

Best Evidence Statement (BESt)

Date published/posted: August 24, 2009

Deep-Pressure Proprioceptive Protocols¹ to Improve Sensory Processing Skills in Children

Clinical Question

- P** (population/problem): In children aged 6 months or older with sensory processing difficulties,
- I** (intervention): does a deep-pressure -proprioceptive protocol (Therapressure Program or Protective Response Regimen)
- C** (comparison) compared to participating in everyday sensory experiences
- O** (outcome): improve the child's sensory processing skills?

Target Population: Children aged 6 months or older with sensory processing difficulties

Inclusions:

- over-responsiveness to sensory input (formerly known as sensory defensiveness)
- under-responsiveness to sensory input

Exclusions:

- Do not complete the protocol if the following conditions exist: skin lesions, burns, rashes, or other obviously tender or sensitive skin areas, weeping tissue or open wounds (*Hansch 2002 [5], Wilbarger 1991 [5]*).

Recommendations

The following are recommendations for using one of the two deep-pressure proprioceptive protocols, the Therapressure Program or the Protective Response Regimen.

1. It is recommended that a deep-pressure proprioceptive protocol be used in conjunction with a sensory diet (see Best Evidence Statement #026 Use of Sensory Diet in Children with Sensory Processing Dysfunction (*Wilbarger 2006 [5], Foss 2003 [5], Hansch 2002 [5], Wilbarger 1991 [5]*)).
2. It is recommended that the family and therapist develop a minimum of one specific functional goal regarding the expected outcome of the protocol (*Wilbarger 2008 [5], Foss 2003 [5], Hansch 2002 [5], Local Consensus [5]*).
3. It is recommended that the protocol be completed every two hours of waking time until symptoms improve (*Wilbarger 2008 [5]*), approximately four to six weeks (*Local Consensus [5]*).
Note: If the family is not able to maintain this frequency, then after two weeks decrease to 3 to 5 times per day.
4. It is recommended that progression/effectiveness of the protocol be monitored closely by the treating therapist (*Wilbarger 2008 [5]*) to determine if the protocol is meeting desired functional goal(s) and if it is being completed correctly and at the proper frequency (*Segal 2006 [5], Foss 2003 [5], Local Consensus [5]*). Ideally, this is assessed each week while the protocol is being completed (*Wilbarger 2008 [5], Local Consensus [5]*).
Note: As the child's symptoms improve, one can either fade the use of a protocol (meaning gradually decrease frequency by one application every 3 to 4 days (*Local Consensus [5]*) and monitor the child's reaction for signs of regression with sensory processing (*Hansch 2002 [5]*) or stop completely without fading (*Wilbarger 2008 [5]*).

¹ Deep pressure-proprioceptive 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.

Note: If a child is not showing improvements toward meeting desired functional goals(s) after 2-3 weeks and the protocol is reviewed with the caregiver to ensure that it is completed properly, the protocol can be stopped completely without fading (*Local Consensus [5]*).

5. It is recommended that using the protocol prior to stressful situations or activities (i.e. dentist, hair cut, starting school, etc.) be considered to help the child tolerate participation in these stressful activities (*Kimball 2007 [5]*, *Local Consensus [5]*).
6. It is recommended that the protocol be administered by a therapist trained by a qualified trainer and able to demonstrate appropriate knowledge of the protocol (*Local Consensus [5]*).

Note 1: A qualified trainer will be able to:

- verbalize the theory behind the protocol to the trainee (*Local Consensus [5]*).
- explain why/how the protocol affects the nervous system to the trainee (*Local Consensus [5]*).
- demonstrate the protocol on the trainee (*Local Consensus [5]*).

Note 2: The therapist being trained will be able to demonstrate the protocol correctly to the trainer (*Local Consensus [5]*). This includes being able to:

- verbalize to the trainer the theory and neurological basis behind the intervention and identify situations in which it would or would not be appropriate to implement the protocol (*Local Consensus [5]*).
- demonstrate ability to apply proper pressure with the brush and during joint compressions (*Local Consensus [5]*).
- verbalize how to educate the family on completing the intervention correctly (*Local Consensus [5]*).

Note 3: Developers of these protocols strongly suggest that therapists be formally trained in theory and practice by attending the instructional course on the use of their respective techniques (*Wilbarger 2008 [5]*, *Hansch 2002 [5]*).

