During the past decade, there has been a dramatic shift in psychotherapy as the impact of the body and nervous system on mental health has been acknowledged. Many forms of psychotherapy, explicitly or implicitly, now integrate an understanding of the nervous system and bodily state into their treatment models. Through both clinical trials and case reports, the body of research on psychotherapy is increasingly documenting impressive evidence of the central role that the client’s body, and especially their nervous system, play in the treatment of all psychological disorders, regardless of severity (Lanius, Vermetten, & Pain, 2010; Lanius, Paulsen, & Corrigan, 2014; Cozolino, 2017; Payne, Koch, & Tantia, 2019). Complementing the empirical literature are several clinically relevant theoretical models (Nijenhuis, Spinphoven, Van der Hart, & Vanderlinden, 1996; Martens, Schweitzer, & Herholz, 2023; Rosendahl, Sattel, & Lahmann, 2021) linking mental processes to bodily states, including strong links that are frequently witnessed as comorbidities between mental and physical diagnoses.

Current theoretical mind–body and brain–body conceptualizations have resulted in the psychotherapy community rethinking mental health disorders and treatments. An increasing number of psychotherapists are recognizing the connection between mental processes and bodily function, and no longer treat them as separate entities. In fact, Allan Schore proposed (Schore, 2009) that the inclusion of embodied experience in clinical practice, a process shared across several therapeutic approaches, represented a new paradigm.
The processes involved in the regulation or disruption of physiological states, which underlie thoughts and behaviors, are dynamically adjusting and adapting during each moment of life. Whether we focus our therapies on thoughts or behaviors, our physiological substrate is constantly adjusting to optimize our survival. This is true not only from the perspective of the individual, but also with respect to relationships. Thus, the co-regulation that occurs between individuals reflects an embodied relationship – a crucial dimension for several psychological theories and for most forms of psychotherapy. We can especially see this in cases of trauma. From a neuroscientific perspective, trauma functionally permeates into the survivor’s nervous system, retuning it from a dynamic state that supports sociality and homeostatic functions (i.e., health, growth, and restoration) to a chronic state that supports defense (e.g., fight, flight, shutdown). Thus, we witness how trauma becomes physiologically embedded, altering the optimal trajectory of a flexible and resilient nervous system, and profoundly disrupting the development of the experience of self and others.

Reframing trauma from an event to a biological behavioral response transforms our understanding of the consequences of “traumatic” events. From this perspective, the traumatic event is viewed as being capable of overwhelming the survivor’s neuroregulatory capacity to support underlying physiological homeostasis and observable resilient and flexible behavior and thinking. The consequence is a general breakdown in the client’s physiological and emotional regulatory capacity within themselves and also in relation to the world around them. Treatment becomes a gradual process of repairing these ruptures, involving a co-construction of a new form of functioning within a therapeutic framework that privileges and elevates a sense of safety as an essential condition for transformation and healing.

Complex trauma therapy can be challenging because attachment patterns, based on trust, develop within a neurobiological substrate occurring outside conscious awareness and expressed non-verbally via bodily reactions (Bessel van der Kolk et al., 2001). Mindfulness, somatic exercises, and touch-based interventions are powerful tools for revealing and studying unconscious patterns and facilitating healing. They provide an embodied experience of change within the context of a safe relationship without triggering an explanatory narrative, which would often recruit defensive memories and associations.

A brief description of the book’s contents

In The Science of Embodiment: Trauma, Body, and Relationship, through the documentation of somatic-oriented practices and theoretical orientations, we attempt to fundamentally transcend the separation between body therapy and psychotherapy. Collectively, the volume supports a transformative view that somatic and psychological problems cannot be treated as disparate domains. Rather, the premise of treating somatic and psychological problems via different therapeutic strategies is challenged by a perspective integrating biological behavioral and neurobiological sciences and clinical observations. Thus, a central message of the book is that no therapy will be effective unless the individual’s physiology welcomes and supports it. By accepting such a perspective, the therapist’s knowledge, awareness of the physiological state of both self and client, and their capacity to self- and co-regulate, become essential tools for therapy. As therapists, we are engaged in a deep process whose effectiveness is related to our ability to engage.

