

*Clinical Report***Vibroacoustic Therapy in the Treatment of Developmental Trauma:*****Developing Safety through Vibrations***Marko Punkanen<sup>1,2</sup>, Marjo Nyberg<sup>3</sup>, Tiinapriitta Savela<sup>1</sup><sup>1</sup>*Nyanssi Therapy Centre, Finland*<sup>2</sup>*VIBRAC Skille-Lehikoinen Centre for Vibroacoustic Therapy and Research, Finland*<sup>3</sup>*Marjo Nyberg Music Therapy Services, Finland***Abstract**

Developmental/attachment trauma may strongly impact a child's capacity to develop self-regulation skills related to feelings of safety. The ability to utilize a social engagement system ensures that defensive reactions such as fight, flight, freeze, and/or total submission will be avoided and replaced with integrative mechanisms of response. Vibroacoustic therapy (VAT) uses pulsed, sinusoidal, low frequency sound on a specially designed mattress or chair. Based on clinical experience, VAT seems to help regulate a traumatized child's autonomic nervous system and may assist in the gradual development of a bodily-related feeling of safety.

**Keywords:** *Vibroacoustic therapy, child psychiatry, developmental trauma, autonomic nervous system*      multilingual abstract | [mmd.iammonline.com](http://mmd.iammonline.com)

**Introduction**

Traumatic experiences, and especially developmental/attachment trauma, may strongly affect a child's developing autonomic nervous system and impede feelings of safety. Developmental/attachment trauma often causes strong and overwhelming emotions such as panic, fear, and depression, and may as well dysregulate arousal reactions. This can lead a child toward encountering serious problems in self-regulation that will likely inhibit the development of the ventral vagus complex, which is essential in keeping the social engagement system activated and is essential in enhancing feelings of safety within relationships.<sup>1</sup> Insecure attachment styles might lead to faulty neuroception, which means that a child's autonomic nervous system may not be able to differentiate between safety and danger.<sup>2</sup>

Based on our clinical experience, vibroacoustic therapy (VAT), which uses whole body low frequency sound stimulation,<sup>3</sup> when coupled with a music therapy relationship,

traumatized children can be helped to calm down by regulating their autonomic nervous system. Sound stimulation with slow pulsations seems to activate a child's ventral vagus complex (vagal brake)<sup>1</sup> and helps to regulate dysregulated arousal states and enhance social engagement between the child and the therapist. In this paper we will present the theoretical framework of our clinical music therapy work and illustrate the clinical use of VAT by describing Matti's experiences as a case example.

**Case Example: Matti**

Matti was a 10-year-old boy when his music therapy process started. His parents were substance abusers, although Matti's mother became sober when she was pregnant and she was able to sustain this for most of Matti's early youth. Yet, due to seemingly unstable social circumstances, Matti was taken into custody and was placed in a children's home when he was 5 years old. Matti's mother went into rehabilitation since their separation, but has been able to stay in contact with Matti.

When the therapy process was initiated, Matti had lived in a children's home for 5 years. Although the safe environment and boundaries had helped him, he still had various difficulties in social situations and explicitly with self-regulation. In school, he had problems with concentration and had diverse learning difficulties. Matti also had severe episodes of unexplained rage, both at school and in the children's home. In general, Matti's character was lively and kind, but he often received negative feedback from adults and peers, primarily because of his outbursts and hyperactivity.

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International Association for Music & Medicine (IAMM).

At the beginning of the music therapy process, Matti presented as quite restless. He also avoided eye contact. Matti nevertheless seemed to be interested in musical activities (improvising together with the therapist by using keyboards, M-Audio Keystation 88 MkII), which seemingly helped him to stay motivated.

#### *Threats Everywhere - Faulty Neuroception and Problems in Self-Regulation*

Developmental trauma affects the functioning of the autonomic nervous system. It is typical, that a traumatized child's arousal level fluctuates between hyper- and hypoarousal states. In a state of hyperarousal, a child experiences excessive bodily, emotional, and cognitive arousal, while in a hypoarousal state the bodily, emotional, and cognitive experiences are flat. In both cases, the ability to integrate experiences is compromised and distorted. At optimal arousal, inside the window of tolerance, a person can engage socially, process experiences, and integrate these as a part of the self<sup>4,5</sup>.

