

The Sensory Environment and Participation of Preschool Children With Autism Spectrum Disorder

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Abstract

Sensory processing is recognized as impacting participation for preschool children with autism spectrum disorder (ASD). Little research exists to examine the impact of the sensory environment on the participation patterns of children with ASD, specifically from a contextual standpoint. The researchers in this study examined the viewpoint of teachers and occupational therapists on the sensory-related environmental barriers to participation within the preschool context. Qualitative descriptive methodology was used for data collection and analysis. Thirteen preschool teachers and occupational therapists were interviewed. Sensory aspects of the environment both inhibited and enhanced participation. Physical and temporal components of the environment are identified as being the most influential. Modifications of the environment are identified as increasing participation. It is important to consider the sensory aspects of the environment, in addition to the sensory processing patterns of the person in assessment and intervention planning within the preschool environment.

Keywords

sensory, participation, environment

Introduction

Autism spectrum disorder (ASD) is one of the most commonly occurring developmental disabilities in children (Boyd, Odom, Humphreys, & Sam, 2010). Children with ASD exhibit deficits in social skills and communication (American Psychiatric Association [APA], 2013) as well as possible differences in sensory processing (SP; APA, 2013; Tomchek, Huebner, & Dunn, 2014). SP patterns in children with ASD often differ from the normative population but vary among children diagnosed with ASD (Fernández-Andrés, Pastor-Cerezuola, Sanz-Cervera, & Tárrega-Mínguez, 2015; Smith Roley et al., 2015; Tomchek et al., 2014). SP differences impact participation of children with ASD (LaVesser & Berg, 2011). These differences are often addressed through interventions designed to remediate SP differences that impede participation (Faller, Hunt, van Hooydonk, Mailloux, & Schaaf, 2016; Lane, Smith Roley, & Champagne, 2014). However, current trends in health care promote a reduction in barriers rather than focusing on the limitations of the person (Schneidert, Hurst, Miller, & Ustun, 2003). Identifying the sensory aspects of the environment that influence participation within the preschool setting contributes to a comprehensive understanding of participation (Forsyth & Jarvis, 2002) and provides the foundation to address environmental barriers to support participation.

Ecological models of development outline the interaction of the environment and the person in participation

(Bronfenbrenner, 1994; Dunn, Brown, & McGuigan 1994). The environment has a continuous effect on behavior (Bronfenbrenner, 1994). Likewise, behavior has a reciprocal effect on the environment. As a result, the environment may inhibit or enhance participation (Law et al., 1996). The interaction of a health condition and environmental barriers has a direct affect on participation in both children and adults with disabilities (Schneidert et al., 2003). Children with disabilities and the parents of children with disabilities indicated a variety of environmental factors, including physical and societal, as influencing participation (Bedell, Khetani, Cousins, Coster, & Law, 2011; Kramer, Olsen, Mermelstein, Balcells, & Liljenquist, 2012).

Participation is defined as active involvement with others to perform a task (“Participation,” n.d.) or meaningful occupation (American Occupational Therapy Association, 2014) within a given environment (Ziviani & Rodger, 2006). It involves the fulfillment of roles to the expectation of others (Chapparo & Lowe, 2012). The World Health Organization’s (2001) definition of participation encompasses learning, task demands, communication, mobility,

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self-care, domestic tasks, relationships, and community and social involvement. For children, this definition includes participation in school, leisure, and recreational activities (King et al., 2003). In the preschool environment, participation involves the fulfillment of the roles of learning, play, work, and self-care to the satisfaction of self and others (Chapparo & Lowe, 2012).

