

# Weighted Items

## Tools for Helping Children Learn to Regulate

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Toddler holding a weighted doll.

### Weighted Items Are Calming

*Weighted items provide safe, calming, deep pressure for persons experiencing anxiety, distress, restlessness, and difficulties with attention and executive control. These items include blankets, vests, dolls, and other soft items that are filled with heavy beads or pellets to add extra weight to them. We have successfully used weighted blankets, weighted vests, weighted dolls, and weighted teddy bears in our work for over fifteen years, as a way to help children and teens learn to self-manage their emotions and behavior.*

*Children can hold a weighted item, place it on their lap, wrap it around their shoulders, or use it as a sleep aid. The amount of weight that is helpful for specific children can vary, and the weight that is most comfortable for the individual child should be used. HOW a weighted item is used, and WHETHER to use a weighted item, are ALWAYS controlled by the child or teen that is using it.*

— Dr. Karyn B. Purvis

### Weighted Items

Weighted items such as weighted vests and weighted blankets have been shown to have a number of benefits for children, teens, and adults. For example, Buckle et al. (2011) found, using an experimental manipulation, that weighted vests improved the in-seat behavior and attention-to-task of school-aged children diagnosed with ADHD. Similarly, Lin et al. (2014) found, again using an experimental manipulation, that weighted vests improved three different attentional measures and three different on-task behaviors among school-aged children diagnosed with ADHD. The impact on classroom behavior in this study was

significant: There was a 23% reduction in off-task behavior, an 82% reduction in out-of-seat behavior, and a 52% reduction in fidgeting (Lin et al., 2014). Fertel-Daly et al. (2001), Olson and Moulton (2004), and VandenBerg (2001) have published additional evidence regarding the use and effectiveness of weighted vests.

There is not as much evidence for the impact of weighted blankets as there is for weighted vests, but the data are beginning to accumulate. Mullen et al. (2008) investigated the safety and efficacy of weighted blankets in college-age adults using an experimental design with multiple physiological and self-report measures. Vital sign metrics

indicate that weighted blankets are safe, while data obtained on effectiveness revealed a 33% decrease in electrodermal activity (an indicator of emotional arousal) and a 63% decrease in self-reported anxiety after use, while 78% of the participants preferred the blanket as a calming modality. The authors conclude that weighted blankets can have a safe, calming influence for at least some non-hospitalized adults (Mullen et al., 2008).

In an in-home study, Lindstedt and Oie Umb-Carlsson (2013) found that adults diagnosed with ADHD rated weighted blankets as “most helpful” among a suite of cognitive assisted technologies designed to

support daily activities and promote life satisfaction. In an evaluation of a sensory room in a hospital (psychiatric) setting, Novak et al. (2012) found that use of a sensory room was associated with significant reductions in distress and improvements in a range of disturbed behaviors, and that those individuals who used a

weighted blanket in the sensory room reported significantly greater reductions in distress and clinician-rated anxiety than those who did not use a blanket. Positive research findings are consistent with the growing use of weighted blankets in clinical settings (Mullen et al., 2008), as well as in our own therapeutic summer

camp (Purvis and Cross, 2006; Purvis et al., 2007, see also the figure on this page). In the next section of this TBRI Practice Brief, we take a look at [Sensory Rooms](#), which commonly employ weighted items as part of a sensory menu.



A Hope Connection camper with a weighted blanket.

## Sensory Rooms

Sensory rooms are designed to provide a self-managed sensory diet for children, teens, and adults who are experiencing difficulties self-regulating their emotional and behavioral states (Champagne and Stromberg, 2004; Webber, 2007). Sometimes, sensory rooms are referred to as “multi-sensory rooms” or “comfort rooms.” Very often, sensory rooms include weighted items, as in the study by Novak et al. (2012), mentioned in the previous section. You will recall that the overall sensory room experience was therapeutic, as was the self-managed use of weighted blankets (Novak et al., 2012). In a separate study of sensory-based approaches deployed within an inpatient psychiatric setting (Chalmers et al., 2012), there were significant reductions in pa-

tient distress, as rated by the patient (48% reduction), and by the clinician (47% reduction). Similar findings have been reported by Smith and Jones (2014). In our own work with residential treatment centers (RTCs) serving youth, we have seen a virtual elimination of restraints and seclusions once the RTCs implement a voluntary sensory room, stocked with weighted blankets, among other sensory items (see also Champagne and Stromberg, 2004).

