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Use of Sensory Diet in Children with Sensory Processing Difficulties

Clinical Question

- P** (population/problem): Among children with sensory processing difficulties,
I (intervention): does a “sensory diet”
C (comparison) compared to usual activities
O (outcome): improve sensory processing skills?

Target Population: Children with sensory processing difficulties including, but not limited to:

- modulation
- discrimination

Recommendation(s):

1. It is recommended that the occupational therapist collaborate with the caregivers regarding the child’s daily routine prior to creating an individualized sensory diet (see handout: *Schedule of My Child’s Day*) (*Local Consensus [5]*).
2. It is recommended that, in addition to direct occupational therapy services, a planned sensory diet be individualized for the child’s unique sensory processing needs, and include:
 - a) consideration of timing, duration and intensity of the activities when choosing appropriate sensory activities (*Wilbarger 2002 [5]*),
 - b) planned, scheduled activities implemented throughout the day (*Wilbarger 2008 [5]*, *Cronin 2007 [5]*, *Nackely 2001 [5]*, *Parham 2001 [5]*, *Local Consensus [5]*), and
 - c) alerting, calming, and organizing activities based on the arousal level of the child (*Cronin 2007 [5]*, *Wilbarger 2002 [5]*, *Yack 2002 [5]*, *Parham 2001 [5]*).

Note: Implement a sensory diet prior to considering a deep pressure proprioceptive protocol¹ (*Wilbarger 2008 [5]*).
3. It is recommended that the sensory diet be implemented by caregivers in each of the child’s environments (home, school, and community) (*Wilbarger 2008 [5]*, *Wilbarger 2002 [5]*, *Nackely 2001 [5]*, *Kimball 1999 [5]*).
4. It is recommended that the therapist review the sensory diet with the caregiver on an ongoing basis in order to ensure that activities continue to provide the most appropriate sensory experiences for the child. There is no predetermined time frame for using various sensory strategies, instead the sensory strategies are modified or discontinued based on the progress of the child (*Wilbarger 2008 [5]*, *Local Consensus [5]*).

Discussion/summary of evidence

Quality of evidence regarding the use of sensory diets is low. Patricia Wilbarger, who studied under Ayres, coined the term “sensory diet” (*Parham 2001 [5]*) to explain how sensory experiences can improve occupational performance (*Wilbarger 2002 [5]*). A sensory diet is not a specific intervention technique (e.g. such as the deep pressure-

¹ Deep pressure-propriceptive protocols = protocols that involve the use of deep pressure and proprioceptive input with a specially designed surgical scrub brush to address sensory defensiveness (see Best Evidence Statement #030: *Deep Pressure Proprioceptive Protocols to Improve Sensory Processing Skills in Children*). The Wilbarger protocol/TheraPressure Protocol and Protective Response Regimen have often been referred to as “brushing.” Brushing may imply touching a person lightly which may be interpreted as harmful by individuals who are over-responsive to tactile input.

proprioceptive protocol), but rather an *individualized structured activity plan embedded in key events throughout the day specific to the child's sensory needs* (Wilbarger 2008 [5]). Key events may differ from child to child. These include morning routine, mealtimes, school, bedtime routine or other events that occur during the child's day. Included within the sensory diet are suggestions for appropriate sensory activities, ways to modify the environment, strategies that can be used to help interact with the child, development of routines (e.g. morning and bed time) and inclusion of leisure activities (Wilbarger 2008 [5]). For many children, the environment offers them a variety of sensations throughout their day, unconsciously providing them with the sensory input they need (Parham 2001 [5]). A child with sensory processing difficulties may not receive the sensory input he/she needs through daily experiences; thus, it is hypothesized that the child may benefit from a sensory diet.

Sensory input is required for the brain to function at an optimal level. Without the correct amount of input the brain "malfunctions" (Hansch 2002 [5], Parham 2001 [5]). When a child has difficulty processing sensory input, one can either eliminate the input or provide additional input. In children who demonstrate over-responsiveness to sensory input, one may use environmental modifications that eliminate sensory input to decrease the demands on the nervous system. This may involve modifying different aspects of the environment including temporal, spatial, social, and physical elements (Hansch 2002 [5], Wilbarger 2002 [5]). When a child demonstrates under-responsiveness to sensory input or has sensory discrimination difficulties, one can provide additional input to improve the brain's neurochemistry and neurocircuitry by developing a sensory diet that focuses on providing input to the vestibular, proprioceptive and tactile systems (Hansch 2002 [5], Wilbarger 2002 [5]). Typically individuals with sensory processing difficulties have an impaired ability to process vestibular, proprioceptive and tactile input which in turn impedes their ability to develop an automatic adaptive response (Hansch 2002 [5]).

