Using Movement-Based Sensory Interventions to Address Self-Stimulatory Behaviors in Students With Autism

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I just cannot get Bobby to sit still to do his work! He is constantly rocking, flapping his hands, and hopping in his chair. How am I supposed to teach him anything? He is more interested in watching his hands than looking at flash cards, he will not sit still long enough to write, and his bumbling is distracting everyone else in the classroom.

Many teachers who work with students with autism share this concern of lack of student attention during instruction, which may negatively affect student performance. Often self-stimulatory behaviors interfere with a student’s ability to engage in learning activities and teachers may not know how to intervene (Smith, Press, Koenig, & Kinnealey, 2005). One of the defining characteristics of autism is the presence of stereotypic behavior (American Psychiatric Association, 2000). A behavior is a stereotype when it is repetitive, does not appear to serve a purpose, and appears inappropriate for the environment (Turner, 1999). Stereotypic self-stimulatory behaviors may interfere with a student’s ability to attend, communicate, learn, and interact (Storey, Bates, McGhee, & Dycus, 1984) as well as prevent the acquisition of new skills (Iwasaki & Holm, 1989). When a student is engaged in stereotypy, it can be difficult to interrupt the behavior to gain his or her attention or engage him or her in a learning activity because of the reinforcing nature of the self-stimulatory behavior. Therefore, it becomes critical for teachers to intervene and decrease or replace self-stimulatory behaviors so the student may attend to instruction and learn new skills.

Several interventions have been used to address stereotypical behaviors without considering the function of the behavior, including response blocking (Reid, Parsons, Phillips, & Green, 1993), punishment (Doughty, Anderson, Doughty, Williams, & Saunders, 2007), overcorrection (Fox & Azrin, 1973), and exercise (Lang et al., 2010). Function-based behavior interventions are associated with greater improvement in behavior (Ingram, Lewis-Palmer, & Sugai, 2005). Often the function of a student’s stereotypical behavior is an effort to seek or to avoid sensory input. A student who is seeking stimulation may engage in behaviors providing tactile, proprioceptive (pres-
sure), or vestibular (movement) stimulation not available in the environment (Bright, Bittick, & Fleeman, 1981). For example, a student may repeatedly rub or slap his or her hands together to gain tactile input. Similarly, a student who is oversensitive to stimuli may engage in activities or behaviors that help decrease or regulate the sensations being experienced (Storey et al., 1984), like covering one’s ears to block out loud noises. See Table 1 for additional examples of common self-stimulatory behaviors associated with each sensory system summarized from Dunn (1999); Heflin & Alaimo (2007); and Robins, Fein, Barton, & Green (2001). Sensory interventions are appropriate and effective when the function of a behavior is sensory based. The use of sensory interventions to decrease stereotypical behaviors has been investigated by several researchers over the past 35 years (e.g., Miller, 2003; Reisman, 1993).
Table 1. Sensory Systems and Common Stereotypic Behaviors

<table>
<thead>
<tr>
<th>Sensory System</th>
<th>Commonly Observed Self-Stimulatory Behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auditory (sound)</td>
<td>Noisemaking (e.g., banging on objects), vocalizations, covering ears</td>
</tr>
<tr>
<td>Visual (sight)</td>
<td>Covering eyes, closing eyes, looking at things out of the corner of eyes, flapping hands, filtering light (waving fingers in front of a light source), rapidly blinking eyes</td>
</tr>
<tr>
<td>Tactile (touch)</td>
<td>Rubbing things, mouthing items, pinching/biting self</td>
</tr>
<tr>
<td>Olfactory (smell)</td>
<td>Smelling items, holding nose</td>
</tr>
<tr>
<td>Gustatory (taste)</td>
<td>Licking things, ruminating</td>
</tr>
<tr>
<td>Vestibular (movement)</td>
<td>Rocking, bouncing, spinning</td>
</tr>
<tr>
<td>Proprioceptive (pressure)</td>
<td>Crashing into things and people, squeezing things and people, grinding teeth, biting self, chewing on things</td>
</tr>
</tbody>
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This article outlines a three-step process to help teachers determine whether or not the function of a student’s stereotypical behavior is sensory-based and if so, how to select and monitor an appropriate sensory intervention to promote instructional engagement. In particular, characteristics of students who are seeking to gain sensory input in the form of movement and possible intervention activities are described. The three-step process includes (1) conducting a functional behavior assessment; (2) determining a replacement behavior that serves the same sensory function; and (3) monitoring and adjusting the intervention as needed. Each step is described.