Discussion/summary of evidence

The quality of the body of evidence regarding deep-pressure proprioceptive protocols is low. The two primary protocols are the Therapressure Program and the Protective Response Regimen (PRR). Research regarding the use of deep-pressure proprioceptive protocols is emerging in occupational therapy literature although techniques and protocols for deep-pressure proprioceptive protocols have been used for years. These studies are indicating positive results for using a deep-pressure proprioceptive intervention as a treatment strategy for children with sensory modulation dysfunction (*Kimball 2007 [5]*, *Foss 2003 [5]*). Theresa May-Benson, a nationally recognized expert in the treatment of children with sensory processing disorders, provided information on the use of a deep-pressure proprioceptive protocol. She suggested that the most important aspect of completing a deep-pressure proprioceptive protocol is providing deep pressure input using a brush immediately followed by proprioceptive input through joint compressions; this is more important than the specific deep-pressure proprioceptive protocol that is chosen (*May-Benson 2007 [5]*). Therefore, the PRR and the Therapressure Program are both methods that can be used to complete a deep-pressure proprioceptive protocol.


The Therapressure Program has been revised and renamed several times over the past 20 years; the intervention designed by the Wilbargers has been called by the following names: deep touch pressure protocol, the Wilbarger Protocol, Therapressure Program, sensory summation technique, and the Therapressure Program. Foss, et al (2003) reviewed several studies examining the effectiveness of the Therapressure Program; this review concluded that there is emerging evidence supporting the use of the Therapressure Program (*Foss 2003 [5]*). Although there is no research specifically on the PRR, Bonnie Hanschu (developer of the PRR) has been referenced in a literature review (Foss, et al, (2003) regarding how deep-pressure input from a deep pressure proprioceptive protocol affects the limbic system (*Foss 2003 [5]*). The developers of both the PRR and Therapressure Program recommend implementing these protocols for individuals that are over-responsive to sensory stimulation (formerly known as sensory defensiveness).








A study by Kimball, et al (2007) examined the effects of a Wilbarger protocol-based procedure; this study implemented the protocol only one time per week. Participants in this study demonstrated both over-responsiveness or under-responsiveness to sensory input based upon results of the short sensory profile. This small case series (n=4) suggests that a single application of the protocol may help a child through a stressful or challenging event (*Kimball 2007 [5]*).

Health Benefits, Side Effects and Risks

Emerging evidence and expert opinion indicate that a deep-pressure proprioceptive protocol may be useful in helping children improve their ability to process sensory information effectively. Reddening of the skin while you are implementing the protocol may indicate a histamine reaction. Joint problems should be taken into account and authorization from the responsible physician should be obtained before initiating protocol with an individual who has a fragile medical condition. The brush is not intended to be used on the inner thighs, stomach, groin area, and face (Hansch 2002 [5], Wilbarger 1991 [5]).

References/Citations

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

1. **Foss, A.; Swinth, Y.; McGruider, J.; and Tomlin, G.:** Sensory modulation dysfunction and the Wilbarger protocol: An evidence review. *OT Practice*, 8(12 supplemental): CE1-CE8, 2003, [5] .
2. **Hansch, B.:** Evaluation and treatment of sensory processing disorders from the perspective of the ready approach. Presented, Hershey, PA, Developmental concepts, 2002, [5] .
3. **Kimball, J. G.; Lynch, K. M.; Stewart, K. C.; Williams, N. E.; Thomas, M. A.; and Atwood, K. D.:** Using salivary cortisol to measure the effects of a Wilbarger protocol-based procedure on sympathetic arousal: a pilot study. *Am J Occup Ther*, 61(4): 406-13, 2007, [5] .
4. **Local Consensus:** at the time the BESt was developed. [5].
5. **May-Benson, T.:** Use of a Therapeutic Brushing Program. 2007, [5].
6. **Segal, R., and Beyer, C.:** Integration and application of a home treatment program: a study of parents and occupational therapists. *Am J Occup Ther*, 60(5): 500-10, 2006, [5] .
7. **Wilbarger, J., and Wilbarger, P.:** In *Avanti Educational Programs; Sensory Defensiveness: A Comprehensive Treatment Approach*, Troy, OH, 2008, [5] .
8. **Wilbarger, P., and Wilbarger, J.:** *Sensory defensiveness in children aged 2-12: An intervention guide for parents and other caretakers*. Santa Barbara, 1991, [5] .
9. **Wilbarger, P., and Wilbarger, J.:** *Sensory defensiveness: a comprehensive treatment approach*. Chicago, IL, Avanti Educational Programs, Inc., 2006, [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

