Bridging Disciplines: Integrating SE+ SOMA with Neuroscience

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This chapter provides a comprehensive overview of trauma and recovery by integrating the Soma Embodiment (SOMA) method with the latest neuroscience findings. This blend seeks to unify traditional somatic wisdom with contemporary scientific evidence, fostering a more effective and compassionate therapeutic approach. It highlights the importance of attuning to the body's signals, understanding the dialogue between mind and body, and exploring the underlying mechanisms involved in clinical processes observations.

We'll examine the nervous system's reaction to trauma, emphasizing the Polyvagal Theory and the Neurovisceral Integration Theory, as well as the role of higher structures in the brain's hierarchical organization, such as the Periaqueductal Gray (PAG), in the autonomic nervous system's defensive behaviors. The discussion includes the difficulties in quantifying subtle, embodied shifts during therapy and introduces a convergent mixed-methods approach that links quantitative measures like Heart Rate Variability (HRV) with qualitative insights. By exploring how physiological states interact with therapeutic activities, our goal is to establish a scientific framework for understanding change in body-centered therapies and to connect the terminologies of neuroscience, psychiatry, and somatic practices.

Understanding Trauma Beyond Symptoms

Trauma involves both mental and physical responses. Healing goes beyond just managing symptoms and needs to restore the integrity of the central nervous system. The Neurovisceral Integration Model highlights the importance of hierarchical communication, from brainstem survival circuits to prefrontal areas that assign meaning. This model shows how essential autonomic nervous system (ANS) regulation is for emotional and cognitive functions.

In response to traumatic experiences, our bodies activate various defense mechanisms. At the core of these responses is the Periaqueductal Gray (PAG), located in the brainstem, which

orchestrates survival responses during moments of danger. Trauma responses involve the activation of different regions of the PAG, as summarized in the following table:

Mediating Region	Response Type	Description	Biochemical Basis
Dorsolateral PAG	Hyperarousal and Hypervigilance	Fight-or-flight response; sympathetic nervous system dominance.	Endocannabinoids
Ventrolateral PAG	Depersonalization and Derealization	Tonic immobility, emotional shutdown; parasympathetic nervous system dominance.	Mu and Kappa Opioids

Source: Terpou et al., 2019, J Neuroscience Research.

Measuring the Invisible: Methodological Innovations

Understanding and evaluating the success of trauma therapy is a complex methodological challenge, mainly because the emotional systems involved in trauma are deeply rooted in subcortical brain regions like the limbic system. Wearable devices such as EEG are useful in clinical settings but cannot capture the detailed activity of these deep structures. The most effective way to visualize the Central Autonomic Network and limbic system is through functional Magnetic Resonance Imaging (fMRI). However, fMRI is inherently incompatible with the ecological validity needed for therapy research; it requires a costly, stationary laboratory setup that isolates the client, preventing the measurement of brain activity during natural therapy sessions.

Due to these limitations, we rely on Heart Rate Variability (HRV) as a primary objective indicator. HRV is a non-invasive, real-time measure offering insight into the Autonomic Nervous System (ANS). The main challenge with HRV is that, while it is highly responsive to physiological and emotional changes, it lacks specificity. A change in HRV signals a shift in state but doesn’t specify what caused it or its exact nature.

To overcome this lack of specificity, we adopted a Convergent Mixed Methods approach. This methodology addresses the limitations of using HRV in isolation by integrating its quantitative data with rich, qualitative insights from video analysis. By systematically observing and coding the client's embodied changes—such as breathing patterns, posture, and eye movements—we can contextualize the physiological data. This triangulation of objective biological metrics with observable behaviors allows us to gain a more comprehensive, valid, and nuanced understanding of the therapeutic process as it unfolds in a natural clinical setting.

