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# Functional Somatic Symptoms in Children and Adolescents: The Stress-System Approach to Assessment and Treatment

Kasia Kozłowska, Stephen Scher, and Helene Helgeland

## Online Supplement 14.1

### Treatment Interventions: Working with the Body

In this supplement to Chapter 14, we provide the reader with additional material and references pertaining to treatment interventions that involve working with the body: tracking/sequencing body sensations; the body scan; movement meditations; synchronized-movement activities; breathing interventions; concrete physical exercises using large muscle groups for providing containment; the health benefits of voluntary regular exercise; trauma-processing interventions; and neuromodulation.

### Origins of Tracking/Sequencing Body Sensations

In the first author's (KK's) clinical team, the strategy of sequencing or tracking body sensations was adapted from Salvador Minuchin's structural family therapy, in which the sequencing/tracking technique was used to identify patterns of interaction between family members (Minuchin 1974; Lappin 1988). We subsequently went on to track changes in affect as they occurred in the context of family interactions (not just behaviour) and later

to track the body activation or sensations that the individual child experienced in the context of family interactions, affects, thoughts, or memories of past interactions or events.

Other therapists have come to use tracking/sequencing of body sensations from other traditions and perspectives. Peter Levine (2010), who works from an ethological perspective, tracked – that is, observed – how animals dealt with trauma. Pat Ogden (2015) came to use tracking of body sensations via the work of Ron Kurtz, who drew on Eastern meditative traditions to develop the Hakomi Method, a mindfulness, somatic, and experience-based approach to change. Kathy Kain came to use tracking of body sensation in trauma work via the body-work tradition, which makes use of touch and focused attention, as originally done in many older healing traditions (see Kain 2017).

## Jon Kabat-Zinn: References and Origins of the Body Scan

As noted in Chapter 14, the *body scan* was introduced into Western clinical practice by Jon Kabat-Zinn, a professor of medicine who studied Buddhist practice under Zen Buddhist teachers (Kabat-Zinn 1982; Kabat-Zinn 1990; Dreeben et al. 2013). In his original article, Kabat-Zinn (1982, p. 36) used the term *sweeping* to refer to the body scan: ‘a gradual sweeping through the body from feet to head with the attentional faculty, focusing on proprioception, and with periodic suggestions of breath awareness and relaxation’. The term *body scan* was subsequently introduced in 1990 with reference to the Mindfulness-Based Stress Reduction (MBSR) program described in a book entitled *Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness* (Kabat-Zinn 1990).

Mindfulness interventions based on Kabat-Zinn’s Mindfulness-Based Stress Reduction program (Kabat-Zinn 1990) have been found to down-regulate various components of the stress system: the hypothalamic-pituitary-adrenal (HPA) axis (John et al. 2011), the autonomic system (Kiran et al. 2011), the immune-inflammatory system (Black and Slavich 2016), the

pain system (Banth and Ardebil 2015; Cherkin et al. 2016), and brain stress systems (Taren et al. 2015).

## **Meditations with Movement**

In the Buddhist meditative tradition, some exercises are designed to increase awareness of the four postures (walking, standing, sitting, and lying down) and, more generally, of any activity in which one is engaged; both types of exercises are ‘concerned with directing mindfulness to the body in activity’ (Anālayo 2003, p. 136). They provide ‘a firm grounding of awareness in the body’ (p. 137). This tradition is probably the origin of walking meditations.

In the Chinese meditative tradition, the practice of *qigong* aligns breath, awareness to the body, and movement. Along these lines, Robert Peng’s *qigong* exercise, the Four Golden Wheels, combines movement (including breath), attention to the body during movement, visualization, and somatic tracking (Peng 2016).

## **Other Group Activities Involving Synchronized Movement That Creates Pleasurable Body Sensations and Behavioural Synchrony, and That Increases Pain Thresholds**

Alternatively, activities such as drumming can be useful. By attending to changes in rhythm and to the beat that runs through her body – involving increases and decreases in tempo and intensity – the child learns to focus her attention on pleasurable body sensations, increasing her pain thresholds and shifting her body away from a pro-inflammatory state (Fancourt et al. 2016; Perkins et al. 2016; Rojjani et al. 2018; Sullivan and Blacker 2017). Dance and other synchronized group activities and sports appear to have similar positive effects (Tarr et al. 2015; Sullivan and Blacker 2017).

## The Neurophysiological Changes That Occur with Breathing at the Resonant-Frequency Breathing Rate

Breathing at a slow rate – the resonant-frequency breathing rate – is associated with myriad neurophysiological changes. Key changes include increased vagal tone to the heart (maximal heart rate variability), optimal baroreflex function (see below), optimal gas exchange in the lungs, increased neurophysiological coherence across body systems, down-regulation of energy-regulation systems, decreased energy use, down-regulation of brain arousal systems, decreased subjective pain, and increased subjective well-being (Lehrer 2013; Lehrer and Gevirtz 2014; McCraty and Zayas 2014; Stern et al. 2014; Russo et al. 2017; Paccione and Jacobsen 2019).

Optimal baroreflex function refers to the maximal increase in gain of the baroreflex (amount of change in heart rate per unit change in blood pressure), which, in turn, maximizes gas-exchange efficiency in the lungs (Lehrer 2013).

