

## **Sensory Diet Applications and Environmental Modifications:**

### **A Winning Combination**

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Occupational therapists use a sensory integrative frame of reference when addressing a child's development of functional skills from a sensory standpoint (Kimball, 1999a). Using the sensory integrative approach, the therapist analyzes the child's processing of vestibular, proprioceptive, and tactile sensations in relation to his or her ability to learn and move, essential components of the child's daily life. Sensory integration theory postulates that difficulties with processing sensory information can impede a child's acquisition of concept and motor learning. Using sensory integrative principles, the therapist incorporates meaningful activities that provide specific sensory stimuli to elicit an adaptive response, thereby assisting the child in his or her overall motor and conceptual learning (Fisher & Murray, 1991). Once a child with sensory processing difficulties has been identified, the occupational therapist is responsible for devising an effective treatment plan (Koomar & Bundy, 1991). Although direct therapeutic intervention is a key component in the process, the implementation of an individualized sensory diet regularly addresses the child's sensory processing needs throughout the day (Wilbarger, 1995). The sensory diet allows the child ample opportunities to receive beneficial sensory input at frequent intervals, thereby enabling him or her to participate more fully in the activities that comprise his or her daily schedule. Implementation of the sensory diet should span all aspects of the child's day, particularly those involving the school and home environments. As Kimball (1999b) stated, "The change in environment that a parent can influence can also result in beneficial changes well beyond the reach of a therapy session" (p. 203). To have an optimum effect, the sensory diet should be designed for the child's unique sensory processing needs (Wilbarger, 1995). In this manner, the child benefits from specific sensory input that is synchronized with the recommended treatment approaches.

In addition to the sensory diet, the occupational therapist often makes recommendations that will afford the child greater opportunities for success throughout the day. These suggestions, though not sensory based, are essential to the child's favorable participation in school, home, and play activities. Modifications are thus made in the child's environment that encourages the child's competence in various contexts (Primeau & Ferguson, 1999). The list of sensory diet and environmental modification suggestions presented in Table 1 represents a cooperative effort of 31 therapists, assistants, students, and teachers who participated in the BOCES Occupational Therapy/Physical Therapy Professional Network of New Hartford, New York. This list was designed to be a starting point and, therefore, is not all-inclusive. Each therapist is responsible for adapting these ideas for a specific child and for creating additional ideas pertinent to the child's home, school, and family situations. Common classifications of sensory integrative disorders have been used as a framework for the sensory diet and environmental modification suggestions.

#### **Decreased Discrimination of Vestibular and Proprioceptive Information**

Children with decreased discrimination of vestibular and proprioceptive information often exhibit poor posture, frequent falling, clumsiness, poor balance, constant moving and fidgeting, and poor attention. Treatment generally focuses on providing intense vestibular and proprioceptive information and improving postural responses (Koomar & Bundy, 1991).

### Decreased Discrimination of Tactile Information

Children with decreased tactile discrimination often present with a poor body scheme. In addition, they have difficulty with praxis and poor hand skill development. They may also crave touch input. Treatment generally focuses on providing a variety of deep- and light-touch experiences (Koomar & Bundy, 1991). Resistance activities, such as those given in the sensory diet ideas for decreased discrimination of vestibular and proprioceptive information, should be used in addition to the ideas specific to tactile discrimination.

### Somatodyspraxia

Children with somatodyspraxia often exhibit poor tactile and proprioceptive processing; clumsiness; frequent tripping, falling, and bumping into objects; difficulty with fine motor and manipulation skills; and poor organization (Cermak, 1991). Treatment focuses on providing heavy work, deep pressure, and light-touch experiences. Verbal cuing and feedback may also be used (Koomar & Bundy, 1991). The sensory diet and environmental modification ideas for decreased discrimination of tactile and proprioceptive information should be used in addition to the ideas specific to praxis issues.