Video Analysis as a Contextual Bridge in Somatic Research

While physiological indicators such as Heart Rate Variability (HRV) provide crucial information about autonomic shifts, revealing moments of sympathetic activation, parasympathetic dominance, or regulatory change, they remain inherently decontextualized when used in isolation. HRV tells us that a change has occurred in the nervous system, but not what was happening in the therapeutic field at that moment, nor how the intervention was experienced by the client. This limitation is particularly significant in body-centered and relational therapies, where timing, language, touch, and micro-interventions are integral to the therapeutic process rather than peripheral variables.

To address this gap, systematic qualitative video analysis was integrated as a complementary methodological lens. Video recordings enable observation of the embodied process as it unfolds in real time, including shifts in posture, breathing, gaze, affect, attention, and practitioner–client interaction. By aligning these observable moments with concurrent physiological data, video analysis enables the interpretation of why a particular autonomic shift occurred and how regulation was supported within the session. In this sense, video functions as a bridge between physiology and lived experience, rendering somatic interventions legible and allowing the therapeutic process to be studied with greater methodological and clinical fidelity.

Heart Rate Variability (HRV) as a Key Indicator

Emotional changes in psychotherapy are often subtle, embodied, and unconscious. Heart Rate Variability (HRV) is a non-invasive physiological marker that reflects moment-to-moment changes in the autonomic nervous system. HRV, a measure of the variation in time between heartbeats, is much more than a simple cardiac indicator; it essentially gauges the nervous system's flexibility — its ability to activate, recover, and shift smoothly between states.

A high HRV is more than just a physiological marker; it signifies a robust and flexible dialogue between the body and the brain's emotional control centers, particularly the medial prefrontal cortex and the amygdala. This strong coordination is the bedrock of emotional regulation. In the context of trauma therapy, HRV serves as a powerful lens through which we can observe the inner workings of the nervous system.

Essentially, HRV provides a snapshot of the Autonomic Nervous System's (ANS) balance, offering a direct measure of a person's capacity for emotional regulation and their resilience to stress. A higher, more variable heart rate pattern is a hallmark of resilience, indicating a nervous system that can adapt and recover from challenges with ease. Conversely, a low, rigid HRV pattern often points to a system under chronic stress, stuck in a defensive posture.
To explore further, we can examine specific components of the HRV signal. The LF/HF ratio, for instance, acts as a barometer for the delicate dance between the sympathetic ('fight-or-flight') and parasympathetic ('rest-and-digest') branches of the nervous system.

Furthermore, a metric known as RMSSD gives us a clearer picture of parasympathetic activity, revealing the strength of the body's capacity to rest, recover, and socially engage. By interpreting these signals, we can move beyond simple observation and begin to understand the nuanced physiological story of a client's healing journey.

From Data to Practice: Implications and Future Directions

Our research confirms that SOMA interacts with the nervous system on multiple levels. HRV data demonstrates the real-time integration of traumatic memories and transitions from sympathetic dominance to ventral vagal tone. Therapeutic touch has been observed to stabilize HRV, thereby enhancing feelings of safety and connection. This objective data substantiates clients' subjective reports of healing.

These findings reaffirm the significance of expert observation and clinical wisdom. The most rigorous scientific advancements are achieved through dialogue among clinicians, neuroscientists, and researchers. The nervous system oscillation identified—the rhythmic cycle of activation, settling, and integration—illustrates the alignment of physiology with therapeutic interventions such as tracking, tremoring, and touch.

The insights gained from this research may hold significant implications for professionals practicing SOMA Embodiment. Instead of providing definitive validation, this exploration supports the idea that SOMA Embodiment engages the nervous system on multiple, complex levels. It helps build a scientific framework that can explain the underlying mechanisms of change observed in therapy. By documenting tangible physiological events such as heart rate variability, involuntary trembling, or subtle changes in respiration, we can initiate the mapping of the nervous system's reorganization process in real time. Most importantly, this integration of somatic practice with objective data may act as a crucial bridge, fostering a shared language and deeper understanding between the fields of SOMA Embodiment, neuroscience, and psychiatry.

