviors (Table 2), non-play behaviors, presence of adults, size of play group, and presence of aggressive behavior, as well as qualitative data related to social behaviors such as use of eye contact, initiation of conversations, and recognizing social cues.

Procedures

This research was approved by the Institutional Review Board of the University of Utah and the participating school district. Written consent was obtained from all parents and children who participated in the study.

Naturalistic Observations. Naturalistic observations of the play behaviors of all participants were conducted during unstructured recess activities on school playgrounds. The schools were all part of the same school district, were of similar size, and had similar play equipment and rules. Quantitative data were collected regarding (1) the category of play; (2) the level of social play; (3) the size of the play group; (4) the presence of adults; and (5) the presence of aggression. Immediately following the observation, the observer completed a questionnaire that allowed for subjective documentation of the behaviors observed. Although this questionnaire did not provide data on the frequency of the behavior, it provided information about the quality of the social behaviors observed.

Scan sampling was used to examine the children's patterns of social participation and time use. Data on both the child with SPD and his or her peer were collected over four 10-minute sessions using 15-second intervals, resulting in 80 data points per participant per category of behavior and providing a representative sampling of the children's behavior over the recess period (Bakeman & Gottman, 1997). The observations were conducted over 5 weeks and were scheduled to ensure representative sampling across the observation period.

Interobserver Agreement. Prior to the initiation of the observation sessions, interobserver agreement was established between the researcher and the research assistant. The two-step process included (1) a review of a videotape and (2) on-site observations, both of children engaged in free-play activities.

Interobserver agreement was computed to evaluate data accuracy by dividing the number of agreements within each category by the number of agreements plus disagreements within that category and multiplying the result by 100. During training, any instances of disagreements were resolved by discussing the videotape and establishing consensus. Following the computation of the agreement percentages, Cohen's kappa was calculated using SPSS (SPSS for Windows, Rel. 14.0.0; SPSS, Inc., Chicago, IL) for each category and for overall agreement within the data collection session, whenever possible.

Both phases of training were considered complete when the agreement reached a level of kappa in each area of 0.6 or greater (or greater than 80% agreement if it was not possible to calculate a Cohen's kappa). The overall Cohen's kappa value for the first phase of the training was .98 (range = .92 to 1.00), with 98% agreement on the qualitative observations. For the second phase of the training, the overall Cohen's kappa value was .95 (range = .62 to 1.00), with 90% agreement on the qualitative observations.

During the data collection phase of the study, interobserver agreement was computed using the procedures outlined above for data gathered during one of the observations for each matched pair of participants. These observations were approximately evenly distributed across the observation sessions to control for possible observer drift. Overall agreement between the observers was good, with the kappa values for the total data set ranging from 0.85 to 1.00 (agreement ranging from 93% to 100%). The mean agreement on the qualitative observations was 93% (range = 78% to 100%).

Data Analysis

The data gathered during the playground observations were analyzed based on the percentage of time intervals that the participants engaged in the various behaviors. For each participant, total percentage of each behavior across the four observations was calculated. Using a series of independent *t* tests, these frequencies were analyzed to determine whether there was any difference in the play behaviors of the two groups of children. The *t* tests were used to compare the group size, presence of adults, presence of aggression, activity patterns, category of play, and level of social play.

Using procedures described by Sigman et al. (1999), the social behaviors were also collapsed into three categories: non-social, low social, and high social behaviors. The frequencies of these three categories of behaviors were also compared between the groups. In addition, the information gathered during the observations was used to provide a descriptive summary of the play behaviors and social skills observed for both groups of children.

Results

A series of *t* tests were used to compare observed group size, intervals with adults present, presence of aggression, activity patterns, category of play, and level of social play of the two groups. There were no significant differences between the two groups on any of these dependent variables ($p > .05$).

Table 3 provides the percentage of time that the two groups of children spent in each of the various categories measured. In summary, both groups spent most of their time in small groups and little

time was spent with adults participating in the activities of either group of children. The presence of aggression was rare in both groups, but the participants in the SPD group demonstrated more aggression toward others than did their typically developing peers. Both groups spent more time playing than engaged in non-play behaviors (e.g., conversation or unoccupied), and most of their play was practice play and games with rules. In addition, both groups of children spent most of their time engaged in cooperative and associative play.

Using an adaptation of procedures described by Sigman et al. (1999), the social behaviors were collapsed into three categories: non-social behaviors (solitary play and onlooker/unoccupied behavior), low social behaviors (parallel and associative play), and high social behaviors (rough and cooperative play and conversation). Both groups of participants engaged in higher percentages of high social behaviors than either non-social or low social behaviors (Table 3). A repeated-measures analysis of variance showed that this difference in levels was significant at $p < .01$ for the typically developing group, $F(2, 10) = 7.88$, $p < .01$, but not for the children with SPD, $F(2, 10) = 1.52$, $p = .27$, indicating that the children with SPD demonstrated greater variations in their play than did their peers.