The *Therapressure Program* by Wilbarger and the *Protective Response Regimen* by Bonnie Hanschu use deep-pressure and proprioceptive input with specially designed surgical scrub brushes to address sensory processing difficulties, specifically over-responsiveness. The brush is held horizontally and slow firm pressure is applied to the feet, legs, hands, arms, and back keeping as much contact directly with the skin as possible. This is immediately followed by joint compressions to provide proprioceptive input. Although originally proposed for children who were over-responsive to sensory input, a deep pressure proprioceptive protocol may be considered for use with children who are under-responsive to sensory input as the deep pressure proprioceptive protocol provides intense sensory input.

Therapressure Program Indications:

Wilbarger & Wilbarger state that the Therapressure Program should be used with children with sensory defensiveness (Wilbarger 2008 [5], Wilbarger 2006 [5], Wilbarger 1991 [5]). The protocol targets sensory defensiveness including tactile defensiveness, gravitational insecurity, auditory defensiveness, proprioceptive defensiveness, postural insecurity, visual defensiveness, and oral defensiveness (Wilbarger 2008 [5], Wilbarger 2006 [5]). Wilbarger & Wilbarger also suggest that sensory seeking behaviors may be “an attempt by the individual to modulate or reduce the negative impact to other disturbing sensory input” (Wilbarger 2006 [5]). Wilbarger & Wilbarger (2006) also recommend that their intervention be implemented in conjunction with an intense sensory diet for maximal benefit [see Best Evidence Statement #026 Use of Sensory Diet in Children with Sensory Processing Dysfunction] (Wilbarger 2006 [5]).

Protective Response Regimen Indications:

The primary indication for use of the PRR is sensory defensiveness. Although the PRR may help with other problems besides defensiveness, it is recommended by Hanschu that the PRR is only to be used for those who have defensive reactions to sensory input (Hansch 2002 [5]).

According to Hanschu "The success of the intervention seems to be directly related to 1) correct application of treatment dose, 2) consistent frequency of treatment dose, and 3) appropriateness of the sensory diet activities" (Hansch 2002 [5]).

Team members and contributors

Division of Occupational Therapy and Physical Therapy

Rebecca D. Reder OTD, OTR/L, Senior Clinical Director, Occupational Therapy and Physical Therapy

BEST Development Team

Aurora Hoobler, OTR/L, MS, Team Leader, Division of Occupational Therapy and Physical Therapy

Christa Aylward, OTR/L, Division of Occupational Therapy and Physical Therapy

Carol Burch PT, DPT, Division of Occupational Therapy and Physical Therapy

Karen Kovacs, OTR/L, MHS Division of Occupational Therapy and Physical Therapy

Vicki McQuiddy, OTR/L, MHS Division of Occupational Therapy and Physical Therapy

Reviewed by:

Jamie Donovan, MOT, OTR/L, Division of Occupational Therapy and Physical Therapy

Amy Johnson, OTR/L, Division of Occupational Therapy and Physical Therapy

Kathy Krebs, OTR/L, Division of Occupational Therapy and Physical Therapy

Division of Health Policy & Clinical Effectiveness Support

Kim Mason RN, MSN, PCNS-BC, Guidelines Program Administrator

Eloise Clark MPH, MBA, Guidelines Program Administrator

Barbarie Hill MLS, Pratt Library

All Team Members and Clinical Effectiveness support staff listed above have signed a conflict of interest declaration.

Ohio State University

Reviewed by

Alison Lane, PhD, OTR/L, Assistant Professor, School of Allied Medical Professions, College of Medicine

Search strategy

1. Databases

OVID MEDLINE

OVID CINAHL

Pedro

All Ovid EBM Reviews – Cochrane DSR, ACD Journal Club

EBSCOhost

www.otseeker.com

2. **Search Terms:** deep touch pressure proprioceptive, occupational therapy, autism, sensory (integration, processing), Wilbarger, Protective Response Regimen, children

3. **Limits and Filters:** English, humans

4. **Additional articles:** from reference lists

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