Porges coined the concept of neuroception to describe the way our autonomic nervous system evaluates risk from perceptual information. Through neuroception, we evaluate whether people or situations we meet are safe or threatening. The evaluation activates neurobiologically determined social or defensive behavior. When we meet a threatening situation, even if we are not aware of it on a cognitive level, the defensive behavior model will be activated. These defensive reactions in threatening situations are to fight, flee, freeze, or submit. If we then evaluate the situation as safe, the defensive reactions are deactivated and social engagement will instead be activated.<sup>1,2</sup>

Matti's experiences in early childhood had an impact on his neuroception. He often reacted with fluctuating arousal in situations when there was no real threat in his environment. For example, in school he had difficulties in trusting adults, and his hyperarousal was also overwhelming in therapy. He was neither able to stay in contact with the therapist nor concentrate on activities, rather his behavior and playing represented his chaotic internal world.

#### *Safety first – Mobilizing the Social Engagement System Through Play and Exploration*

The social engagement system controls social gestures like looking/observing, facial expressions, or the ability to identify a human voice. Together, these factors make engagement in social situations possible by regulating the heartbeat and keeping the optimal arousal level for social interaction. A child who has grown up with secure interaction has internalized the experience of safety. This helps him to keep his arousal level inside the window of tolerance or, if needed, to return his arousal to the optimal level after defensive behavior.<sup>4</sup>

Matti's first experience of the vibroacoustic mattress was to listen to his favorite music (Finnish pop artists Antti Tuisku and Robin) through its speakers. First, he was just carefully

touching the mattress with his hand and feeling the vibrations of the music. After a couple of sessions it was also possible to sit on the mattress and feel the vibrations of the low frequency sound.

After familiarizing himself with the vibroacoustic mattress, Matti got the idea to build a fort on it. He planned different kinds of constructions and he built them with the therapist. First, it was the act of building that was important, but little by little Matti also spent more time hanging out in the fort. He liked to draw inside of it, or play board games with the therapist, while the soothing low frequencies sang their relaxing song (40Hz sinusoidal sound with 6,8 seconds pulsation from MULTIVIB mattress).

The VA method helped Matti to stay in contact by decreasing his arousal from a state of hyperarousal to within the window of tolerance. Therapeutic interaction was another side of the development; the therapist's aim in terms of interaction was to help Matti find his optimal level of arousal and stay there.

#### *Being Taken Care of: The Special Meaning of Touch*

As Matti's therapy process progressed, he became more and more fond of the vibroacoustic mattress. On the mattress, Matti's behavior seemed to be more likened to a younger child's behavior – it was as though he had regressed to have the needs of a younger child and was thirsty for attention and sensitive interaction.

The deep dimension of the vibroacoustic method can perhaps be examined through touch. Sound is both movement and vibration. We can comprehensively track low frequency sound vibrations within the body. Sound touches us both physically and psychologically. Sound is like a bridge between the body and the mind. Sound vibration massages us from the inside out<sup>3</sup>.

We sense this touch of sound through our somatosensory system, which develops before our auditory and sensory systems<sup>6</sup>. In addition to the somatosensory system, the auditory system has a significant role in vibroacoustic treatment (especially when listening to music).

The auditory system also develops very early. Recent brain research indicates that everyone senses different elements of music prior to birth; for example rhythm, melody, and harmony.<sup>7,8</sup> Perhaps this explains why experiencing sound vibration touches us very deeply, and why the sensation of low frequency sound during VAT reminds clients of very early pre-birth experiences.<sup>9</sup>