We will explore several somatic interventions for working with relationship issues through a combination of participant experience and case presentation. Each section of the book is organized to open up new directions in treatment. Identifying competencies is an essential part of defining the somatic psychotherapy profession, and increases its
credibility among other psychotherapy modalities. By establishing clear parameters for therapists, it also contributes to the development of a more robust framework for future research in the field. We aim to highlight a few qualitative and quantitative measures of interoceptive awareness (IA), and build on the conversation for when reactions can be adaptive and lead to further embodiment — especially in realm of self-agency or autonomy, which are arguably most important in the clinical healing process. SPECS, the Somatic Post–Encounter Clinical Summary (Freedman, Silow et al., 2022), a newly designed instrument, will be highlighted for its innovative role in helping clinicians and researchers measure clients’ physiological states relative to task and treatment efficacy. A wide variety of different clinical approaches within somatic therapy will be presented, including chapters on touch work, the relationship between fascia and emotion, deep brain reorienting, post–traumatic growth, the treatment of trauma and addiction, the impact of yoga in treating sexual trauma, and the benefits of creating a sense of safety during birth.

Several chapters provide guidance for healthcare practitioners seeking to incorporate interoceptive practices, which we believe will lead to better choices in caring for both themselves and others. The book emphasizes a common theme: when healthcare providers are informed by the wisdom of the body and practice self-care, they tend to pass this value on to their clients, which leads to more effective care of others. By cultivating interoceptive practices, healthcare providers can enhance their resilience in high-stress professional contexts, benefiting both themselves and their clients.

Each chapter will be organized by following these six guidelines:

1. Tools for somatic assessment, including the ability to monitor both the client’s and therapist’s own physiological states. There are several tools that can be used to assess somatic features and to infer physiological state. Below are a few examples, although the chapter’s authors will not be constrained by this list. These tools can be combined to provide a more comprehensive assessment of the client’s somatic state, and guide interventions that address both emotional and physiological needs.
   - Observations of the client’s body language, facial expressions, and nonverbal cues. These observable features can provide valuable information about the client’s emotional and physiological state. For example, a client who is slouching, fidgeting, or avoiding eye contact might be experiencing anxiety or discomfort.
   - Monitoring the client’s heart rate, blood pressure, and respiration rate can provide important information about their physiological state. These measurements can be taken using inexpensive instruments such as a blood pressure cuff, smartphone app, or pulse oximeter.
   - Through biofeedback techniques, a client can learn to become more aware of and more efficient in controlling physiological variables, such as muscle tension, skin temperature, and heart rate variability.
   - Therapeutic techniques such as Somatic Experiencing® can provide the client with greater awareness of bodily sensations and physiological reactions, which enhances their ability to regulate physiological responses. Polyvagal Theory, as a model of the nervous system’s reactions to challenges, enables the therapist to provide the client with an intuitive and understandable narrative of bodily reactions, along a continuum from safety to life threat. By understanding the theory, therapists can become more proficient in reading their client’s physiological state and tailoring interventions to their specific needs.

2. Develop a structured diagnostic framework to evaluate the client’s physiological state. Each author has the freedom to creatively propose a structured diagnostic framework that can be used to evaluate a client’s physiological state. This can be implemented...
through well-defined protocols, including specific challenges and tasks. By using a structured diagnostic framework, a client’s physiological state can be evaluated and a therapeutic strategy can be developed to address their vulnerabilities and challenges.

- **Interoception.** Interoception refers to the ability to perceive and interpret internal bodily sensations, such as hunger, thirst, pain, and emotional arousal. To evaluate a client’s interceptive abilities, the therapist could:
  - ask the client to describe bodily sensations they are currently experiencing, and the emotions associated with them.
  - use biofeedback to measure the client’s physiological responses to different stimuli and help them learn to regulate their bodily sensations.
  - observe the client’s nonverbal cues, such as facial expressions, body language, and breathing patterns, so as to infer their emotional state.

- **Proprioception.** Proprioception refers to the ability to perceive the position, movement, and orientation of one’s own body in space. To evaluate a client’s proprioceptive abilities, the therapist could:
  - ask the client to close their eyes and move their limbs in different directions, and describe the position of their limbs as they move voluntarily.
  - use physical tests, such as balancing on one leg or walking heel to toe.
  - observe the client’s movements and posture, and make note of any irregularities or asymmetries.