Conclusion: Trauma Lives in the Body, and Integration is the Path Forward

Healing trauma requires more than cognitive insight; it demands a reunion of mind and body, guided by both ancient somatic wisdom and modern neuroscientific understanding. Integrating SE+ SOMA Embodiment with neuroscience offers clinicians a holistic framework that respects both the quantifiable and the intangible aspects of human healing. Science and somatic wisdom are not opposing forces but complementary perspectives on the same profound truth: the body holds the key to unlocking trauma's grip.

As our understanding advances, the question is no longer whether to integrate these approaches, but how we can most skillfully and compassionately apply this integrated knowledge. This is an invitation to ongoing dialogue and collaboration among clinicians, researchers, and neuroscientists.

SOMA-Embodiment®* + SE™

Let's explore SOMA® + SE™ research further with a case focused on helping individuals recover from trauma and reestablishing their sense of self. It emphasizes understanding how our bodies and minds respond to traumatic experiences and using this knowledge to support healing. SOMA® + SE™ combines different techniques and ideas to improve our connection with ourselves and our surroundings. It promotes learning to listen to our body's signals to address past traumas and to engage more fully with the present.

By using techniques from Rolfing®, movement analysis, and knowledge from polyvagal theory, SOMA®+ SE™ helps us reconnect with our bodies and emotions in a healthier way, emphasizing the importance of feeling physically stable before we can deal with emotional trauma. It's like establishing a solid foundation for healing. Through exercises and therapies that focus on body awareness, SOMA® aims to restore balance, feelings, and movements, leading to a more positive self-image.

In SOMA® + SE™, a variety of methods are used that make it possible to change the way we see things (active perception), use social interactions to help our brain function better (neurobiological regulation), and understand how our nervous system reacts in different situations. By paying attention to the performance of our ANS (Autonomic Nervous System), observing, especially, heart rate variability (HRV), a lot can be learned about how our body responds to therapy. This helps to better understand our emotions and makes therapy more effective for dealing with trauma and personal growth. It offers a clear picture of how we're responding emotionally. It's like having a dashboard that shows us whether we're feeling calm and connected or stressed and disconnected.

During therapy sessions, progress is tracked using tools that monitor the ANS (Autonomic Nervous System) through heart rate and stress response monitoring. By analyzing this data, we can see how the body is reacting and adjust therapies accordingly. Monitoring the ANS is like having a window into how emotions rise and fall during therapy. Things like changes in heart rate variability (HRV), heart beat patterns (RMSSD), and different frequencies in heart rhythms (LF power and HF power) and their comparison with each other in the LF/HF ratio are observed. "Heart rate variability (HRV) refers to the variation in the time intervals between consecutive heartbeats. It is a measure of the fluctuations in the time intervals between successive cardiac contractions, representing the adaptability and flexibility of the autonomic nervous system" (YURDAKUL; ÖZEL, 2024, p. 3). This helps to see how our "fight or flight" and "rest and digest" systems are doing, and offers a clear picture of how we are responding emotionally. It's like having a dashboard that shows us if we are feeling calm and connected or stressed and disconnected.

This monitoring is especially important for understanding polyvagal theory, which analyzes how our nervous system responds in social situations and when we feel threatened or safe. HRV predominantly shows us good vagal tone. Similarly to HRV, RMSSD and HF values also help

predict PNS activation. LF power, on the other hand, gives us clues about SNS activation. Thus, by paying attention to the levels of HRV, RMSSD, LF and HF power, and the LF/HF ratio, we can see how the body is handling the therapy and adjust it as needed to support emotional well-being. In Figure 3, it is possible to observe the data collected to calculate HRV, which is based on the variation of heartbeats measured in a specific time interval, with each beat per second occurring at a different frequency. In addition, along with the raw data, we can observe the results obtained after the calculation.

Figure 3: Measuring HRV
Source: Yurdakul; Özel.