**Step One: Functional Behavior Assessment**

Conducting direct observations of the student’s stereotypic behavior in the environment where it typically occurs is the first step in determining the function of the behavior. Observations should be conducted for at least five sessions, preferably across multiple days. These observations do not have to be formal or time consuming and can be completed while teaching. The length of observations will vary according to the behavior. Behavior that occurs frequently may be observed for shorter periods of time than behavior that only occurs once or twice during the day. The goal is to gather a full description of the stereotypic behavior, focusing on behaviors the student engages in to gain sensory input or reduce environmental overstimulation through the vestibular system (Iwasaki & Holm, 1989). This description should include (1) which body parts are engaged; (2) which directions the student moves these body parts; and (3) the duration, frequency, and intensity of the behavior. For example, is the student bouncing up and down or moving side to side? Are the legs, arms, head, or entire body moving? Observing these aspects of behavior and describing the behavior as objectively as possible provides data that will guide you when choosing a replacement behavior. Also, it is helpful to determine the rate of behavior. For example, if a student is bouncing in his or her seat, use a stopwatch and count how many times the student bounces in 1 minute. A sample observation form is shown in Figure 1. This form uses a 5-point scale to rate intensity, with “1” indicating slow and “5” indicating rapid motion.

In addition to direct observations, a version of the *Sensory Profile* (Dunn, 1999) may be completed. The *Short Sensory Profile* (SSP; McIntosh, Miller, & Shyu, 1999) is an abridged version that can be completed in less than 30 minutes by a teacher or parent. It is a 38-item assessment used to evaluate sensory processing patterns to determine whether a student is seeking or avoiding (under- or overresponsive) different types of sensory stimulation. To complete the assessment, the rater assesses the student according to the frequency of specific behaviors on a 5-point Likert scale from “never” to “always.” Final scores are categorized as “typical,” “probably different,” or “definitely different”—with higher scores indicating atypical sensory processing for the areas of tactile sensitivities, taste/smell sensitivity, movement sensitivities, underresponsive/seeks sensation, auditory filtering, low energy/weak, and visual/auditory sensitivities. The area of the SSP that relates to students seeking movement is the “Underresponsive/Seeks Sensation” domain. If the student’s score indicates “probably different” or “definitely different” in this domain, it is likely that the function is to gain movement.

**Step Two: Replacement Behavior and Intervention**

Once the function of the student’s stereotypical behavior is determined to be an effort to gain vestibular input or movement, the next step is to select a replacement behavior. A replacement behavior is a behavior that serves the same function as that which one is trying to change (Sugai, Lewis-Palmer, & Hagan-Burke, 2000). In the case of self-stimulatory behavior with a movement-seeking (gain) function, the replacement behavior will be a sensory activi-
ty or intervention that provides movement in an appropriate way. Sensory interventions help students register and modulate responses to sensory stimuli (Dunn, 2001) allowing them to overcome some of their overreactive or underreactive responses to sensory stimulation (Heflin & Alaimo, 2007; Yack, Aquilla, & Sutton, 2002).