- **Kinesthesia.** Kinesthesia refers to the ability to sense the force, effort, and tension required for different movements. To evaluate a client’s kinesthetic abilities, the therapist could:
  - ask the client to perform simple movements, such as lifting a light object or pushing against resistance, and then ask them to describe the force and effort required.
  - use instruments such as dynamometers or grip strength meters to measure the client’s strength and force.
  - observe the client’s movements and make note of any irregularities or difficulties.

- **Balance.** Balance refers to the ability to maintain stability and control while standing or moving. To evaluate a client’s balance abilities, the therapist could:
  - ask the client to perform different standing or walking tasks, such as standing on one leg or walking on a balance beam, and observe their control.
  - use instruments such as force plates or computerized balance assessments to measure the client’s balance control and sway.
  - make note of any balance limitations or difficulties, and observe how the client compensates for them.

3. Describe how neural regulation, expressed in self- and co-regulation, is embedded in the proposed somatic approach. In this context, neural regulation refers to the process by which the nervous system modulates and regulates the body’s physiological responses. In somatic applications, neural regulation can be used to help individuals self-regulate their bodily sensations, physiological reactivity, and emotions, or to co-regulate with others in social and therapeutic contexts.

- **Self-regulation.** Self-regulation refers to the ability to monitor and modulate one’s own physiological responses to different stimuli. This can be achieved through techniques such as mindfulness, deep breathing, and relaxation exercises, which activate the parasympathetic nervous system and help reduce stress and arousal. By practicing self-regulation techniques, individuals can become more aware of their bodily sensations and emotions, and learn to regulate them more effectively.

- **Co-regulation.** Co-regulation refers to the process of regulating one’s physiological responses in response to another person’s cues and signals. This can occur...
in social interactions, where individuals may unconsciously synchronize their breathing, heart rate, and other physiological responses with those of others around them. In therapeutic contexts, co-regulation can be used to help clients regulate their emotions and bodily sensations in the presence of a supportive therapist or group.

The principles of self- and co-regulation are often applied in somatic therapies, such as Somatic Experiencing® and Sensorimotor Psychotherapy. These therapies aim to help clients regulate their bodily sensations and emotions through techniques such as breath work, movement, and touch. By practicing self- and co-regulation, clients can learn to regulate their physiological responses more effectively, leading to improved emotional regulation, stress reduction, and overall well-being.

4. Demonstrate the hierarchy of autonomic nervous system (ANS) states, and how to work with them therapeutically. The following description of the hierarchy of ANS states illustrates how to work with them within a therapeutic context. By understanding these states, therapists can tailor their interventions to help clients regulate their physiological responses, and achieve states of optimal arousal and well-being. Therapies such as Somatic Experiencing® and Sensorimotor Psychotherapy, and others informed by Polyvagal Theory, are based on the principles of ANS regulation, and can be effective in helping individuals heal from trauma, reduce stress and anxiety, and improve their overall functioning.

- **Hypoarousal.** This state is characterized by low levels of physiological arousal, such as low heart rate, blood pressure, and breathing rate. Individuals in a hypoaroused state might feel sluggish, numb, or disconnected from their bodies and surroundings. Therapeutic work with individuals in this state can involve gentle physical touch, movement, or sensory stimulation to help them become more aware of their bodily sensations, and increase physiological arousal.

- **Resting state.** This state is characterized by a baseline level of physiological arousal in which the body is relaxed and at ease. Individuals in this state may feel calm, centered, and grounded. Therapeutic work with individuals in the resting state can involve mindfulness, meditation, or relaxation exercises to help them remain calm and reduce stress and anxiety.

- **Sympathetic activation.** This state is characterized by high levels of physiological arousal, such as increased heart rate, blood pressure, and breathing. Individuals in this state may feel anxious, fearful, or agitated. Therapeutic work with individuals in a sympathetic state may involve techniques such as deep breathing, progressive muscle relaxation, or cognitive restructuring to help them regulate their physiological responses and reduce anxiety and arousal.