SP is defined as the organization of sensory information for use (Ayres, 1979). SP differences contribute to decreased participation of preschool and school-aged children with ASD (LaVesser & Berg, 2011; Reynolds, Bendixen, Lawrence, & Lane, 2011). Participation is limited in social tasks including activities with friends, structured activities, and pretend and imaginative play (Little, Sideris, Ausderau, & Baranek, 2014; Reynolds et al., 2011). Participation in the school environment is also limited by SP differences (Fernandez-Andres et al., 2015; Smith Roley et al., 2015). SP differences in auditory and tactile processing impact school performance including attending to tasks and engagement with peers (Ashburner, Ziviani, & Rodger, 2008; Fernández-Andrés et al., 2015). Children who exhibit sensory-seeking behaviors have poorer academic performance (Ashburner et al., 2008), and children with sensory-related praxis difficulties display deficits in academic performance and participation in the school environment (Fernández-Andrés et al., 2015; Smith Roley et al., 2015; Tomchek et al., 2014). Teachers and other school personnel employ environmental modifications, including sensory supports, to improve participation. Supports include, but are not limited to, the use of ball chairs (Bagatell, Mirigliani, Patterson, Reyes, & Test, 2010; Fedewa, Davis, & Ahn, 2015), wearing of weighted vests (Collins & Dworkin, 2011), and incorporation of yoga into the classroom routine (Koenig, Buckley-Reen, & Garg, 2012). In addition, environmental modifications to change sounds and lighting were found to increase attention of children in the school environment (Kinnealey et al., 2012).

The consideration of both the environment and the SP patterns of the child shifts the focus from exclusively on the person's deficits to also include the reduction of barriers. The reduction of environmental barriers is especially important in the complex sensory environment of the preschool classroom. Components of the environment that are sensory related include aspects of the physical environment, social environment, and elements used to perform tasks expected in the preschool setting. By identifying the sensory aspects of the environment that both inhibit and facilitate participation, environments can be altered or structured in a way to increase compatibility of the person and environment to support participation (Law et al., 1996) of preschool children with ASD in the roles of the classroom.

In this study, we explored the relationship between the sensory features of the preschool environment and participation from the perspectives of professionals, such as teachers and occupational therapists (OTs), working with children

with ASD. Teachers and other school professionals work closely with students within the preschool classroom and provide unique information on how sensory aspects of the environment may impact the participation of the student. We used qualitative methods to answer the following research questions:

Research Question 1: What sensory aspects of the preschool environment affect the participation in school tasks of preschool children with ASD?

Research Question 2: What sensory aspects of the environment support and inhibit a the participation in school tasks of preschool children with ASD?

Research Question 3: What supports are offered to facilitate participation in school tasks of preschool children with ASD?

Methodology

The researchers utilized a qualitative descriptive approach (Sandelowski, 2000). Specifically, the researchers examined the perceptions of teachers and OTs working with preschool children with ASD, as they related to the sensory aspects of the environment and the participation of the child. The methodology utilized a descriptive approach to data collection and analysis to summarize the perceptions of teachers and therapists (Sandelowski, 2000). Temple University's institutional review board approval was obtained prior to the initiation of the study. We obtained informed consent from each participant before the start of the interviews. Informed consent included the risks and benefits of the study, indication that participation was voluntary, and that identity of the participants was confidential.

Sampling

Purposive and snowball sampling (Patton, 2015) was used to recruit participants for a semistructured interview. For inclusion, participants were preschool teachers or OTs who worked with at least one preschool-aged child with ASD. We recruited a total of 13 teachers and OTs. Table 1 represents the demographics of participants.

Interview Procedure

The interviews occurred either face to face or via phone. We gathered consent to audio record prior to the start of the interview. Before the interviews, we developed open-ended interview questions and probing questions to provide structure for the interview. Interview questions were developed based on the need to gather specific data relevant to the research questions and focused on the sensory components of the preschool environment. Probing questions provided a supplement to the guided questions. Interview questions can be found in the Appendix. Each interview lasted

Table 1. Teacher/Therapist Demographics.

	<i>n</i>	%
Occupation		
Teacher	8	61.5
Occupational therapist	5	38.5
Years of experience		
1-3 years	6	50
8-10 years	2	16.7
11-15 years	2	16.7
16-20 years	1	8.3
21 or more years	1	8.3
Education		
Undergraduate degree	2	15.4
Master's degree	10	76.9
Not answered	1	7.7
Community		
Major urban	5	38.5
Suburban	7	53.8
Rural	1	7.7
Age		
20-29 years	4	30.8
30-39 years	5	38.5
40-49 years	2	15.4
50-59 years	1	7.7
60 or over	1	7.7

between 30 and 60 min. The interviews were recorded and transcribed.