## Resources for Achieving Diaphragmatic Breathing

Other techniques and resources for achieving diaphragmatic breathing, which the reader can try out for him- or herself, are described elsewhere (Little Twisters Yoga; JD McCarty Center 2011; James 2015; Williams and Zahka 2017; Paccione and Jacobsen 2019).

### **Bee Breathing**

Amanda James (2015) writes: ‘**Bumble Bee Breath:** Close your eyes and plug your ears. Inhale through your nose and quietly hum as you exhale. You will feel vibrations in your head, calming the nervous system’.

### **Concrete Physical Exercises Using Large Muscle Groups for Providing Containment**

A series of concrete physical exercises using large muscle groups are described by Raja Selvam and Lori A. Parker (Selvam and Parker n.d.). The article and the exercises described are based on Bodydynamic Somatic

Developmental Psychology, a body psychotherapy system from Denmark. While the theoretical model that underpins Body Psychology is outside of mainstream and may or may not have scientific veracity – it suggests a developmental sequence in which psychological and emotional elements are linked to specific muscles (Marcher and Sonja Fich 2010) – some of the exercises that emerge from the model or were inspired by it are extremely useful.

The exercises can be done together by the child and therapist, and they can subsequently be implemented by the child as needed – to promote a sense of containment and grounding – as she goes about the activities of daily living. The exercises include the following:

- Tightening of the lateral muscles of the thigh – the tensor faciae latae and the iliotibial tract. In the standing position the child digs her heels into the ground and attempts to raise her legs to the side. In the sitting position she tries to spread her thighs while resisting the movement by pushing her knees together with her hands. This exercise gives some children a physical sense of strength, containment, and grounding, in the lower part of the body.
- Tightening of the muscles of the back – the latissimus dorsi. The child bends her arms at the elbows, and lifts her arms back so as to bring the tips of the shoulder blades together and down. This exercise gives some children a physical sense of strength, containment, and grounding, in the upper part of the body.
- Tightening of the muscles in the front of the chest – the pectoralis minor and pectoralis major. Using small movements, the child brings her shoulders forward and down. This exercise gives some children a physical sense of safety and containment in the anterior chest/solar plexus area – what Selvam and Parker (n.d., p. [3]) refer to as closing ‘the heart area at will in order to protect themselves from being too open when they go out into the world’. In the Eastern meditative traditions, this region is one of the key energy areas and is referred to by a variety of names: as the *middle dantian* (tai chi or qigong) or as one of the *primary chakras* (Hindu traditions).

## Resources for Progressive Muscle Relaxation

See *Progressive Muscle Relation Script*, <https://www.baylor.edu/content/services/document.php/183466.pdf>.

## Resources for Bottom-Up Mindfulness Practice Resources

For resources, see Cyruba: Make Meditation Yours. *Meditation Exercises*. <https://www.cyruba.org/meditation-exercises/>.

## Research About the Mechanisms That Underpin the Health Benefits of Voluntary Regular Exercise

The complex mechanisms that underpin the health benefits of voluntary regular exercise are progressively coming into focus through current research (Nicastro and Greenwood 2016; Tanner et al. 2019; Greenwood 2019; Mailing et al. 2019).

For literature pertaining to the positive health benefits to physical activities that involve synchronous behaviour and that are done with other people, see previous section ‘Concrete Physical Exercises’.

## Eye Movement Desensitization and Reprocessing (EMDR)

*Eye Movement Desensitization and Reprocessing* (EMDR) is the trauma-processing intervention with the largest evidence base (Valiente-Gomez et al. 2017; Wilson et al. 2018; Whitehouse 2019).

Recent studies suggest that when the EMDR intervention is successful, the pattern of brain activation associated with the trauma memory shifts from activation of brain stress systems to activation of cognitive-processing regions (Pagani et al. 2012, 2015).

## The Flash Technique

For the flash technique, see Manfield and colleagues (2017).

## Other References Pertaining to Somatic Experiencing

For other references pertaining to somatic experiencing, see Winblad and colleagues (2018) for treatment effects in therapists, and Brom and colleagues (2017) and Anderson and colleagues (2017) for treatment effects in post-traumatic stress disorder.

## Other Trauma-Processing Interventions

For *radical exposure tapping*, see Karatzias and colleagues (2011), Church and colleagues (2011, 2013), Church and colleagues (2013), and MacKinnon (2014).

For the *progressive counting technique*, see Greenwald (2013) and Greenwald and colleagues (2015).

## References Pertaining to Neuromodulation

For spinal cord neurostimulators, see Sdrulla and colleagues (2018).

For transcranial magnetic stimulation, see Nicholson and Voon (2016).

The PoNS – the portable neuromodulation stimulator – was developed to enable non-invasive neuromodulation for use in rehabilitation therapies to initiate brain recovery secondary to damage or dysregulation of brain functions as seen in neurological or psychological disorders. Thus far it has shown utility in patients undergoing rehabilitation interventions for motor symptoms related to brain injury, and theoretically, it may, in the future, be of use in treating children with severe functional impairment secondary to functional neurological disorder (Harbourne et al. 2014). The PoNS appears to work by modulating limbic (subcortical) regions within the brain (Wildenberg et al. 2010, 2013; Harbourne et al. 2014; Danilov et al. 2015;

Leonard et al. 2017). Theoretically, neuromodulation devices should also have utility in patients with difficult-to-treat functional neurological symptoms.

For the transcutaneous auricular vagus nerve stimulator, see Kong and colleagues (2018).

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