Case Study: A Hybrid Narrative of Therapy and Analysis

In this brief sample of the application of the SOMA® approach in a therapeutic setting, I highlight physiological responses as an indicator of treatment effectiveness. I briefly present a case study involving a participant who underwent a series of sessions aimed at addressing a trauma: a 38-year-old woman sought therapy to treat her medical trauma. Six months before the session, she suffered cardiac arrest due to an arrhythmia, requiring cardiopulmonary resuscitation (CPR). Since then, she has been experiencing memory problems and feels that she has not fully returned to life; a part of her feels trapped in that moment. Throughout the chapter, the first-person voice ("I") is used to describe Sonia's lived clinical experience and in-session interventions; references to "the researchers" and the analytic commentary denote the analyses conducted by Selin and Dilara.

Background

The client was experiencing financial difficulties due to an impending divorce. She was overworked during the period of her medical emergency. One night, feeling exhausted, she decided to rest for a while. Even so, her mother insisted that she go to the hospital. Despite feeling well, she agreed to go. She sought emergency care alone, and then her heart rate skyrocketed to 330 beats per minute, resulting in cardiac arrest and requiring resuscitation twice. She spent approximately 10 days in the intensive care unit (ICU), during which her brain suffered from oxygen deprivation, leading to a relative loss of memory. She continues to have problems in this regard.

Methodology

Since HRV is a reliable predictor of ANS states, participants wore HRV monitors before beginning each session to record heart rate changes. All sessions I conducted were video recorded, with camera angles carefully chosen to provide a complete view without disrupting the natural interaction flow. Before each session, the participant used wearable devices to monitor heart rate variations during therapy. The HRV data were analyzed using the mix convergent method by Selin and Dilara, and the results were combined with the data from the video recordings.

Therapeutic Process and Data Analysis

The SOMA® therapeutic process consists of two stages. The sessions begin with clients seated, initially focusing on stabilizing their activation level. Once a foundation of trust and mutual connection has been established, the therapy progresses to table work.

Session Beginning: Freeze and Therapeutic Touch

In the case of the client mentioned above, the session began, and she was at a high level of activation. At the beginning of the session, there was no movement in her upper body, which led me to think that the client was under the influence of the dorsal vagus. In the analysis conducted by the researchers, the low values indicated by HRV and RMSSD suggested a low tone of the parasympathetic system, while the low LF power, a marker of the PNS, showed that all the system's energy was low, indicating a complete shutdown. I approached the client by interacting with her to activate the ventral vagus through physical touch. The client was activated at the beginning of the session because she did not receive enough attention as a child, and now the whole group was waiting for her, and all the attention was focused on her.

Emotional Release and Regulation

She had some emotional release associated with the loneliness of her childhood. I received her feelings and gave the client time to regulate herself. She moved from the dorsal vagal system towards a sympathetic discharge. After allowing some discharge, I provided containment by

placing one of my hands on her spine. I provided psychoeducation to break the patterns of incorrect associations stemming from childhood. This facilitates the restructuring process.

As the client began to emerge from isolation, she started interacting socially, making jokes. With laughter came an extra discharge of excessive sympathetic energy. Data analysis demonstrated the dramatic increase in the RMSSD calculation, HRV, and LF and HF power indicated the transition from disengagement to social engagement, also reflected at the nervous system level. I placed pillows behind her back for support and gently squeezed her feet, giving her more space to feel her emotions. As we were more socially connected, she continued self-regulating.

After providing psychoeducation and maintaining social engagement, I gave her some time to incorporate the positive feelings brought about by the social interaction. I used this resource to enhance future therapeutic collaboration. After the high excitement that accompanies joking, researchers observed a decrease in sympathetic activation, which had increased significantly, correlating with the decline in LF power. Although there was a slight decrease in HRV and the RMSSD calculation indicative of parasympathetic tone, they remained at a higher level compared to the beginning. In these initial moments of the intervention, I told the client that she is a good person and deserved to receive help.

Trauma Origins and Physiological Responses

Due to being neglected by her parents because of her disabled brother, the client experienced trauma. She said she did not have the right to be angry with her disabled sister. Thus, she repressed her feelings. Suppressing her anger caused dysregulation. As I continued to gently press the client's feet, I noticed some relaxation in her lungs, as if more space was opening up in her upper body.