Qualitative Observations. The qualitative observations guide that was completed by the observer after each playground observation provided additional information on the qualitative nature of the children's interactions.

Presence of Conflict. Of the 48 observation sessions, conflict involving a child with SPD was observed in 14 sessions, compared to only five instances involving typically developing peers. More children with SPD experienced conflict during the observations ($n = 8$) than their peers ($n = 5$) and they tended to have conflict over more than one observation session. In fact, four of the children with SPD had conflict during at least half of their observation sessions. In addition, the children with SPD tended not to apologize after doing something wrong ($n = 11$), unlike their peers ($n = 1$). All six sessions with a child not controlling his or her temper involved four children from the SPD group.

Access to Play Opportunities. In addition to the differences observed between the two groups in the frequency of conflict, there were also notable differences in whether the target child was sought out by other children for play. Although all of the children in the study were sought out as playmates for at least two of the four sessions, only three of the children with SPD were sought out for play during all four of the observation sessions, compared to nine of the typically developing peers.

Table 3
Percent of Time in Play Behaviors in Children With Sensory Processing Disorders and Their Typically Developing Peers

Characteristics of Play	SPD Group	Typically Developing Peers
Group size (including target child)		
Large (> 5 children)	12.6	24.2
Small (1 to 5 children)	87.4	75.8
Adult present		
Yes	95.1	97.9
No	4.9	2.1
Aggression		
Not present	96.5	99.1
Toward others	3.2	0.2
From others	0.2	0.7
Behavior		
Out of sight	5.2	7.3
Conversation	13.1	15.6
Playing	64.2	62.5
Transitioning	4.1	4.3
Onlooker/unoccupied	13.4	11.0
Category of play		
Games with rules	17.1	40.3
Dramatic play	3.1	1.1
Constructive play	5.8	2.2
Practice play	74.0	56.4
Level of social play		
Solitary	20.2	12.1
Rough	7.7	4.3
Cooperative	33.5	54.9
Associative	31.6	24.5
Parallel	7.0	4.2
Level of social play (collapsed)		
Non-social	28.2	19.9
Low social	27.8	17.7
High social	44.1	64.4

Awareness of Social Cues. Finally, differences were noted between the two groups in the area of response to social cues. This included behaviors such as not responding to other children's verbal and nonverbal communication of boredom or annoyance and pursuing social interaction even when the other children seemed to be disinterested in inter-

acting (e.g., based on the other child walking away, ignoring the child with SPD, or focusing on other children). Seven of the children with SPD failed to respond to social cues during at least one of the four observation sessions, compared to only two of the children in the typically developing group.

Discussion

Social participation is a construct that has significant implications for the identification and provision of services to people with disabilities, and play is specifically highlighted as a domain that can be impacted by health and disability (World Health Organization, 2001). Social participation has been studied for a variety of children with disabilities, but little research has examined the social participation of children with SPD. This is the first known study to examine the social participation of children with SPD within the natural context of the school playground. This study used naturalistic playground observations to examine the social skills and play behaviors demonstrated by children with SPD and their typically developing peers. Data collected did not show any statistically significant differences in the play behaviors of the two groups of children, but qualitative differences were observed.

Presence of Conflict

The children with SPD demonstrated more frequent conflict than their peers, which is not surprising given that children with SPD often have difficulty resolving conflict appropriately because of their difficulty processing sensory input and generating appropriate adaptive responses (Ahn et al., 2004; Dunn, 2001). Although children with SPD seem to generally prefer the same types of play as their typically developing peers (Cosbey et al., 2010), they may need explicit instruction in strategies to manage their sensory over-responsiveness and under-responsiveness and may need structured play situations while they are developing the ability to use strategies independently (Case-Smith & Miller-Kuhaneck, 2008).

The children with SPD also seemed less aware of other children's social cues. For example, the children with SPD did not consistently respond appropriately to the behaviors of their peers, indicating that these children may have been less sensitive of their peers' needs. A similar finding has been reported by Cordier et al. (2010) regarding 5- to 11-year-old children with ADHD. They found that the children had difficulty responding to social cues, taking the perspectives of others, and sharing affective responses. The authors characterized these difficulties as a developmental lag in the area of empathy. Because the children with SPD who were identified in this study generally demonstrated behavioral characteristics similar to those demonstrated by children with ADHD (e.g., sensation seeking and inattention), it is possible that the conflict and limited awareness of social cues may also reflect developmental lags in empathy, but the methodology used in this study did not allow for this level of analysis into the children's empathetic responding.

Play Patterns

Both groups of children engaged in more high social behaviors than in low social or non-social behaviors, but this difference was only significant for the typically developing peers. The children with SPD demonstrated a wider range of behaviors, spending relatively more time engaged in low social and non-social behaviors. The children who were typically developing spent approximately two-thirds of their time in high social behaviors, compared to less than half of their time for the children with SPD. When looking specifically at play, the greatest difference was seen in the areas of cooperative and solitary play. Although these differences were not statistically significant, perhaps related to the limited sample size, the typically developing children spent more than half their time in cooperative play and 12% of their time in solitary play, compared to one-third and 20% of the time, respectively, for the children with SPD.