Based on studies such as these, as well as a growing foundation of clinical experience, there is considerable interest in sensory rooms as a therapeutic modality in residential settings (Champagne and Stromberg, 2004; Webber, 2007). As part of this movement, the National Association of State Mental Health Program Directors (NASMHPD) has issued a plan-

ning framework for mental health agencies that specifies comfort and sensory rooms as seclusion/restraint reduction tools (Huckshorn, 2005). Tonarelli (2007) provides some guidance for setting up sensory rooms in residential facilities, but Chalmers et al. (2012) discuss how environmental changes are insufficient on their own, and must be accompanied by deliberate cultural change efforts within residential settings, with buy-in from both staff and clients.

## Deep Pressure

Weighted items such as blankets, vests, dolls, and stuffed animals provide a particular form of sensory stimulation, namely, what Mullen et al. (2008) and others refer to as *Deep Pressure Stimulation* (DPS). Grandin (1992) observed that

DPS can help calm autistic children, calm children diagnosed with ADHD, and calm other large mammals besides humans. She further speculated that the neurological mechanisms responsible for the calming effect of DPS may involve the cerebellum, a topic to which we will return later in this Practice Brief (see [Sensory Processing](#), below). More recently, Reynolds et al. (2015) found that DPS, applied with a “Vayu Vest” (therapeutic systems.com), reduced sympathetic arousal (distress), increased parasympathetic arousal (calming), and enhanced cognitive performance in a sample of normal adults.



Youth with a weighted animal.

DPS can take many forms, including weighted items, hugs, and massage. There is considerable neuropsychological research on the benefits of massage, which may provide insight about the neurophysiological underpinnings of DPS effects in general. In a comprehensive review of therapeutic massage research, Field et al. (2005) conclude that therapeutic massage results in a 31% decrease in cortisol, a 28% increase in serotonin, and a 31% increase in dopamine. All of these changes are in the direction of improved psychological functioning and well-being, and they are averaged across studies investigating a wide range of problems, including depression, chronic pain, autoimmune conditions, and stress reduction. Field (2010) reviews the effects of touch more generally, including the necessity of healthy touch for the developing child, and the beneficial impact

of touch and massage for adult social interaction and personal well-being. Field et al. (2010) argue that the neurophysiological mechanism for massage (DPS) involves the *vagal system*, which develops into an autonomic platform for the child’s engagement with with his or her environment.

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*The diverse benefits of massage therapy observed across a wide range of conditions may stem from a common underlying mechanism. Recent findings suggest that this mechanism may involve increased vagal activity from the stimulation of pressure receptors under the skin.* (p. 381)

”

– Field et al. (2010)

## Sensory Processing

The vagal system works with the autonomic systems of the brain and body (sympathetic and parasympathetic) to regulate arousal as we humans engage with the physical and (especially) the social environments (Porges, 2011; Porges and Furman, 2011). Research suggests that these autonomic systems are what give children and youth the capacity for resilience in the face of challenge and stress (Doussard-Roosevelt et al., 2003; Porges, 2011). These lower-order neurophysiological systems are the foundation for engagement itself, which involves a complex and dynamic network of interacting sensory, cognitive, and motor components (Angelaki and Cullen, 2008; Koziol et al., 2011; Owen et al., 2013). Building on the pioneering work of Ayres (1979) and Wilbarger (1984), occupational therapists have developed a wide range of sensory processing supports for children (Kranowitz, 2006; Miller and Fuller, 2007), and for teens (Dorman et al.,

2009). The sensory processing supports that have been discussed in this newsletter, including weighted items and sensory rooms, are elements of a large menu of sensory strategies that are available to those who wish to help youth “who come from hard places.”