After calming the activation and establishing the social bond, the client began to discuss the issue she wanted to work on. Initially, there was no noticeable emotional response. The body did not show any reaction; the client was completely dissociated. She told the story as if she were talking about another person. Observing the HRV data, the researchers noted that there was no significant change in the ANS when discussing factual information with emotional isolation.

As the client continued to narrate her story and interact with me, the consistently low value of the LF/HF ratio, which accompanied all the data, confirmed the assumption that she was still under parasympathetic dominance, characterized by a high vagal tone. I continued to gently press the client's feet throughout the process.

Triggering the Cardiac Arrest Memory

When the client referred to the cardiac arrest event, there was a sudden change in the monitor's rhythm. Upon closer examination, the researchers realized that the cardiac pacemaker, which should come into action in case of a possible arrhythmia, had been activated. It is a well-known fact that traumatic memories are registered in the body and that, during trauma processing, the body presents ANS responses similar to those of the actual event. Although this is a commonly understood concept, witnessing and recording such a clear case provides valuable evidence for effective treatment. In Figure 4, it is observed that with the sudden drop in heart rate, the pacemaker comes into action, resulting in the disappearance of the HRV previously seen in the graph. Instead, the heart maintains a constant rhythm under the influence of the pacemaker's rhythm.

Figure 4: HRV of the participant
Source: Yurdakul et al..

Analysis of the Freeze State

Analyzing the ANS parameters, the researchers noted that the heart rate plummeted to the lowest level observed throughout the session. Similarly, the RMSSD, LF, and HF values were also at their lowest levels. All these physiological indicators suggested that the client had entered a state of emotional freeze. During this freeze, the participant's heart rate decreased to such an extent that it could lead to the activation of her pacemaker, a device implanted to control heart rhythm irregularities to restore normal cardiac function. These critical physiological indicators underscore the intensity of the autonomic response during the therapy session.

Analyzing the video, the researchers observed that the client appeared relatively calm while telling the story. This serves as a valuable example of how freezing can manifest. Her right side was

paralyzed, and her left hand sometimes moved. Throughout the process, I gently pressed the client's feet to provide grounding.

Emotional Reconnection and Physiological Shifts

The client continued to express her experience during her stay in the intensive care unit (ICU) after the cardiac arrest. Observing her body, we could still perceive signs of freezing. This observation was supported by the heart rate variability measurements. The client spent 10 days in the ICU, five of those days on mechanical ventilation. She expressed difficulty in making sense of this experience and integrating the simultaneous memory loss caused by oxygen deprivation in the brain. She had difficulty processing the traumatic memory, but through the support I provided to her feet, she felt more present.

I directed all my attention and presence to the client, listening to her story with an open heart and without intervening. When the client reached the point where she forgot about her son, emotions resurfaced. She let out a deep sigh after the emotions began to emerge. With tears in her eyes, she expressed the feeling of leaving her son without a mother. When she expressed this feeling, the researchers observed that the HRV, RMSSD, and HF values remained low, indicating the continuation of parasympathetic tone, while the indicator of sympathetic activation (LF power) showed a tendency to increase. She was experiencing sadness at a somatic level.

I supported the client by holding her arm during this activation. With this action, I gave her more space for the emotions. At that moment, her system was disorganized, but with the support of physical touch and psychoeducation, she became calmer. The researchers could perceive this change through her breathing, and checking the data, they saw that the HRV and RMSSD levels increased significantly.

When discussing the disagreement with her spouse and the divorce process, the client's activity occurred primarily in the dorsolateral frontal cortex. She was controlling her body and had limited access to emotions. I continued to gently press her feet. This helped her to open more space for feelings. During the discussion about the divorce and the conflicts with her husband, the client began to show signs of fear in her body language and breathing, expressing feelings of collapse and crying. In the HRV data, the researchers observed a sharp increase in LF power, which indicates sympathetic activation. She conveyed a transition from fear to sadness, as she had

developed a dependence on him, thus experiencing emotional conflicts. Despite claiming hope, fear predominated in her emotions. She exhibited deep and exhausting breathing patterns.