Coding Procedure

We used a conventional content analysis approach to data analysis (Hsieh & Shannon, 2005). Prior to analysis, each recorded interview was transcribed and then cross-checked to ensure accuracy of the data. We analyzed data into predetermined categories based on the initial open coding of the data and identified research questions. These five categories included (a) sensory environmental characteristics, (b) sensory supports, (c) nonsensory supports, (d) indicators of sensory environment, and (e) impact on the classroom. In addition, we organized relevant quotes with the aligning category. All data were organized using an excel spreadsheet. Open coding used a line-by-line analysis process targeting the perceived experiences and reported observations of participants specifically as they related to sensory features of the environment. A second coder who was blinded to the first coder's results coded all the data using the five predetermined categories for triangulation in the data analysis process (Patton, 2015). We used a constant comparison method to compare data across participants and identify consistent and central themes. After initial coding, we compared data with the other previously analyzed participants' data for investigator triangulation (Patton, 2015). Researchers trained in qualitative methodology completed all the data analysis.

Trustworthiness

To ensure trustworthiness throughout the study, the researchers completing the analysis first wrote perceptions of how the sensory environment affects children's participation in an attempt to bracket personal bias from the topic. In addition, the use of multiple coders triangulated the data analysis process. We did not consider data not identified by multiple coders in the development of central themes. No new themes were identified after Participant 10 indicating that the data were saturated. Themes were independently peer reviewed and validated by a researcher with extensive experience in qualitative research (Burnard, Gill, Stewart, Treasure, & Chadwick, 2008).

Findings

The participants identified all seven of the sensory systems and a variety of preschool activities. Participants identified both the presence of sensory stimuli and a child's response to sensory stimuli as influential on participation, engagement, and interactions. In addition to activities, participants also described the preschool environment as being composed of many smaller environments, some of which were supportive and some that were restrictive, depending on the sensory features of each environment. Each context within the preschool environment, such as the playground, provided a different level and type of sensory stimuli. Therefore, participation was supported in one context but inhibited in another context. Furthermore, the participants identified behaviors such as meltdowns and aggression as occurring in response to sensory stimuli. Disruptive behaviors impacted the participation of the child with ASD and others within the context. The physical structure of the environment affected the sensory stimulation within the environment and was key in both inhibition and facilitation of participation of children with ASD. A child's unique response to that sensory input impacted participation on an individual level.

Themes

Three themes emerged explaining the experience of the sensory aspects of the environment and how these aspects affect participation of preschool children.

1. Avoidance and perseveration: Sensory aspects of the environment moved a child toward avoidance of a task or perseveration in one particular task preventing participation in classroom activities.
2. Routines: Sensory aspects of the environment affected the routines set by the classroom teacher for the entire classroom. The routines of the classroom changed to meet the sensory needs of the child.
3. Modifications and sensory support: Modification to the environment or task altered the sensory aspects of

the environment to increase participation. Certain sensory input supported participation. On the other hand, the removal of other sensory input supported participation.

Avoidance and Perseveration

The presence of sensory stimuli within the environment affected the participation of children within tasks. Participants identified a variety of situations where a child would avoid an activity due to the sensory components. Participants frequently referenced the tactile components of activities that students avoided. For example, a child would avoid a task, such as craft time, because of the involvement of glue in the task. Participant 12 stated, "They don't want glue on their hands. They don't want to finger paint." One participant reported that a child would shut down while another child would push the glue away. Another participant (Participant 3) noted, "Sticky, mush stuff like play-dough, they don't like." Participant 5 noted similar avoidance during snack time: "A lot of kids do not like to touch applesauce, yogurt. I've had kids just try it. They'll put it on their lips and then they'll go throw it away." Tactile input also inhibited the child's participation with other children. Participant 6 described the difficulty with accepting touch from other children: "They don't understand the difference. That other kids don't want to be touched, or other kids will touch them and they don't want to be touched." Participants also reported that the response of each child was different. Participant 7 reported, "Some students are more accepting of textures than others." Participant 8 described the magnitude avoidance of touch could have: "He's very aversive to touch, and flinches and just, the lightest, lightest touch he will throw himself on the floor and you know freaks out. Literally."