- **Hyperarousal.** This state is characterized as a consequence of experiencing an extreme level of physiological arousal, such as panic, terror, or rage. Individuals in this state may feel overwhelmed, out of control, or disconnected from reality. Hyperarousal has metabolic causality, and the body cannot sustain it for extended periods without eventually shifting to hypoarousal as a result of feedback circuits that regulate the autonomic nervous system. In the therapeutic context, working with individuals in this state can involve techniques such as grounding, sensory modulation, or trauma processing to help them regulate their physiological responses and stabilize their emotional states.

5. Describe how traumatic experiences influence the ability to build strong co-regulatory relationships within the therapeutic context. Therapists should be aware of the potential impact of trauma on co-regulation and adapt their approaches accordingly. This may involve creating a safe and supportive environment, using trauma-informed...
approaches to build trust and establish a sense of safety, and working collaboratively with clients to help them regulate their physiological responses and develop more secure attachment patterns. Therapeutic approaches such as Somatic Experiencing®, attachment-focused therapy, and trauma-focused cognitive behavioral therapy can be particularly effective in helping individuals who have experienced trauma to build stronger co-regulatory relationships within the therapeutic context.

- Traumatic experiences can have a significant impact on an individual’s ability to build strong co-regulatory relationships within the therapeutic context. Trauma can be defined as an event or series of events that overwhelm an individual’s ability to cope, resulting in a sense of helplessness, terror, or horror. Trauma can have lasting effects on an individual’s nervous system, leading to difficulties with emotional regulation, attachment, and social interaction.

- One of the key ways that trauma can impact co-regulation within the therapeutic context is through disruptions to attachment patterns, which may have enduring influences on subsequent relationships. Attachment refers to the emotional bond that forms between an infant and caregiver, and it plays a critical role in the development of social and emotional skills. Traumatic experiences can disrupt attachment patterns, leading to difficulties with trust, intimacy, and emotional connection. Individuals who have experienced trauma may struggle to form secure attachments with others, and may have difficulty building strong co-regulatory relationships within the therapeutic context.

- Additionally, trauma can impact an individual’s ability to regulate their own physiological responses, which can in turn make it more difficult to engage in co-regulation with others. Individuals who have experienced trauma may be hyperaroused or hypoaroused, making it challenging to engage in social interactions and connect with others on an emotional level. They may also experience dissociation, which can result in a sense of detachment from themselves and their surroundings, which further hinders their ability to form meaningful connections with others.

6. Describe the concept of relational well-being and how it relates to context, choice, and connection.

- Relational well-being refers to the quality of an individual’s relationships and their overall sense of connectedness and satisfaction with their social environment. It encompasses a range of factors, including emotional intimacy, social support, sense of belonging, and trust.

- Context is an important aspect of relational well-being, as it shapes the nature and quality of social connections. Context refers to the social and cultural environment in which an individual lives, including factors such as family, community, and broader societal norms and values. Different contexts can provide different opportunities for connection and choice, and can impact an individual’s sense of well-being in different ways.

- Choice is also a key aspect of relational well-being, as it reflects an individual’s ability to make meaningful decisions about their social connections and interactions. Having agency and autonomy in choosing relationships can lead to a greater sense of fulfillment and satisfaction, while a lack of choice or control can lead to feelings of disconnection and disengagement.

- Connection is at the heart of relational well-being, as it reflects the quality and depth of an individual’s relationships with others. Strong connections are characterized by mutual trust, respect, and empathy, while weak connections can lead to feelings of isolation and loneliness.
Overall, the concept of relational well-being highlights the importance of social connection and support in promoting overall well-being. It underscores the need for individuals to have agency and choice in their relationships, and to be mindful of the context in which those relationships develop. By fostering strong connections and prioritizing relational well-being, individuals can lead happier and more fulfilling lives.

A science of correlation or an embodied science

Beneath the exploration of embodied practices embedded in existing psychotherapeutic practices, there is a need to examine scientific rationales for addressing embodiment in both quantitative and qualitative research paradigms to help provide a platform for future research programs. This volume will focus on reframing psychotherapy to expand beyond dialogue, memory retrieval, and behavior to include an objective appreciation of both the client’s and therapist’s bodily states through reliable metrics, which would include monitoring autonomic function (e.g., heart rate variability) and structured questionnaires assessing bodily feelings (e.g., Body Perception Questionnaire, 1993; Neuroception of Psychological Safety Scale, 2022).