While I provided re-education, her movements caused changes in her breathing, indicating a shift in her emotional state. I encouraged her to maintain eye contact, reinforcing her positive attributes, which facilitated an emotional shift. The client's return to a more positive state and a fear-free physiology was marked by a more ventral vagal state, with greater eye contact and deep social engagement.

I mentioned that she was too focused on cognition and not enough on emotional awareness. After thirty minutes of education, it became clear to the client that there had been a neglect of heart-centered awareness, emphasizing the importance of enjoying life and re-education. At this moment, I was no longer pressing the client's feet. Throughout the educational process, the client appeared calm, despite occasional episodes of rapid breathing, indicative of mild anxiety. However, upon examining the data, the researchers observed a significant decrease in HRV, RMSSD, HF, and LF values, indicating that the client was in a state of freeze.

Non-verbal communication was crucial for her coping mechanisms. Discussions about this provoked anger in the client. The action of pressing her feet was an attempt to support her social engagement response, with the aim of bringing awareness to her anger, rather than suppressing it. The data clearly indicated that she was emerging from the freeze response, with both sympathetic and parasympathetic tones increasing. The client demonstrated hypertonicity, characterized by a mixture of anger and sadness, which required a delicate approach to distinguish and address these emotions.

She acknowledged her sadness and remorse, beginning to connect with her heart, placing her hand over it and channeling sympathetic energy to distinguish her anger. Her body responded to these emotional changes. When she became more aligned with her physical sensations, especially in her upper body and abdomen, her symptoms began to alleviate, leading to a state of calm. She focused on nurturing her whole body. After the sympathetic discharge, there was a significant increase in HRV, suggesting that she had transitioned to the ventral vagal system.

Having finished the first cycle of trauma processing, when the client was already more connected to her heart and more regulated, I suggested moving to the table. When working with syndromes,

it is best to take the client to the table when the symptoms are more regulated. After some preparations, the second part of the session begins.

Table Work: Deepening the Process

At the table, I asked her how I could further support her physical state, promoting a ventral vagal response. I placed my hands on the client's shoulder blades to improve ventral vagal support, providing a sense of containment and assisting in relaxation and parasympathetic activation. The client began to open up; she showed an improvement in respiratory coordination between the chest and abdomen. Supporting her neck helped to release the nerves, guiding her to deep relaxation and resulting in a more relaxed body.

The client expressed difficulty breathing, which led me to place one hand on her diaphragm and the other on her back to open the sternochondral and costochondral cartilages. As soon as more space was opened, the client began to cry out of fear. I reassured her, saying: "You are not alone in the hospital; you are here with me." I explained to her that the defibrillation was invasive and was like a near-death experience, and that at that time she could not express her emotions freely, but now she could cry. The data showed that the LF, HF, and RMSSD levels were low, indicating that she was frozen. Interestingly, the HRV was not as low as the other values. **The researchers' interpretation** was that this could be due to the therapist's assisted touch, providing additional regulatory capacity.

The client mentioned feeling pain in her heart and loneliness. She cried in terror; her emotional fragility reached its limit. Then, I hugged her and partially lifted her from the table, creating space for regulation and preventing further regressions. I continued saying: "You are not alone now. Hold on to me, hug me tightly." I continued offering the support she needed at that moment, encouraging her to hold on and supporting her physically. With the support of the hug, an increase was observed in all ANS parameters.

The client expressed feeling disconnected and lifeless, saying: "I can't come back, I don't feel alive. I'm not here… I'm scared." When observing the HRV data from this moment, the researchers observed that the client's ANS was in a state of complete shutdown, indicating freeze. Then I encouraged her to feel her heartbeat to activate the ventral vagus, which gradually helped her to become calmer. This gradual reconnection prepared the ground for me to affirm to her that

her spirit was returning to her body and that she was, indeed, present, that she wanted to return to life; she wanted this. At this moment, I asked her to breathe.