Participants reported environmental noises as a perceived reason for children to avoid activities. Environmental noises ranged from the sound of the other children, to outside noises, to the echo of noises within the room. Participant 1 reported that a child demonstrated such a strong aversion to the echo in the room that he would curl up in the fetal position on the floor whenever the teacher would start talking: "they [teacher] would start talking and they were losing him because, you know, drums are going off in his head." Others reported that noises caused tantrums in other students, setting off a domino effect. Participant 5 reported, "They have tantrums everyday and so the screaming bothers a lot of the kids' ears." Several participants reported that the noises of other students affected the child's interaction and engagement with peers. A child would move away from the group to avoid noises. Participant 8 indicated, "Initially I think it is just too much . . . again and again too much auditory stuff going on." Participants reported aggression as one response to auditory input. When the room was too loud, the student would hit other children. Participant 2 reported that loud songs or songs without music would "send them into an outburst."

In contrast, participants described several situations when a child appeared to be so engrossed with the sensory characteristics of a task that the child would only participate in that particular task. Participant 5 described a child who walked the perimeter of the playground and did not engage with the equipment. Participant 4 described the child was only focusing on the swing and had difficulty navigating other playground equipment: "[He] loves the swing because for some children that give them vestibular, proprioceptive . . ." In another instance, Participant 11 described a child who constantly smelled markers to the point that the child would not use markers to color or write. "He would request them [markers] a lot and he would just sit there smelling, smelling them . . ." Participant 10 described a child who put everything in his mouth rather than using the item for play or instruction. Several participants commented on how the constant movement of children inhibited participation during circle time. Participant 10 described it as a need to move: "A lot of it is the 'I need this right now.' My body is telling me I don't want to be sitting here. And they will get up and dart and run." Participant 10 also described a situation of a child listening to a favorite song repetitively and not moving on to a different task: "but then what happens is that we play the song once and they ask for more, more, more, and they could probably sit for three hours on that same song."

Routines

Participants described the routines of the classroom structured around the sensory needs of the students as an important component to successful participation and that changes in routines often caused a child to seek out sensory input. Participant 10 described these disruptions as leading to tantrums or self-injurious behavior during transitions. "He ends up banging his head and hitting himself . . . and he doesn't do that unless he is highly overwhelmed." Participant 10 also reported, "so whether that is going from outside back inside or to the bus or to a different classroom. All the transitions can be very difficult." Almost all participants described several ways they helped with transitions using visual input including schedules and pictures. Participants reported picture schedules and adherence to structured routines as essential components to support children's participation. Participant 2 described how unanticipated events that included unexpected sensory stimuli, such as fire drills, caused a disruption to the routine that caused the child to become upset. The participant described several strategies such as visual and verbal reminders of the change in routine. In addition, participants reported they built in additional calming sensory activities into the routine following a major disruption, such as in the case of drills.

Several participants described incorporating sensory components into the routine of the classroom. Participant 1 described a very structured routine of incorporating different sensory activities every 15 min. Participant 9 indicated that

structured sensory time every morning was essential to the success of the day. "I mean these guys are 3, 4, and 5 year olds and they need to move around and they need that kind of input. They're not good at regulating it themselves." Participants described providing routine sensory activities within the schedule of the day as essential to the participation of the children with ASD. Participant 9 reported, "We kind of address a lot of their needs prior to them ever actually needing them . . . It's kind of built into the program." The participant further described a "sensory room." "But we do go to the room everyday, every student goes. We're in there for about 15 minutes just trying to get them set up for handling some of the more stressful situations of the day."