Teen with a weighted blanket.

## Relational Trauma

Children adopted from Eastern European orphanages may experience serious sensory processing challenges (Cermak and Danhauer, 1997; Cermak and Groza, 1998), and that the extent of their sensory processing challenges increases with the length of their institutionalization (Lin et al., 2005). These children may also experience self-regulation challenges, apparently as a function of extreme deprivation during their formative years (Gunnar, 2001; Gunnar et al., 2001). A similar pattern of outcomes is associated with early relational trauma (Atchison, 2007; Schore, 2001), even though these children typically have not experienced nearly the level of deprivation that the orphanage-reared children have experienced.

But why are social and sensorimotor experiences so important to the developing human? Esther Thelen and Linda Smith provide some answers, for they argue that sensorimotor experiences and processes are essential components of a complex dynamic system that generates key developmental outcomes (Smith and Thelen, 2003; Thelen, 2000). In particular, Smith and Breazeal (2007)

identify three principles that, when taken together, can explain developmental change: (a) coordination of component processes during sensorimotor activity; (b) coordination of external actions and internal states with a (mindful) social partner; (c) overlapping component processes engaged in the solution of many inter-related and developmentally ordered tasks. These are likely to be the developmental mechanisms whereby the complex neurophysiological systems described by Angelaki and Cullen (2008) and Koziol et al. (2011) are constructed (see [Sensory Processing](#), above).

According to Smith and Breazeal (2007), developmental change arises on processes that are sensorimotor,

social, and complex. In light of this, it is interesting (and important) that we can see an emerging consensus about interventions designed to help those who have experienced relational trauma. In the view of prominent developmental traumatologists, successful interventions must include a focus on the body and sensorimotor experiences. Bessel van der Kolk (2014) provides a strong, evidence-based argument for “body work” with adults, and Warner et al. (2013) extend this argument to youth living in residential settings. Kaiser et al. (2010) is one example of an empirical demonstration of these principles. Bruce Perry’s Neuro-Sequential Model also recognizes the developmental and therapeutic underpin-

nings provided by sensorimotor experiences (Perry, 2006, 2009). Bath (2008) has synthesized these ideas and proposed an approach that is based on three “pillars” of trauma-informed care:

1. Connection (Relationship)
2. Felt-Safety
3. Self-Regulation

It is worth noting that providing weighted items not only helps children and youth *self-regulate* (the obvious effect), but also helps them *feel safe* (because they *feel* self-regulated and in control of their own feelings and actions) and *connected* (because they appreciate an adult seeing and meeting their needs).



## References

- Angelaki, D. E. and Cullen, K. E. (2008). Vestibular system: The many facets of a multimodal sense. *Annual Review of Neuroscience*, 31:125–150.
- Atchison, B. J. (2007). Sensory modulation disorders among children with a history of trauma: A frame of reference for speech-language pathologists. *Language, Speech, and Hearing Services in Schools*, 38:109–116.
- Ayres, A. J. (1979). *Sensory integration and the child*. Western Psychological Services, Los Angeles.
- Bath, H. (2008). The three pillars of trauma-informed care. *Reclaiming Children and Youth*, 17(3):17–21.
- Buckle, F., Franzsen, D., and Bester, J. (2011). The effect of the wearing of weighted vests on the sensory behaviour of learners diagnosed with attention deficit hyperactivity disorder within a school context. *South African Journal of Occupational Therapy*, 41(3):36–42.
- Cermak, S. A. and Danhauer, L. A. (1997). Sensory processing in the post-institutionalized child. *Journal of Occupational Therapy*, 51:500–507.
- Cermak, S. A. and Groza, V. (1998). Sensory processing problems in post-institutionalized children: Implications for social work. *Child and Adolescent Social Work Journal*, 15:5–37.