Health Benefits, Side Effects and Risks

When designed by a licensed occupational therapist in conjunction with caregiver input, the hypothesized outcomes and benefits of a sensory diet include:

1. decreased sensory defensive reactions (Wilbarger 2008 [5], Wilbarger 2002 [5], Yack 2002 [5])
2. improved sensory processing (Wilbarger 2008 [5], Nackely 2001 [5])
3. enhanced arousal level and improved performance of the nervous system (Wilbarger 2008 [5], Cronin 2007 [5])
4. enhanced ability to orient and respond to sensory input (Yack 2002 [5])

Risks:





- A stress response can be generated by too much sensation (Parham 2001 [5]).
- The use of the wrong type of input can negatively impact a child's level of arousal; thus impacting the child's ability to appropriately interact with the environment (Local Consensus [5])
- Vestibular input can easily overload some individuals causing either excitability, a nauseous response, or stimulate a shut down response (2004 [5], Hansch 2002 [5], Local Consensus [5]) (Yack 2002 [5]).

Side Effects/Burden:

- There is a low burden associated with participating in a sensory diet program due to the time the caregiver spends engaging in the various activities with his/her child.

References/Citations

Note: When using the electronic version of this document,  indicates a hyperlink to a PubMed abstract. A hyperlink following this symbol goes to the article PDF when the user is within the CCHMC network.

1. **Anonymous:** Neurobiological Foundations of Sensory Integration. In *Step 1 SIPT Certification*, Tampa, FL, 2004, [5] .
2. **Ayres, A. J.:** *Sensory Integration and the Child: Understanding Hidden Sensory Challenges*. Los Angeles, 2005, [5] .
3. **Cronin, A.:** Asynchronous development and sensory integration intervention in the gifted and talented population 2007. Accessed August, 2009 from <http://www.sengifted.org> [5]  _____.
4. **Hansch, B.:** Evaluation and treatment of sensory processing disorders from the perspective of the ready approach. Presented, Hershey, PA, Developmental concepts, 2002, [5]  _____.

5. **Kimball, J. G.:** Sensory integration frame of reference: postulates regarding change and application to practice. In *Frames of Reference for Pediatric Occupational Therapy*, pp. 169-204. Edited by Kramer, P., and Hinojosa, J., Lippincott, Williams and Wilkins, 1999, [5] 🗨️.
6. **Local Consensus:** at the time the BEST was developed. [5].
7. **Nackely, V.:** Sensory Diet Applications and Environmental Modifications: A Winning Combination. *Am J Occu Ther - Sensory Integration Special Interest Section Quarterly*, 24(1), 2001, [5] 🗨️ _____.
8. **Parham, L. D., and Mailloux, Z.:** Sensory Integration In *Occupational Therapy for Children*, pp. 329-381. Edited by Case-Smith, J., Philadelphia, Mosby, 2001, [5] 🗨️.
9. **Shumway-Cook, A., and Wollacott, M.:** Physiological basis of motor learning and recovery of function In *Motor Control: Theory and Practical Applications*, pp. 92. Edited, Philadelphia, Lippincott, Williams and Wilkins, 2001, [5] 🗨️.
10. **Wilbarger, J., and Wilbarger, P.:** In *Avanti Educational Programs; Sensory Defensiveness: A Comprehensive Treatment Approach*, Troy, OH, 2008, [5] 🗨️.
11. **Wilbarger, J., and Wilbarger, P.:** Clinical Application of the Sensory Diet. In *Sensory Integration, Theory and Practice*, pp. 339-378. Edited by Bundy, A., Philadelphia, F. A. Davis Company, 2002, [5] 🗨️ _____.
12. **Yack, E.; Sutton, S.; and Aquilla, P.:** *Building Bridges through Sensory Integration*. Las Vegas, 2002, [5] 🗨️ _____.

Note: Full tables of evidence grading system available in separate document:

- [Table of Evidence Levels of Individual Studies by Domain, Study Design, & Quality](#) (abbreviated table below)
- [Grading a Body of Evidence to Answer a Clinical Question](#)
- [Judging the Strength of a Recommendation](#) (abbreviated table below)

Table of Evidence Levels (see note above)

<i>Quality level</i>	<i>Definition</i>
1a† or 1b†	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain
5	Other: General review, expert opinion, case report, consensus report, or guideline

†a = good quality study; b = lesser quality study

Table of Recommendation Strength (see note above)

<i>Strength</i>	<i>Definition</i>
“Strongly recommended”	There is consensus that benefits clearly outweigh risks and burdens (or visa-versa for negative recommendations).
“Recommended”	There is consensus that benefits are closely balanced with risks and burdens.
No recommendation made	There is lack of consensus to direct development of a recommendation.
<p><i>Dimensions:</i> In determining the strength of a recommendation, the development group makes a considered judgment in a consensus process that incorporates critically appraised evidence, clinical experience, and other dimensions as listed below.</p> <ol style="list-style-type: none"> 1. Grade of the Body of Evidence (see note above) 2. Safety / Harm 3. Health benefit to patient (<i>direct benefit</i>) 4. Burden to patient of adherence to recommendation (<i>cost, hassle, discomfort, pain, motivation, ability to adhere, time</i>) 5. Cost-effectiveness to healthcare system (<i>balance of cost / savings of resources, staff time, and supplies based on published studies or onsite analysis</i>) 6. Directness (<i>the extent to which the body of evidence directly answers the clinical question [population/problem, intervention, comparison, outcome]</i>) 7. Impact on morbidity/mortality or quality of life 	

Supporting information

Introductory/background information

Definition:

Sensory diets are planned, scheduled activities embedded throughout the day to help children with sensory processing difficulties achieve or maintain an optimal arousal level. Sensory processing is “the method and manner of sensation detection and transmission through the central nervous system” (Ayres 2005 [5]). Sensory processing includes two components: sensory modulation and sensory discrimination. Sensory modulation is the ability to filter or attend selectively to sensory information. Sensory discrimination is the ability to accurately identify and interpret the most important qualities of sensory input for skill use (Ayres 2005 [5], Local Consensus [5]). A sensory diet is a treatment strategy that can be used to promote improved sensory processing.