Modifications and Sensory Supports

The participants identified environmental modifications and sensory supports as essential to participation for the child with ASD in the classroom. Modification included changes to the sensory aspects of the environment or the sensory components of the task. In regard to noise, participants described structuring the environment to be quiet and allow for few extraneous noises in the room. Another participant described using calming music to block classroom noises, while yet another participant described placing items in the room to soak up the sound in attempt to "diffuse the echo." Changing the visual environment was another modification described by several participants. The participants described changing the lighting in the room by dimming or turning the lights off. Participant 3 described the importance of keeping the visual stimuli in the room to a minimum. "You know definitely keep things off of my walls so much because that is where their focus is." On the other hand, the incorporation of specific visual input, namely visual schedules, was a recurrent theme among participants to support participation within the classroom tasks. Although often described as a cognitive strategy or behavioral support, participants in this study frequently mentioned visual schedules when discussing the visual aspects of the sensory environment. Finally, environmental modifications included sensory supports. Participant 10 and Participant 5 described the use of different types of seating, such as rocking chairs, to help children with ASD sit and attend during circle time. Several participants indicated the use of weighted items, such as weighted vests, to help children sit and attend during circle and instruction periods. Participant 2 described the importance of using deep pressure to calm the child, and Participant 10 described using sensory activities, such as movement and pushing items, to support participation.

Something is off balance, kind of in themselves and once they have that break it is almost like they have put whatever is missing back together and now their brain can calm, their body is calm and they can do work.

Participants reported that the physical set up of the classroom was important to participation. They described blocking

off sections of the room, covering up certain items in the room, and creating a separate, quiet space within the classroom. Participant 2 discussed the use of a calming space that was utilized when children became upset or over stimulated: "Sometimes we can tell if they're getting overloaded, we do off that [chill center]." Participant 9 discussed the importance of modifying the environment, but not to the point of completely ridding the environment of the stimuli:

We don't go out of our way necessarily to reduce it or kind of, you know, get rid of it altogether. We'll provide them with practice in real comfortable environment so that if it happens in the real world . . .

Participants described that modifying and providing support for tasks increased participation, even in tasks previously avoided. Participants described the experience of taking small steps with multiple interactions during classroom activities when it came to encouraging students to touch textures. Participant 9 reported, "For the students who do not really want to touch obviously giving them a couple of interactions, not making them dive in fully, at least getting them used to it." Participants described snack and lunch as a time when children would avoid or refuse certain foods. Participant 2 described offering an alternative snack rather than pushing the child to eat the nonpreferred food: "avoiding a meltdown is easier than pushing." Participant 9 described a different approach: "You know again they're kind of resistant at first, but we provided food in real positive way so they're enjoying it and not something that's painful to them." On a separate note, participants described times when a child had difficulties initiating participation in a task. Participant 11 described the importance of providing structure and assistance in initiation of tasks, such as during play, "A lot of kids will stand there and look and even though they're watching their peers, they don't really know how to initiate . . ."

The participants reported a variety of aspects of the environment that impacted participation in the multitude of tasks that occur throughout the preschool day. The participants identified the physical environment, sensory components of items used to complete tasks, and the temporal environment as barriers to participation. On the other hand, changes and supports in the environment facilitated participation.

Discussion

The researchers in this qualitative study explored the experiences of teachers and OTs who work with preschool children with ASD. Specifically, we studied the perceptions of teachers and OTs in regard to the sensory aspects of the environment and the impact on participation of children with ASD. Results identified that the presence of sensory stimuli impacted participation. Responses to stimuli varied by child and were dependent on the SP patterns of a particular child. While the child's response to sensory stimuli was the driving factor of either avoidance or perseveration, the aspects of the

environment was the compelling force behind participation. If an activity was altered, or sensory aspects removed, a child's participation would change.

Results of this study are similar to a study by LaVesser and Berg (2011) that linked decreased participation of preschool aged children to a variety of aspects including child's behavior and the child's SP difficulties. The study identified a child's response to sensory stimuli within the environment as a key barrier to participation in community activities. The results of the current study identified sensory stimuli as a barrier due to the response of the child to sensory input. However, the results further indicate that by modifying the sensory aspects of the external environment, participation increases. Results of this study support previous findings that children with ASD have unique patterns of SP that impact participation (Fernández-Andrés et al., 2015; Smith Roley et al., 2015; Tomchek et al., 2014). Participants most commonly mentioned tactile and auditory stimuli as affecting participation in the preschool environment. This is similar to other studies that found a child's response to tactile input impacted attention within the classroom (Fernández-Andrés et al., 2015). As reported in the results of this study, unexpected tactile input from other children nearby is problematic for many children with ASD within the school environment (Ashburner et al., 2008). Participants commonly reported auditory stimuli as inhibiting participation. Previous studies support the finding that child's response to auditory input is the sensory system most impacted by the classroom environment (Fernandez-Andres et al., 2014). Furthermore, participants in this study stressed the importance of decreasing visual input within the classroom so as not to distract the student. A study by Ashburner et al. (2008) supported the concept of decreasing visual input in the classroom because children with ASD have difficulties filtering visual input in the school setting to attend to tasks. Finally, participants discussed how some children with ASD who exhibited sensory-seeking-type behaviors over participated in one task thus limiting their engagement in the classroom routines. Similar results reported children who exhibit sensory-seeking behaviors have poorer academic performance (Ashburner et al., 2008).