### Impaired Bilateral Motor Coordination

Children with impaired bilateral motor coordination often exhibit difficulty with bilateral activities, such as clapping, hopping, skipping, jumping jacks, and keyboarding. Difficulty with bilateral self-care skills, such as fastening and shoe tying, is often present. These children may have some right-left confusion, avoid midline crossing, and have difficulty developing a hand preference. Additionally, they appear to have vestibular and proprioceptive difficulties. Treatment generally focuses on providing vestibular and proprioceptive experiences and graded bilateral activities. Treatment may start with simple crossing midline, rotation, and symmetrical activities and work toward asymmetrical activities and more complex coordination skills (Koomar & Bundy, 1991).

The sensory diet and environmental modification ideas from decreased discrimination of vestibular and proprioceptive information that address vestibular input should be used in addition to the ideas specific to bilateral motor coordination.

### Tactile Defensiveness

Children with tactile defensiveness often exhibit an aversive response to a variety of tactile experiences, such as craft materials, food, clothing, and bathing. They will often avoid a variety of activities and may react aggressively at times. They can be easily distracted and have difficulty with attention. Therapy generally focuses on providing heavy work and deep pressure input. Slow linear vestibular input may also be helpful. Therapy also provides opportunities for participation in graded tactile experiences (Royeen & Lane, 1991). The proprioceptive sensory diet ideas from decreased discrimination of proprioceptive and vestibular information could be used in addition to the ideas specific to tactile defensiveness.

### Gravitational Insecurity

Children with gravitational insecurity may exhibit limited participation in gross motor play; avoidance or fear of escalators, elevators, cars, or planes; or resistance to being off the ground. Treatment in the clinic environment generally focuses on providing proprioceptive input and graded vestibular input. The child is always in control of the amount of vestibular input received and is never pushed beyond his or her limits (Koomar & Bundy, 1991). Environmental modifications would focus on helping the child to feel safe in

all environments and situations. Sensory diet activities would focus on providing calming proprioceptive input throughout the day. The proprioceptive sensory diet ideas from decreased discrimination of proprioceptive and vestibular information could be used in addition to the ideas specific to gravitational insecurity.

### Projected Action Sequences

Children who have difficulties with projected action sequences are unable to plan and initiate movement in response to changing environmental stimuli. These difficulties are associated with inefficiencies in processing vestibular and proprioceptive input. Intervention strategies are aimed at enhancing vestibular and proprioceptive processing while enhancing the child’s ability to both plan and produce projected action sequences (Koomar & Bundy, 1991). Sensory diet suggestions and environmental modifications for decreased discrimination of vestibular and proprioceptive information should be considered in addition to the ideas specific to projected action sequences.

### General Recommendations

The therapist should recognize that each child processes sensory information uniquely. Although the treatment techniques and the associated sensory diet suggestions described in this article are recommended for the various areas of sensory integrative dysfunction, the therapist must discern whether these measures are appropriate for the individual child or for the specific performance context. The therapist, in conjunction with caregivers and school personnel, should monitor the child’s responsiveness to the strategies in order to determine effectiveness. Should adverse reactions occur, the therapist should discontinue the activity and modify the treatment approach accordingly (Koomar & Bundy, 1991).

### Conclusion

The format addressed in this article affords the therapist the opportunity to convey pertinent sensory diet suggestions and environmental modifications to classroom personnel and caregivers from a sensory integrative frame of reference. The combination of sensory diet strategies and environmental modifications, in association with therapeutic intervention, provides the child with a multifaceted approach to addressing sensory processing needs while promoting successful participation in daily activities.