Researchers contend that sensory interventions need to meet the following criteria: (1) involve active participation by the student; (2) be self-directed, which includes responding to activities (not withdrawing from the activities), vocalizing pleasure and smiling (Reisman, 1993); (3) be based on the individual’s neurological needs; and (4) emphasize sensory stimulation and elicit an adaptive response that integrates the senses (Bundy, 2002; Kimball, 1988, 1999; Miller & Kinnnealey, 1993). When selecting and implementing a sensory intervention, one must ensure that all four of these criteria are met.

Consider the type, rate, and intensity of the movement the student obtains from the stereotypy, as well as the part(s) of the body involved. For the replacement behavior to serve the same function as the self-stimulatory behavior, it needs to be similar in type, rate, and intensity (Van Rie & Heflin, 2009). Think of alternate activities that provide the same type of movement. Examples of common activities that provide different types of sensory input can be found in books such as The Out-of-Sync Child (Kranowitz, 2005). The activities selected will depend on not only the function and type of stereotypy but also on the materials and equipment available in the classroom as well as the student’s preference. To determine the student’s preference, invite the student to participate in multiple activities and then ask which is the student’s favorite or observe for behavioral cues such as smiles and other expressions of pleasure (Reisman, 1993).

To ensure that the student is engaging in the replacement activity at the same rate as the self-stimulatory behavior, a metronome may be used. Use the rate of behavior from the observations and set the metronome at that number of beats per minute to help the student maintain a similar rate. To do this, you may need to hold his or her hands as he or she jumps on the trampoline, push/pull the rocking chair or swing, or apply pressure to his or her shoulders as he or she bounces on a ball, making sure that he or she bounces/rocks/swings/jumps with the beat of the metronome.

Another consideration involved in the development of a sensory intervention is the time the student will engage in the movement activity. Many of the activities that address sensory seeking behaviors may be stimulating to the point that the student is still unable to focus on anything else. These will need to occur prior to instruction. Some interventions may take place during instructional activities or throughout

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**Figure 1. Example of Observation Form**

| Student: ________________________________ |
| Date: __________ Observer: ______________ |
| Behavior: ____________________________________ |
| Observation began (time): __________ ended: __________ |
| Sensory system(s) involved (circle): |
| Vestibular (movement) | Proprioceptive (pressure) | Visual | Tactile | Auditory | Gustatory (taste) | Olfactory (smell) |
| Description of behavior: ________________________________ |
| Intensity (Rate on a scale of 1 = not intense, 5 = very intense): __________ |
| Part(s) of body involved: ________________________________ |
| Rate (number of behaviors observed per minute): __________ |
| Duration (time engaged in stereotypy): ____________________________________ |
| Did student complete assignment/participate in activity during observation time? YES or NO |
| Notes: |

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**Sensory interventions help students register and modulate responses to sensory stimuli allowing them to overcome some of their overreactive or underreactive responses to sensory stimulation.**
the day. One student who needs to regulate his vestibular system may jump on the trampoline before reading group, but another student may rock in a rocking chair during reading group, whereas another student may need a rocking footrest at his desk that allows him to rock his feet back and forth throughout the day.

After determining the type of activity and when the student will participate, decide how long the student needs to engage in the activity. The goal is to produce an adaptive response, which in this case is focusing and engaging in learning activities. The amount of sensory input needed to produce the adaptive response will vary according to each individual. Although some researchers have found that engaging in 5 minutes of sensory intervention can be effective (Van Rie & Heflin, 2009), other studies show that some students require up to 30 minutes of sensory intervention (Smith et al., 2005). The amount of time should be based on the data collected. Students who engage in intense self-stimulation behaviors may require longer periods of intervention or more frequent periods interspersed throughout the day.