The unique contribution of this study provides information as to the impact of the sensory environment, rather than SP difficulties, on participation. The sensory components of the environment presented as a barrier to participation for some children; at other times, sensory aspects supported participation. Likewise, a sensory feature might cause one child to avoid a task and another child to overly engage in the same task. The features of the environment impacted participation, but the unique SP patterns of each child influenced activity choices. Smaller environments within the preschool setting provided different sensory stimuli, thus impacting participation in each of the subenvironments. Subenvironments, such as the playground, were supportive of some children's participation, but inhibitory of others. A study of parents indicated similar

variances in children's participation dependent on context. Parents perceived various levels of supportiveness based on the environment. For example, parents of children with mild to moderate disabilities viewed the home environment as providing the most support. Parents viewed the school and community environment as restrictive to participation (Rosenberg, Ratzon, Jarus, & Bart, 2012). The current study also supports the idea that facilitation of participation is supported in one environment and inhibited in another environment.

The participants in this study identified two essential components to increasing participation of preschool children with ASD in classroom activities. First was to provide consistent routines. Participants identified two purposes for consistent routines: first to provide structure to the day and second to provide consistent participation in sensory activities. The importance of routine in supporting participation for preschool children with ASD addresses the temporal aspects of the environment. Temporal aspects of experience allows for routines and habits to form. Routines provide synchronicity to engagement in daily tasks and routines (Larson, 2004). Routines also provide a predictable sensory experience for children. Participants stressed the importance of schedules and routines, including sensory routines. They indicated that changes in routines were disruptive to participation. Previous studies also indicate the benefits of schedules for children with ASD. The use of schedules in the classroom environment increases on task behaviors and the acquisition of novel tasks (Bryan & Gast, 2000; Liu & Breslin, 2013). In addition, schedules within the classroom setting reduced harmful behaviors and increased engagement within the classroom (O'Reilly, Sigafos, Lancioni, Edrisinha, & Andrews, 2005). This study provides preliminary information on the importance of establishing routines as part of the temporal aspect of the environment. The use of a picture schedules as part of the visual environment provides structure and consistency in the establishment of routines within the preschool environment. In this way, temporal design supports participation.

Next, participants described the importance of modifying the task or environment and offering sensory supports to increase participation. These results are similar to the study of preschool children's participation in the home environment (Sood, LaVesser, & Schranz, 2014). Parents modified the home environment to support participation in play for children with ASD. Modifications included designating a play area and structuring sensory tasks within the play to meet the child's sensory needs (Sood et al., 2014). In the current study, results suggest that modifications to the physical environment support participation. Modifications included both an increase and decrease to the sensory stimuli within a task or environment. In addition, grading of the amount of stimuli or the manner of presentation of sensory stimuli increased participation. In addition, participants reported changing the routine of the day to incorporate sensory input, just as parents incorporated sensory components into play

routines (Sood et al., 2014). Participants indicated the importance of the human factor to modify the environment for support of participation. Often the teacher was the coordinator of the environmental modifications. In turn, the human factor provided support for participation by acting as the stimulant for changing the environment. This contrasts the results of a study of parents of children with mild developmental disabilities. Parents reported they perceived the human aspects of the environment as a greater barrier to participation than the physical environment (Rosenberg et al., 2012).