**Table 1**

### **Sensory Diet and Environmental Modification Suggestions**

Classification and Activities	Suggestions
<b>Decreased discrimination of vestibular and proprioceptive information</b>	
Desk work	
Sensory diet	<i>Active resistance:</i> chair push-ups, chair/body squeezes, pocket push-ups, theraband stretches, hand gripper exercises, leaning on upper extremities, weighted vest or lap tray. <i>Finger-fidget activities:</i> pinches, spider push-ups, rubber band stretches, fidget balls, theraputty, pen walking, and pencil

	aerobics. <i>Seating options for linear motion:</i> casters, inflatable cushions, T stool, ball, peanut ball, bounce or rocking chair, one or two slightly shortened legs of chair for rocking.
Environmental modifications	Solid seat with armrests of correct height, tilt-top desk, frequent position changes, dycem to stabilize objects on desk, paper placement outlined with masking tape.
School break time	
Sensory diet	<i>Play activities:</i> donkey kicks, heavy marching, pushing against the wall, doorway pushes, “popcorn” activity in chair (popping up at different speeds or intervals), seat walking while sitting on the floor with legs extended, jumping, hopping, squeezes, stretches, self-imposed body hugs, push-ups, sit-ups, jumping jacks, wheelbarrow walks, crab walking. <i>Errands:</i> carrying heavy books, moving chairs.
Environmental modifications	Routine that provides these activities before class and throughout the day, frequent breaks during the day.
Play	
Sensory diet	<i>Proprioceptive input:</i> Roughhousing, play wrestling, leap frog, tug-of-war, wheelbarrow walking, jumping on a small trampoline, crawling under couch cushions, chin-ups, play with weighted balls, jumping and crashing on the bed, pushing another child on the swing, playing in a body sock, foot-to-foot bicycling with friend, firm family hugging. <i>Vestibular input:</i> sitting on a rocking chair; sitting on a ball to watch TV; jumping on a trampoline; playing on slides, swings, seesaws, trapezes, rings, ladders, monkey bars, gliders, suspended bridges.
Environmental modifications	Large, open area with unbreakable items for roughhouse play; mattresses, pillows, and beanbag chairs; outdoor swing set.
Chores	
Sensory diet	<i>Proprioceptive input:</i> stirring, rolling/kneading dough, digging, carrying, shoveling, raking, pushing/lifting heavy objects, moving furniture, vacuuming, sweeping, mopping, carrying laundry basket.
Environmental modification	Avoid chores with breakable items, such as putting away dishes.

Snacks and meals	
Sensory diet	Healthy, chewy foods (e.g., celery, carrots, apples, nuts, fruit leather, beef jerky), thick liquids requiring straw (e.g., milkshakes, smoothies, gelatin, pudding).
Environmental modifications	Sturdy chair with arms for meals, stabilized meal items to prevent breakage.

<b>Decreased discrimination of tactile information</b>
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Desk work	
Sensory diet	<i>Writing tool alternatives:</i> grippers, pencils of different hardnesses, felt-tip pens, ballpoint pens, vibratory pens. <i>Writing surface alternatives:</i> blotters, layers of paper, raised-line paper, textured papers.
Environmental modifications	More time for note taking and fine motor activities, oral tests, writing alternatives (e.g., word processor, tape recorder), no grading on fine motor performance if area of weakness, peer for note taking.
School break time	
Sensory diet	<i>Discriminatory play activities:</i> feely boxes, hidden objects in sandbox.
Environmental modification	Breaks for sensory diet activities, especially before fine motor activities.
Snack and meals	
Sensory diet	Weighted spoons.
Environmental modifications	Self-checking during and after meals to ensure cleanliness; mirror for self-checking; weighted, unbreakable dishes stabilized with a dycem.
Dressing	
Environmental modifications	Self-checking while dressing and toileting, hook-and-loop fasteners.
<b>Somatodyspraxia</b>	
Desk work	
Sensory diet	Loops and Other Groups writing program (Benbow, 1990).

Environmental modification	Grids and graph paper.
Gym	
Sensory diet	Consult physical education teacher about child's needs and continual activity modification to enhance motor planning.
Environmental modifications	Simplified physical education activities; visual, auditory, and physical cues.
Organizational tasks	
Environmental modifications	Simplified instructions, colored folders to organize subject matter, daily schedule, child verbalizes steps to complete task.
Play	
Sensory diet	Tactile and proprioceptive play activities.
Environmental modifications	Containers to organize items; child verbalizes steps in a task; visual, auditory, and physical cues while teaching new play activities.
Dressing	
Sensory diet	Tactile and proprioceptive play activities.
Environmental modifications	Lay out clothing in order, with labels for cuing and tabs to hold; simple clothing with big fasteners; simplified activities of daily living.