**Step Three: Monitor and Adjust**

As with any intervention, it is critical that the teacher monitors the student’s response and adjusts the intervention accordingly. By monitoring the student’s stereotypy following intervention, the teacher can modify the type or length of intervention by increasing or decreasing the amount of time that the student is exposed to the sensory activity or by trying another activity addressing the same sensory function. For example, if a student is still seeking vestibular input by bouncing in his seat directly after jumping on the trampoline for 2 minutes prior to instruc-

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**Case Study: Bobby**

Bobby’s teacher observed him and noted that the bouncing, rocking, and hand-flapping involved moving his body. She completed an observation
form for each behavior, across 5 school days and covering several different time periods (one sample completed form for Bobby’s bouncing is shown in Figure 2). She noted that he bounced quickly and intensely throughout the day. His average rate of bouncing was 30 bounces per minute and on a Likert scale of 1 to 5 (1 being “not intense at all” and 5 being “very intense”), his intensity averaged 4.7.

She completed a Sensory Profile and he scored high in “understimulated/sensory seeking.” She decided to have him sit on a therapy ball (exercise ball) instead of a chair at his desk during instructional activities to allow him to gain the movement he seemed to be seeking. She chose this activity because he was bouncing almost constantly, causing the legs of his chair to bang on the floor, and she felt that the therapy ball would allow him to bounce while working without being distracting to himself and others.

Following 5 days of intervention, her data collection showed that Bobby was still not completing his work or participating in class, and he bounced intensely on the ball during class activities. She reconsidered the timing of the intervention, realizing that Bobby was unable to work and bounce simultaneously, and decided to try letting him engage in movement activities prior to working.

She chose 5 minutes to begin with because she wanted to balance Bobby’s sensory integration needs with the other instructional requirements of his school day. Starting with a short period of time and increasing it as needed would ensure that she was not taking away more instructional time than necessary. Because Bobby bounces intensely throughout the day, his teacher added movement time to his schedule several times during the day. During the last 5 minutes of each class segment prior to a segment requiring Bobby to sit at his desk or at a table, Bobby’s teacher sends him to the movement corner of the room. There he sets a timer for 5 minutes and bounces on the therapy ball or jumps on a trampoline. When the timer beeps, he returns to his desk for the next activity. Bobby’s teacher has observed that he is sitting for longer periods of instruction without rocking or bouncing in his seat, and that when he does move, it is less intense than prior to the intervention. He is now completing more assignments and is participating in class activities more frequently. His teacher also has noticed that the entire class seems to have benefited from the intervention, as his classmates are no longer distracted by his constant movement and class activities run much more smoothly.

CASE STUDY: Jose

Following the successful use of a sensory intervention with Bobby, his teacher began considering sensory-based functions for other behaviors in her class. Jose frequently covers his ears and closes his eyes when asked to do work, and his teacher had previously assumed he was just trying to avoid doing the assignments. After closer observation, data collection, and completing the Sensory Profile on Jose, the teacher determined that covering his ears and closing his eyes are sensory avoiding behaviors—Jose seems to be avoiding additional auditory and visual stimulation because his body is already overstimulated. She notices while observing Jose that he usually closes his eyes when the fluorescent classroom lights flicker.
The teacher considered turning off the fluorescent lights and replacing them with incandescent lamps throughout the room but decided to first try covering the lights with shades. Jose no longer covers his eyes in the classroom and will look at the teacher and materials. He is completing much more of his written work following the intervention.

To address his aversion to sounds, his teacher bought Jose a pair of foam earplugs, but he was uncooperative when she tried to insert them in his ears. She then tried a pair of noise reducing headphones that reduce auditory input by 20 decibels—these allow Jose to hear but reduce the volume of what he hears. These seem to be working for Jose, as he is no longer covering his ears but instead puts on his headphones when the classroom gets too loud or in other noisy situations.

**Conclusion**

Sensory interventions involving movement can be effective in reducing stereotypical behavior in students seeking vestibular input. When students have opportunities to gain or reduce sensory input in meaningful ways, their need to self-stimulate is decreased, and they are able to focus on instructional tasks and activities. Stereotypical behaviors with a determined function of self-stimulation or self-regulation can be replaced with appropriate behaviors that provide or reduce stimulation resulting in increased classroom participation and improved performance.

**References**


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