- Chalmers, A., Harrison, S., Mollison, K., Molloy, N., and Gray, K. (2012). Establishing sensory-based approaches in mental health inpatient care: A multidisciplinary approach. *Australasian Psychiatry*, 20(1):35–39.
- Champagne, T. and Stromberg, N. (2004). Sensory approaches in inpatient psychiatric settings: Innovative alternatives to seclusion and restraint. *Journal of Psychosocial Nursing*, 42(9):1–8.
- Dorman, C., Lehsten, L. N., Woodin, M., Cohen, R. L., Schweitzer, J. A., and Tona, J. T. (2009). Using sensory tools for teens with behavioral and emotional problems. *OT Practice*, pages 16–21.
- Doussard-Roosevelt, J. A., Montgomery, L. A., and Porges, S. W. (2003). Short-term stability of physiological measures in Kindergarten children: Respiratory sinus arrhythmia, heart period, and cortisol. *Developmental Psychobiology*.
- Fertel-Daly, D., Bedell, G., and Hinojosa, J. (2001). Effects of a weighted vest on attention to task and self-stimulatory behaviors in preschoolers with pervasive developmental disorders. *American Journal of Occupational Therapy*, 55(6):629–640.
- Field, T., Diego, M., and Hernandez-Reif, M. (2010). Moderate pressure is essential for massage therapy. *International Journal of Neuroscience*, 120:381–385.
- Field, T., Hernandez-Reif, M., Diego, Miguel Schanberg, S., and Kuhn, C. (2005). Cortisol decreases and serotonin and dopamine increase following massage therapy. *International Journal of Neuroscience*, 115(10):1397–1413.
- Field, T. M. (2010). Touch for socioemotional and physical well-being: A review. *Developmental Review*, 30(4):367–383.
- Grandin, T. (1992). Calming effects of deep touch pressure in patients with autistic disorder, college students, and animals. *Journal of Child and Adolescent Psychopharmacology*, 2(1):63–72.
- Gunnar, M. R. (2001). Effects of early deprivation: Findings from orphanage-reared infants and children. In Nelson, C. A. and Luciana, M., editors, *Handbook of developmental cognitive neuroscience*, pages 617–629. MIT Press, Cambridge, MA.
- Gunnar, M. R., Morison, S. J., Chisholm, K., and Schuder, M. (2001). Salivary cortisol levels in children adopted from Romanian orphanages. *Development and Psychopathology*, 13(3):611–628.
- Huckshorn, K. A. (2005). Six core strategies to reduce the use of seclusion and restraint planning tool. National Technical Assistance Center & National Association of State Mental Health Program Directors.
- Kaiser, E. M., Gillette, C. S., and Spnazzola, J. (2010). A controlled pilot-outcome study of sensory integration in the treatment of complex adaptation to traumatic stress. *Journal of Aggression, Maltreatment & Trauma*, 19:699–720.
- Koziol, L. F., Budding, D. E., and Chidekel, D. (2011). Sensory integration, sensory processing, and sensory modulation disorders: Putative functional neuroanatomic underpinnings. *Cerebellum*, 10:770–792.
- Kranowitz, C. (2006). *The out-of-sync child: Recognizing and coping with sensory processing disorder*. Penguin Putnam, New York, revised edition.
- Lin, H.-Y., Lee, P., Chang, W.-D., and Hong, F.-Y. (2014). Effects of weighted vests on attention, impulse control, and on-task behavior in children with attention deficit hyperactivity disorder. *American Journal of Occupational Therapy*, 68:149–158.
- Lin, S. H., Cermak, S., Coster, W. J., and Miller, L. (2005). The relation between length of institutionalization and sensory integration in children adopted from Eastern Europe. *American Journal of Occupational Therapy*, 59(2):139–147.
- Lindstedt, H. and Oie Umb-Carlsson, . (2013). Cognitive assistive technology and professional support in everyday life for adults with adhd. *Disability and Rehabilitation: Assistive Technology*, 8(5):402–408.
- Miller, L. J. and Fuller, D. A. (2007). *Sensational kids: Hope and help for children with sensory processing disorder*. Perigree Trade, New York.
- Mullen, B., Champagne, T., Krishnamurty, S., Dickson, D., and Gao, R. X. (2008). Exploring the safety and therapeutic effects of deep pressure stimulation using a weighted blanket. *Occupational Therapy in Mental Health*, 24(1):65–89.