<b>Impaired bilateral motor coordination</b>	
Desk work	
Sensory diet	Chair push-ups performed bilaterally, then alternating R-L-R-L and varying the rhythm (first use arms then legs); theraband to encourage pulling tasks while stabilizing with one arm and moving with the other; two-hand grippers with child using different alternating patterns and rhythms to grip bilaterally; finger fidget activities performed in alternating fashions.
Environmental modifications	Dycem to stabilize papers, reinforced use of dominant hand, strategies for remembering right from left hands, stamp or sticker to indicate dominant side, index card with red LR to reinforce left-to-right progression.

nbsp; School break time	
Sensory diet	Donkey kicks with alternating patterns (e.g., jump-jump-kick, jump-kick-jump, R-L-R-kick; L-R-L-kick); march in place, alternating the speed and rhythm; games with clapping patterns using speed and rhythm; jumping, hopping, skipping, galloping, and so forth; these activities to transition to another activity.
Environmental modifications	Simplified recess and play activities, variety of simple recess games.
Gym	
Sensory diet	Simple bilateral activities.
Environmental modifications	Simplified games and gym activities, as needed.
Play	
Sensory diet	Clapping games while reciting jingles, foot-to-foot bicycling, Chinese jump rope games, jump rope activities, dancing, swimming and pool activities, ball activities (e.g., bouncing and catching with L-R-L hands, basketball dribbling, soccer dribbling, kicking R-L-R, running and kicking).
Environmental modification	Simplify sports activities to ensure successful performance.
<b>Tactile defensiveness</b>	
Desk work	
Sensory diet	Deep pressure input (e.g., weighted vest, backpack, lap tray), active resistance activities, finger fidgets and resistive hand activities (e.g., cutting, erasing, hand grippers).
Environmental modifications	Separate space areas to prevent incidental touch by others; designate spaces for circle time (e.g., carpet square); approach the child from the front and warn the child before touch; avoid touch to sensitive areas (e.g., hair, face, neck, abdomen); use firm touch and avoid light touch; minimize other possible overwhelming environmental stimuli (use natural lighting; shut the classroom door; use blotters on desks; use rubber bottoms on the chair and desk legs; provide curtains, blinders, and room dividers; eliminate aromas in the classroom).

School break time	
Sensory diet	Play and break activities that provide resistance and heavy work input, “How Does Your Engine Run?” program (Williams & Shellenberger, 1994).
Environmental modification	Frequent breaks during the day.
Gym	
Sensory diet	Regular calisthenics (e.g., push-ups, sit-ups, jumping jacks, wheelbarrow walks, crab walking), self-imposed deep touch and active resistance activities before gym class.
Environmental modification	Minimize touch contact with other children when engaged in physical education activities.
Arts and crafts	
Sensory diet	Variety of tactile art media; never force children to do more than they are ready to do.
Environmental modifications	Glue stick instead of glue or paste, paintbrush instead of finger paints.

Riding the bus	
Sensory diet	Backpack, weighted vest, or heavy jacket.
Environmental modifications	Child has own seat, is first or last in line to board bus, and wears headphones to filter out extraneous sensory stimuli.
Play	
Sensory diet	<i>Deep pressure and resistance:</i> rolling up with a blanket to make a hot dog or burrito, rolling a large ball over the child to make a pizza, playing tug-of-war, crawling under couch cushions, using a chin-up bar, crawling into a stretchy pillow case.
Environmental modification	Teach family members about the child’s sensory needs and the need to avoid unwanted touch.