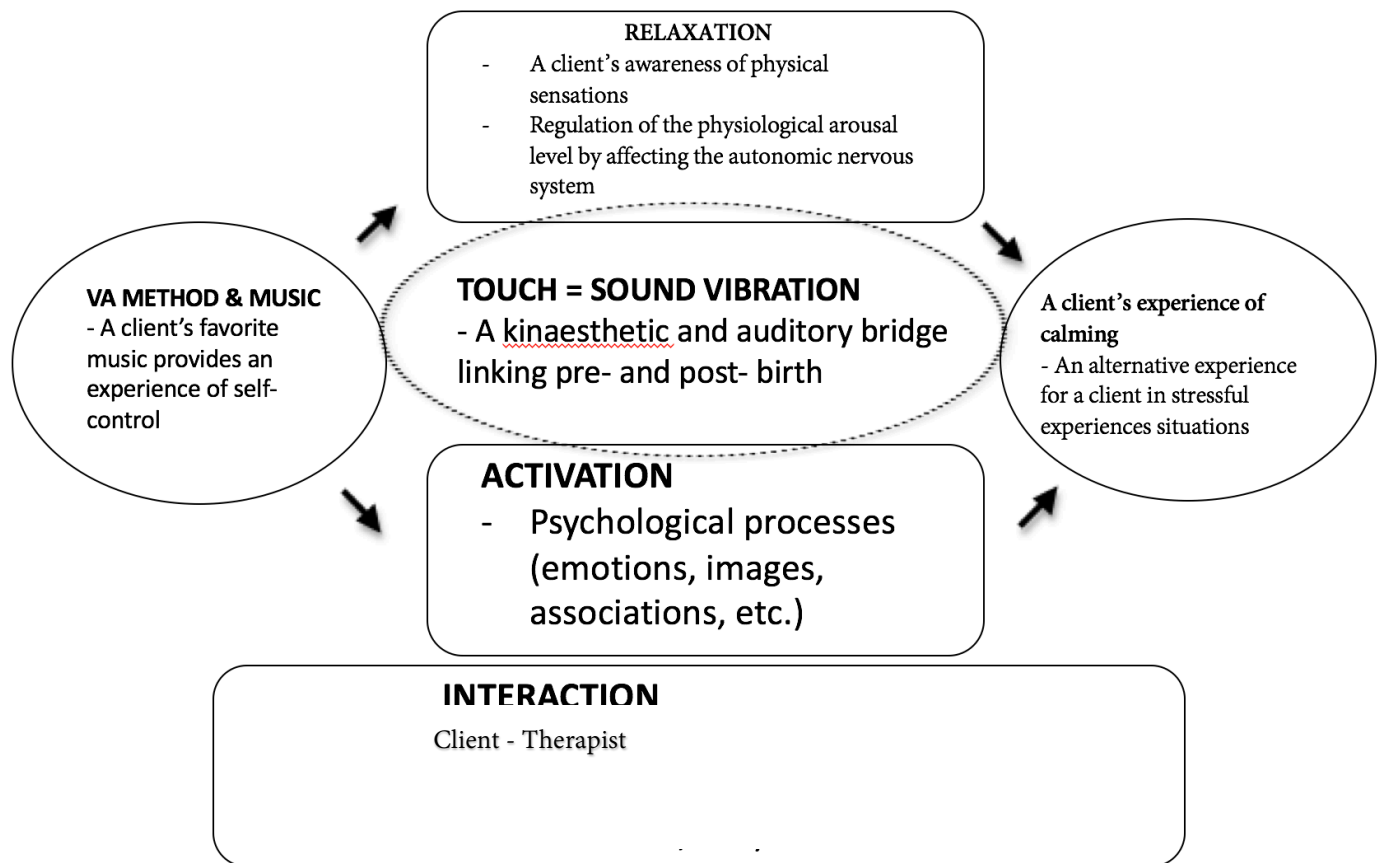
Finnish child psychiatrist Jukka Mäkelä has mooted the significance of touch in child development and has raised the prospect of using touch in children's psychiatric treatment. Touch increases oxytocin levels and vagal tone hence touch can repair developmental defects of the brain that have been caused by insecure attachment<sup>10</sup>. The special meaning of touch in traumatized children's music therapy is illustrated in Figure 1.

According to the principle of the development of brain plasticity, repeated touch and, in this case VAT, can provide a compensatory experience for a juvenile client. Importantly, the child becomes aware that it is possible to experience inner safety<sup>1</sup>.

Over time, Matti learned to relax on the vibroacoustic mattress. The atmosphere in these situations was very intimate, warm, and safe. The vibroacoustic mattress was a safe nest, where it was possible to experience care and sharing.

During the same period, other music therapy methods were used in Matti's therapy. It was interesting, that his

concentration skills had developed considerably. This was visible, for example, in his ability to learn new instruments (Fender Squier Bronco bass guitar and Roland TD-11KV V-drum set) and play improvisations with the therapist (therapist playing keyboard M-Audio Keystation 88 MkII) for longer periods of time. When Matti had begun to trust the therapist, and his ability to stay inside his window of tolerance increased, he also achieved the capacity to develop other skills.