Assumptions

1. The brain is plastic. Neural plasticity can be thought of as a continuum that goes from “short-term changes in the efficiency or strength of the synaptic connections to long-term structural changes in the organization and number of connections among neurons” (Shumway-Cook 2001 [5]). The brain can learn and, with assistance, it can modify and refine how it responds to input (Hansch 2002 [5]).
2. When the brain is not receiving sensory input of adequate quantity or quality, it drives the individual to engage in behaviors in an attempt to satisfy this need (Hansch 2002 [5]).
3. Input that the brain receives must be meaningful in order to be effective (Hansch 2002 [5]).
4. The input needs to change. Without change the brain loses its ability to notice the sensation (habituate to it). The one exception is that the brain does not habituate to irritating light touch (Hansch 2002 [5]).
5. The brain must detect a sensation and perceive what it is in order to register it. If the sensation is too weak, unclear, or confusing, the brain may not perceive it and thus not understand how to interpret it (Hansch 2002 [5]).
6. An adaptive response is the most effective way to learn. When an individual makes an adaptive response, the brain is learning through action and receiving feedback during the process. This in turn allows the brain to automatically refine and perfect its level of efficiency (Hansch 2002 [5], Wilbarger 2002 [5], Parham 2001 [5]).
7. An individual has “an inner drive to develop efficient sensory processing.” (Hansch 2002 [5]). This drive is what keeps us safe, gives us the emotional desire to make life interesting, and makes it possible to perform activities automatically in order to pay attention to other matters. “This drive is present in all humans, regardless of disabilities, for the whole of the lifespan” (Hansch 2002 [5]).
8. To achieve optimal outcomes, the therapist must identify the problem correctly (Wilbarger 2008 [5], Hansch 2002 [5]).
9. The child must actively organize and use sensory input to act on the environment (Parham 2001 [5]).
10. A sensory diet provides the child with scheduled opportunities to experience beneficial sensory input frequently throughout the day, thus helping the child participate and engage in daily activities (Wilbarger 2008 [5], Nackely 2001 [5]).

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Search strategy

1. Databases

OVID MEDLINE
OVID CINAHL
PEDRO,
All OVID EBM Reviews - Cochrane DSR, ACP Journal Club, DARE, and CCTR
www.otseeker.com
www.pedro.fhs.usyd.edu.au
www.otcats.com
Looked at Can Child - <http://www.canchild.ca/>

2. Search Terms:

Home, diet, activities, sensory diet, occupational therapy (see attachment)

3. Limits and Filters: English, humans; dates: 1998 to present

Applicability issues

There is minimal cost to consider when designing an appropriate sensory diet. The primary cost is time (time of the therapist and time of the caregiver). Outcomes can be measured using the Canadian Occupational Performance Measure (COPM). For more information on the COPM please see BESt #031 on outcome assessment.

Training and Home Programming

Handouts for caregivers

- Document titled: Sensory Diet
- Document titled: *Schedule of My Child's Day* (Daily schedule to assist with development of sensory diet)

Handouts for therapists

- Document titled: Sensory Diet Ideas for Children with Autism

For more information about these handouts, contact the Division of Occupational Therapy and Physical Therapy at: 513-636-4651 or OTPT@cchmc.org.

Known conflicts of interest

Conflict of interest declarations were completed as stated above and none were found.

Copies of this Best Evidence Statement (BEST) are available online and may be distributed by any organization for the global purpose of improving child health outcomes. Website address: <http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/ev-based/default.htm>

Examples of approved uses of the BEST include the following:

- copies may be provided to anyone involved in the organization's process for developing and implementing evidence based care;
- hyperlinks to the CCHMC website may be placed on the organization's website;
- the BEST may be adopted or adapted for use within the organization, provided that CCHMC receives appropriate attribution on all written or electronic documents; and
- copies may be provided to patients and the clinicians who manage their care.

Notification of CCHMC at HPCEInfo@cchmc.org for any BEST adopted, adapted, implemented or hyperlinked by the organization is appreciated.

*Additionally, for more information about CCHMC Best Evidence Statements and the development process, contact the **Division of Occupational Therapy and Physical Therapy** at: 513-636-4651 or OTPT@cchmc.org*

Note

This Best Evidence Statement addresses only key points of care for the target population; it is not intended to be a comprehensive practice guideline. These recommendations result from review of literature and practices current at the time of their formulation. This Best Evidence Statement does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this Statement is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.

Reviewed by Clinical Effectiveness