These differences highlight the fact that the children with SPD tended to engage in play that was less mature and less socially based than their peers, consistent with research that has found that children with developmental delays do engage in higher level cognitive play (e.g., dramatic play), but that the timing of this play may not coincide with this level of play in typically developing peers (Case-Smith & Miller-Kuhaneck, 2008). Because play has an important role in developing social skills and relationships, professionals and family members supporting children with SPD should be aware of their ability to engage in higher level cognitive play and should identify opportunities to facilitate their engagement in these activities to support the child's future relationships.

Related and similar differences were seen in the proportion of time that the children spent in the different categories of play. Although both groups spent the majority of their time engaged in practice play, it represented just over half of the play for children who were typically developing and almost

three-fourths of the play for the children with SPD. In contrast, the children who were typically developing spent approximately 40% of their time playing games with rules, compared to only 17% of the time for children with SPD. Again, these differences emphasize that the children with SPD had qualitatively, if not quantitatively, different social experiences on the playground. Their play was characterized by more solitary and less complex play than that of their peers.

Because the play of children changes as they get older, with more time spent in cooperative play and games involving complex rules (Williamson & Dorman, 2002), children with SPD may be at increased risk for fewer opportunities to socially participate with others as they get older. This increased difficulty as the child ages was mentioned by the mother of one of the children with SPD, who reported that her son usually played with younger children, which she attributed to his desire to be a leader during activities and his preference for physical activities. She expressed concern about his ability to be accepted by same-aged peers and reported significant involvement in selecting activities that would encourage him to interact with same-aged peers. Environment has been found to play an important role in the play and playfulness of children with disabilities (Hamm, 2006), so parents and professionals who are working with children with SPD should be aware of their role in helping identify appropriate environments and supports to encourage children with SPD to participate in a variety of play activities, including play that is more formal and more complex.

In addition to addressing the skills of children with SPD, interventions should also examine the impact of the environment on the play behaviors of children. A study by Bundy et al. (2008) found that simply modifying the playground to include opportunities for exploratory and creative play by adding loose materials (e.g., bicycle tires, foam, or trash can lids) changed the play behaviors of children who were typically developing. This simple intervention promoted more active and cooperative play by the children. Because creativity was more highly valued, the more creative children became leaders on the playground, rather than the children with stronger physical skills. This research has significant relevance to the play of children with SPD because these children often have associated motor difficulties while simultaneously benefitting from activities involving vestibular, proprioceptive, and tactile input (Miller, Coll, & Schoen, 2007). By creating playground environments that deemphasize sports-based activities and instead emphasize creative and active cooperative play, school-based professionals may be able to promote the play behaviors and social participation of children with SPD using a simple, non-intrusive intervention.

Given that the children with SPD were more likely to have conflict, were less likely to be aware of the social cues of others, and tended to engage in less complex play than their peers, it is not surprising that the children with SPD were less likely to be sought out for play by other children. Due to the current methodology, the relationship between SPD and social play is not clear. It is possible that the children with SPD were sought out for play less often than their peers because they engaged in less mature play than their typically developing peers. On the other hand, the converse could just as easily be true. It could be that the children with SPD appeared to participate in less mature play simply because they spent less time engaging in activities with other children (e.g., they were not sought out for play). Further investigations are warranted to determine the nature of this relationship.

Limitations

Because this study was limited to playground behaviors and no efforts were made to alter the naturally occurring environment and activities, the children were only able to participate in a limited number of activities. For example, the children did not have access to play objects (e.g., dolls, action figures, blocks, and coloring materials). The findings of this study may be less generalizable to children who attend schools that provide more diverse activities during recess. Additionally, the methodology did not allow for documentation of the context of the behaviors of other children in the area.

Future research in this area should explore more diverse groups of children with SPD. This study involved a small and demographically homogeneous sample. Although the behaviors observed may have been typical for the participants involved in the study, further research is necessary to extend these findings to children from more diverse racial, cultural, and socioeconomic backgrounds. Additionally, most of the children who participated in this study tended to seek a high level of activity and sensory input, so the findings may have limited generalizability to children who demonstrate other patterns of SPD.

Conclusion

This study provides preliminary information about the playground behaviors of children with

SPD, suggesting that the play of children with SPD differs from their typically developing peers, with children with SPD engaging in less complex and more solitary play than their peers and having their play characterized by more conflict. Future research that more closely examines specific elements of social skills, such as empathy and contrition, is needed to identify areas to target to support children with SPD. Although more research is necessary to determine the nature of the relationship between SPD and playground behaviors, interventions to support the playground participation of children with SPD need to be developed and validated. Based on the findings of this study, children with SPD may benefit from interventions to address issues related to sensitivity to and awareness of others and interventions to develop more complex play skills, including strategies to participate in group activities.

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