- Novak, T., Scanlan, J., McCaul, D., MacDonald, N., and Clarke, T. (2012). Pilot study of a sensory room in an acute inpatient psychiatric unit. *Australasian Psychiatry*, 20(5):401–406.
- Olson, L. J. and Moulton, H. J. (2004). Occupational therapists' reported experiences using weighted vests with children with specific developmental disorders. *Occupational Therapy International*, 11(1):52–66.
- Owen, J. P., Marco, E. J., Desai, S., Fourie, E., Harris, J., Hill, S. S., Arnett, A. B., and Mukherjee, P. (2013). Abnormal white matter microstructure in children with sensory processing disorders. *Neuroimage: Clinical*, 2:844–853.
- Perry, B. D. (2006). Applying principles of neurodevelopment to clinical work with maltreated and traumatized children: The neurosequential model of therapeutics. In Webb, N. B., editor, *Working with traumatized youth in child welfare*, pages 27–52. Guilford Press.
- Perry, B. D. (2009). Examining child maltreatment through a neurodevelopmental lens: Clinical applications of the neurosequential model of therapeutics. *Journal of Loss and Trauma*, 14(4):240–255.
- Porges, S. W. (2011). *The polyvagal theory: Neurophysiological foundations of emotions, attachment, communication, and self-regulation*. Norton Series on Interpersonal Neurobiology. W. W. Norton, New York.
- Porges, S. W. and Furman, S. A. (2011). The early development of the autonomic nervous system provides a neural platform for social behaviour: A polyvagal perspective. *Infant and Child Development*, 20(1):106–118.
- Purvis, K. B. and Cross, D. R. (2006). Improvements in salivary cortisol, depression, and representations of family relationships in at-risk adopted children utilizing a short-term therapeutic intervention. *Adoption Quarterly*, 10(1):25–43.
- Purvis, K. B., Cross, D. R., Federici, D. R., Johnson, D., and McKenzie, L. B. (2007). The Hope Connection: A therapeutic summer camp for adopted and at-risk children with special socio-emotional needs. *Adoption & Fostering*, 31:38–48.
- Reynolds, S., Lane, S. J., and Mullen, B. (2015). Effect of deep pressure stimulation on physiological arousal. *American Journal of Occupational Therapy*, 69(3).
- Schore, A. N. (2001). The effects of early relational trauma on right brain development, affect regulation, and infant mental health. *Infant Mental Health Journal*, 22(1–2):201–269.
- Smith, L. B. and Breazeal, C. (2007). The dynamic lift of developmental process. *Developmental Science*, 10(1):61–68.
- Smith, L. B. and Thelen, E. (2003). Development as a dynamic system. *TRENDS in Cognitive Sciences*, 7(8):343–348.
- Smith, S. and Jones, J. (2014). Use of a sensory room on an intensive care unit. *Journal of Psychosocial Nursing and Mental Health Services*, 52(5):22–30.
- Thelen, E. (2000). Grounded in the world: Developmental origins of the embodied mind. *Infancy*, 1(1):3–28.
- Tonarelli, L. (2007). Some starter tips on creating and using a sensory room. *Current Activities in Longterm Care*, pages 47–49.
- van der Kolk, B. A. (2014). *The body keeps the score: Brain, mind, and body in the healing of trauma*. Viking, New York.
- VandenBerg, N. L. (2001). The use of a weighted vest to increase on-task behavior in children with attention difficulties. *American Journal of Occupational Therapy*, 55(6):621–628.
- Warner, E., Koomar, J., Lary, B., and Cook, A. (2013). Can the body change the score? Application of sensory modulation principles in the treatment of traumatized adolescents in residential settings. *Journal of Family Violence*, 28:729–738.
- Webber, L. (2007). From seclusion to solutions. *Office of the Senior Practitioner (Victoria, Australia): Positive solutions in practice*, 2:1–4.
- Wilbarger, P. (1984). Planning an adequate “sensory diet:” application of sensory processing theory during the first years of life. *Zero to Three*, pages 7–12.