**Figure 1.** *Touch: Special meaning with traumatized children's music therapy.*

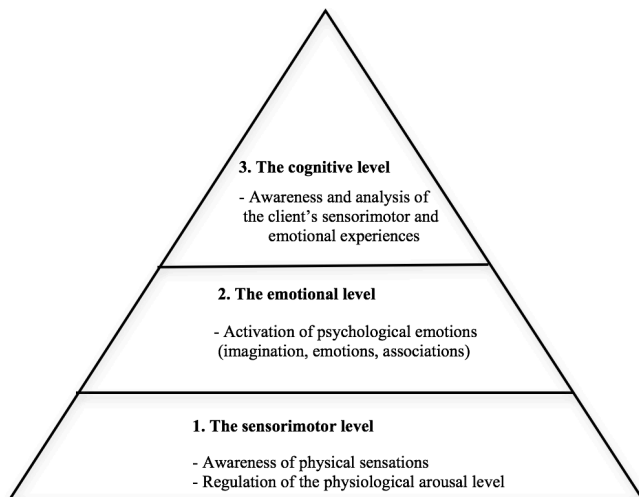
**Towards Integration**

Sensorimotor reactions and different bodily symptoms can tell us a story without words. The body knows what we do not cognitively know.<sup>3</sup> VAT can help therapists to discover their clients' nonverbal historical narratives. Typically, prior to commencing therapy, traumatized children are unable to verbally explain any physical sensations or sensorimotor and emotional experiences. VAT may increase a child's awareness of physical sensations. For example, by listening to a child's favorite music on a vibroacoustic mattress or using a low frequency sound program, a child may be able to describe sensations in his/her body.

As noted above, it was possible to regulate Matti's arousal level in the autonomic nervous system by using VAT. At the beginning of the therapy process, when the relationship between Matti and his therapist was in the early stages, Matti was able to calm on the vibroacoustic mattress, but the deeper experience of relaxation was not yet possible. As the therapy process progressed and Matti started to trust the therapist more, he was also ultimately able to relax during VAT.

VAT stimulates a client's physical sensations, images, emotions, associations, and memories.<sup>3</sup> These can be processed with different music therapy methods; for example by singing, playing, improvising, and through discussion and so forth. In Matti's music therapy process, it was eventually

possible to process his emotions, images, and memories by improvising and then discussing the experience. Hierarchical information processing related to vibroacoustic method is presented in Figure 2.



**Figure 2.** Hierarchical information processing: How the vibroacoustic method is experienced in music therapy.

## Conclusion

Developmental trauma affects a child's action systems so that the defensive action system dominates a child's perception about himself and the outer world. In Porges's words, a child's neuroception about safety has become biased.<sup>2</sup> Matti had serious problems in feeling safe in relationships, which resulted in challenges within his social environments. During his music therapy process VAT helped him to gradually learn to regulate his autonomic nervous system and become more competent in self-regulation. Of course, VAT alone is not sufficient when treating developmental traumas. The music therapist needs to be an interactive psychobiological regulator for a traumatized child's dysregulated bodily and emotional states. Based on our clinical experience, a therapist's therapeutic presence in addition to VAT can be a successful combination particularly when helping children who have early developmental trauma.

## References

1. Porges SW. The polyvagal perspective. *Biol. Psychol.* 2007; 74: 116-143.
2. Geller SM, Porges SW. Therapeutic Presence: Neurophysiological Mechanisms Mediating Feeling Safe in Therapeutic Relationships. *J Psychoter Integr.* 2014; 24(3): 178-192.
3. Punkanen M, Ala-Ruona E. Contemporary Vibroacoustic Therapy: Perspectives on Clinical Practice, Research, and Training. *Music Med.* 2012; 4(3): 128-135.
4. Ogden, P, Minton, K, Pain, C. *Trauma and the Body – A Sensorimotor Approach to Psychotherapy.* New York – London: W. W. Norton & Company; 2006.
5. Siegel DJ. *The Developing Mind - How Relationships and the Brain Interact to Shape Who We Are.* New York, London: Guilford Press; 1999.
6. Nolen-Hoeksema S, Fredrickson BL, Loftus GR, Lutz C. Atkinson & Hilgard's *Introduction to Psychology.* Hampshire: Cengage Learning EMEA; 2014.
7. Huotilainen M. Kuulojärjestelmä. In J Louhivuori, S Saarikallio, eds. *Musiikkipsykologia.* Jyväskylä: Atena; 2010: 47-56.
8. Huotilainen M, Fellman V. Sitä äitiä kuuleminen jonka kohdussa asunto. Lapsi kuulee ja oppii jo kohdussa. *Duodecim* 2009; 125: 2573-7.
9. Lehtonen K. Musiikki ja psykoanalyysi. In J Louhivuori, S Saarikallio, eds. *Musiikkipsykologia.* Jyväskylä: Atena; 201: 237-258.
10. Mäkelä J. Kosketuksen merkitys lapsen kehityksessä. *Suomen Lääkärilehti.* VSK 2005; 60(14) 1543-1549.

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