Snack and meals	
Sensory diet	<i>Deep pressure techniques before meals:</i> biting down hard on teeth and releasing, pursing lips and releasing, sucking in cheeks, flapping tongue, blowing balloons, clicking tongue; thick liquids to drink with straw; chewy and crunchy foods.
Environmental modifications	Experiment with different utensils (e.g., plastic, weighted, rubber coated); explore different textures acceptable to the child and reinforce those textured foods for nutrient intake.
Dressing	
Sensory diet	Deep touch pressure to limbs and torso before dressing, body hugs, hand squeezes.
Environmental modifications	Determine whether baggy, loose-fitting clothing is preferable; ensure that clothing is prewashed, with labels and tags removed (clothing with minimal seams may be preferred); cut tight elastics for comfort; wear socks inside out to avoid seams at the toes; determine whether overalls may be preferred to pants with a waistband; avoid becoming overheated.
Bathing	
Sensory diet	Heavy rubdown before and after bath; towel wrapped tightly after bath with heavy hugs; lotion applied firmly, if tolerated.
Environmental modifications	Experiment with different sponges, wash mitts, cloths; have child wash self.
Hair care	
Sensory diet	Deep pressure to torso, limbs, and scalp before hair care; heavy blanket worn during haircuts.
Environmental modifications	Conditioner and detangler, different combs.
Nail care	
Sensory diet	Deep pressure and finger exercises before nail care.
Environmental modification	Soak nails before cutting.

Tooth care	
Sensory diet	Deep pressure activities before brushing teeth (e.g., eating, water pick, gum massage); deep pressure techniques while in the dentist's chair; weighted x-ray blanket worn while at the dentist.
Environmental modifications	Experiment with different toothbrushes, use electric toothbrush, use of a washcloth initially.
Sleep and bedtime routine	
Sensory diet	Deep pressure hugs and slow rocking before bedtime; no roughhousing and TV before bedtime; heavy blanket; sleep under couch cushions or pillows.
Environmental modifications	Prewashed soft sheets, sleeping bag.

<b>Gravitational insecurity</b>	
Desk work	
Sensory diet	Continual implementation of “grounding” input throughout the day via the use of active resistance and joint compression and teaching the child to implement the strategies.
Environmental modifications	Firm, supportive seat with arms that does not tip; proper desk and chair fit.
Gym	
Sensory diet	Active resistance and joint compression activities before class; do not push child beyond his or her limits.
Environmental modifications	Limit number of children and space to increase sense of security; limit activity on movable or suspended equipment; allow child to always have two feet flat on the floor <i>or</i> allow the child to have someone or something to hold.
Recess	
Sensory diet	Child pushes another child on the swing or catches another child at bottom of slide; child holds jump rope for other children.
Environmental modifications	Allow the child to be sedentary during recess; organize one-on-one play with a buddy.

Riding the bus	
Sensory diet	Routine of calming activities before the bus ride (e.g., slow rocking, heavy joint compression, active resistance activities, deep breathing exercises); teach child to implement these strategies; child wears a backpack on the bus.
Environmental modification	Child sits alone with headphones to minimize stimuli.
Snack and meals	
Sensory diet	Thick liquids to drink with straw, chewy and crunchy foods.
Environmental modification	Solid, supportive chair that allows child's feet to touch floor.
Mobility	
Sensory diet	Weighted backpack, vest, or fanny pack.
Environmental modifications	Stairs with railings or child holds onto someone when ascending or descending, no escalators and elevators, a "safe" environment with no items on the floor and no extraneous material (e.g., scatter rugs).
Sleep and bedtime routine	
Sensory diet	Heavy, weighted blankets or cushions to sleep under, a calming routine before bedtime (e.g., joint compression, slow rocking).
Environmental modification	Bed mattress on the floor.
<b>Projected action sequences</b>	
Play or gym	
Sensory diet	Activities that yield active resistance before engaging in gross motor activities (see "decreased discrimination of vestibular and proprioceptive information").
Environmental modifications nbsp;Mobility	Activities in which the child can experience success (e.g., hook-and-loop ball and mitt, T-ball stand, kick the can, kick ball with the ball stationary, tether ball, golf, croquet); make sure that any ride (swing, merry-go-round)

Environmental modifications

has stopped moving before child gets onto it.

Avoid escalators.