The client began to cough, described the strange taste of the tube in the ICU, and reported discomfort. Then I told her that it was enough to remove the toxic element. She was processing deeply, releasing what she had internalized. During this process, I continued to support her back with therapeutic touch. The client, who was previously in dorsal shutdown, began to show activity in the SNS, expressed by a cough. The researchers could understand this from the increasing LF data. Similarly, there was also a tendency for HRV to increase. This change was significant in her life.

I continued to hug the client; she felt my heart beating. She recognized the comforting nature of my heartbeats, saying: "Your heartbeats are so good, so peaceful." I helped the client to connect not only with my heartbeats but also to establish a meaningful relationship. When examining the data while she listened to my heartbeats, the researchers realized that the increase in HRV and HF power values indicated that the client was transitioning to the ventral vagal state. Through touch, she was becoming more aware and present.

Conclusion and Integration

When the client began to approach self-regulation in the social engagement zone at the end of the session, she made a joke. Especially at the moment of making the joke, the researchers realized that the HRV reached its highest level among all recordings. Similarly, there was a notable increase in RMSSD, LF, and HF levels. With laughter, the client not only interacted socially but also released the sympathetic energy accumulated in the nervous system.

As the client was in a more regulated state, we moved to the chairs for the session's closure. While we discussed the integration process, I noticed that the client's legs still showed small tremors. These tremors indicated that the healing and integration of the trauma were still in progress at a deep physiological level. Furthermore, the ANS parameters went through several stages throughout the session in response to fluctuations in emotions.

Overall Analysis and Interpretation

When the researchers analyzed the HRV data, they observed a significant increase compared to the beginning of the session. In the graphs, Figure 5, we can see the client's HRV flow in the therapy session; and also the RMSSD data. Another parameter was used to assess parasympathetic activation throughout the session.

The significant life changes and traumatic experiences faced by the participant, including cardiac arrest and subsequent memory problems, represent profound autonomic disturbances. Such traumatic events can cause the ANS to shift into a defensive state, activating the dorsal vagal complex and leading to states of immobilization or shutdown. This physiological state aligns with the participant's experiences of memory loss and the profound impact of her cardiac arrest. The researchers observed a large decrease in RMSSD and HRV levels compared to baseline values during the recollection of the cardiac arrest and the ICU stay. Furthermore, LF levels decreased significantly due to the states of emotional shutdown. LF power and HF power are good indicators of the sympathetic and parasympathetic systems respectively. Moreover, the LF/HF ratio indicates which branch of the ANS is more dominant. An increase in this ratio supports the predominance of the sympathetic branch, while a decrease suggests that the parasympathetic system is more predominant.

Throughout the session, it is possible to observe oscillations in the nervous system due to the processing of traumatic material. With each cycle, as a new emotion is processed, we witness a large oscillation in the ANS, ranging from the trauma vortex to the resilience vortex through pendulation, as can be seen in Figure 6.

Figure 6: LF and HF power flow of the participant
Source: Yurdakul; Özel.

The therapeutic intervention, particularly my assisted touch, can be understood as a means of activating the ventral vagal system. This system is responsible for social engagement behaviors and is linked to feelings of safety and tranquility. The regulation of the participant's heart rate during therapy suggests a shift from a sympathetic or dorsal vagal dominance to a state of ventral vagal activation, promoting states of relaxation and social engagement. The researchers also perceived that, through therapist-assisted tactile and somatic interventions, the RMSSD, HRV,

and Cardiac Index (CI) ratios increased significantly. This physiological change could facilitate the participant's engagement with therapy, allowing for deeper processing of traumatic memories.

Furthermore, the observed alteration in heart rhythm can be interpreted through the lens of neuroception (Porges), to describe how neural circuits distinguish safe and dangerous situations. The participant's physiological responses during this session likely reflect a neuroceptive process, in which her nervous system detects threat signals related to her traumatic memories, triggering a protective physiological response.

SOMA-Embodiment®* + SE™

Soma Embodiment ® it is a complementary interventions in SE™ in which we use Breath, Touch & Movement during the session in order to increase the client’s Self-Regulation.