The information gathered in this study provides preliminary data on how sensory aspects of the environment impact participation of preschool children with ASD. In addition, the results of this study demonstrated the magnitude of the influence of the environment on the participation of children with ASD in the preschool classroom. It is important to consider the environment in addition to the person when addressing SP in children with ASD. While the SP patterns of the individual impact the response to the environmental aspects, this study documents the impact the sensory environment has on participation. Support and modifications to the environment provided by the teachers and therapists can facilitate participation in the classroom activities. In addition, the results of this study indicate it is important to address more than just the physical environment. The temporal aspects of the environment play an essential role in the participation of children with ASD in preschool tasks.

Limitations

The study was qualitative in nature and therefore relied on the participants' verbal descriptions of perceived experiences and did not actually observe the participation pattern of children with ASD or observe the sensory aspects of the environment. Therefore, results should not be generalized to all preschool children with ASD. Interview questions and interpretation of results focused on the sensory components of environment. While reported findings may have encompassed other types of supports, this study focused only on the sensory aspect of what participants reported. Future studies involving observation of children within the preschool environment are needed to triangulate the experiences reported by participants. Studies are also needed to identify adequate interventions to address sensory-related environmental barriers.

Conclusion

The sensory aspects of the environment are both inhibitory and facilitatory to participation of preschool children with ASD.

Recommendations for OT Practice

The evaluation of the sensory aspects of the environment and the SP patterns of the person provides an overall picture to

plan interventions that support an increase in the person and environment fit (Law et al., 1996) and address contextual barriers to participation.

Appendix

Guiding Questions for Interview

Guiding questions. Our research team is trying to develop a way to record and understand how sensory characteristics in the environment impact the ability of children with ASD to participate in daily activities and routines in the preschool and daycare environments. Sensory characteristics include stimuli such as noise, visual information, smells, tastes, movement, and touch or how things feel. Daily activities are those tasks or actions that the child participates in throughout their daily school or daycare routines and participation is the involvement in a life situation. We hope to learn how the sensory environment impacts participation in these daily activities. Your stories will help us understand what to measure. Do you have any questions before we begin?

1. What makes it hard for the children you know with ASD to participate in daily activities and routines in the classroom or daycare setting?
To make sure that we obtain input on all daily activities, additional questions targeting the general areas can be used as follow-up questions. What makes it hard for the children you know to participate in circle time, snack, or lunch, and so on?
2. What are some of the characteristics of the sensory environment or activity that impact these situations/daily activities? If there are sensory characteristics identified, follow up by asking questions about how that sensory characteristic in the environment impacts on other situations/daily activities. For example, "you identified that sounds . . . are there other activities or situations in which sounds impact the child's participation" or "Are there other daily activities that these responses impact?"
3. How do you know or what makes you believe that it is the sensory environment impacting these situations/daily activities? and/or What behaviors have you observed that makes you know it is the sensory environment impacting these situations/daily activities?
4. Can you describe some responses to sensory characteristics/stimuli in the environment such as noise, visual stimuli (i.e., lights), smell, taste, movement (i.e., playing on playground equipment/swings or driving in a car), touch or how things feel? How does this limit participation in daily activity? How does it help participation in daily activity?
5. How much of an impact does the child's or children's sensory responses to the environment have on daily activity? Is it the amount of occurrences, the magnitude

or intensity, or both that seems to have the greatest impact?

6. What aspects of the sensory environment enhance or support participation in daily activities for the child/children? or What aspects of the sensory environment help your child to participate in daily activities?
7. Are there any other examples of things that you think would be helpful for us to know?

Possible additional questions

1. What are the sensory characteristics in the environment that help the child/children participate in daily activities in the home?
2. What are the sensory characteristics in the environment that limit or hinder the child's/children's ability to participate in the home environment?
3. Are there specific types of environmental stimuli/sensory characteristics that limit the child's/children's ability to participate in the school/daycare environment?
 - a. What are the sensory characteristics?
 - b. Where are the environments?
 - c. Can you provide any specific examples?
4. Are there specific types of environmental stimuli/sensory characteristics that help or supports the child's/children's participation in community environments?
 - a. What are the sensory characteristics?
 - b. Where are the environments?
 - c. Can you provide any specific examples?
5. What words would you use to describe how the sensory environment impacts the child's/children's ability to participate in daily activities in either the school or daycare?

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