Introducing the body into treatment requires changing aspects of the clinical treatment model, including diagnostic and prognostic criteria. This would lead to conceptualizing healing processes within a relational dimension, which might include touch, as frequently employed in forms of somatic-oriented therapies (SOT). A central message is that therapy can be efficiently delivered only if the therapist is trained to detect the cues of safety and threat that are broadcast by clients. Therapists gain this skill by learning to infer autonomic state from facial expressions, vocal intonation, muscle tension, and gestures, because these overt markers are linked to the neural regulation of our viscera, including our neural calming system that involves vagal regulation of the heart. Moreover, therapists need to be trained to discern their own bodily reactions (i.e., interoception) to their clients, and to appreciate that clients are responding to their physiological states.

This book does not advocate any particular therapeutic approach or training orientation. It does, however, recognize influences from other disciplines, including occupational and physical therapy as well as dance therapy and sensory integration, as important contributions. It is structured to examine and explore the embodied scientific foundation of several therapeutic methods. In this context, the embodied phenomenology of diagnostics are critically contrasted with symptom-driven diagnostic systems (i.e., DSM–V, ICD–10).

The novelty of this book is centered on the relational perspective of treatment. Prior to this publication, most strategies to either study or treat trauma have focused on the client’s range of function and identifiable features of malfunction. This volume, by starting from the realm of body interaction and mutual co-regulation, emphasizes the importance of relational complexity in transforming the client’s physiological and emotional regulation. In treating trauma, and especially complex trauma, the environmental and relational context is crucial, and influences both the client’s and therapist’s biobehavioral state and the dynamic relational atmosphere created in the therapeutic setting.

This book is designed for a professional audience interested in learning about the field of clinical somatic-oriented therapies (SOT) as an applied science of embodiment research and treatment. It is timely and consistent with contemporary neuroscience research (e.g., Porges, 2021, 2022), which has informed trauma treatment by illuminating the importance of bodily experience for self-regulation and interaction with others in a social context. Human behavior, especially in traumatic situations, is understood as a complex and fully embodied biobehavioral process expressed in thoughts, feelings, and behaviors that
are driven through neurophysiological sensors detecting features in both our body and external environment. This integrated sensory–motor system dynamically adjusts aspects of physiology, perception, behavior, and motivation to enhance our ability to cope with a full range of dynamic challenges, ranging from cues of safety to those of threat.

**Weaving long-established somatic approaches into treatment models that have formerly ignored the body**

Currently, the consideration of physiology is not prominent in many forms of psychotherapy. Because some clients do not benefit from highly cognitive verbal methods like talk therapies, the integration of more physiologically–oriented approaches would expand the toolbox of therapists working with dysregulated nervous systems.

During the past few decades, there has been a trend in trauma treatment where several “talk”–focused psychotherapies have attempted to incorporate techniques and methods that were developed in somatic–oriented therapies. As therapists cope with the challenges of treating trauma, there has been increased interest in integrating somatic–oriented perspectives and techniques within traditionally verbal approaches. Clinical evidence documents that the clinical course of trauma patients is enhanced by incorporating body–oriented techniques (Gene–Cos, N., Fisher, J., Ogden, P., and Cantrel, A., 2016). By including a body perspective, many more traumatized patients can be effectively treated. Therapy is conceptualized as a process of mutual co-construction where the therapist influences the client’s physiology, nervous system, and self–regulatory capacity. In complex trauma, the subject loses both the ability to regulate biobehavioral state and the capacity to process regulatory stimuli from the other. For this reason, relational techniques that influence and normalize bodily functions are proliferating, including those listed below:

- Treating disorders of embodied self-awareness
- Using sensory processing as a layer of experience in human development
- Improving the capacity for embodied emotional attunement
- Integrating autonomic regulation into therapy
- Strengthening self-regulation through dyadic co-regulation

The success of these techniques depend upon the theoretical basis on which somatic–oriented therapies are founded. The body–mind unity, which is dependent upon bi-directional neural communication between brain and body, is the basic assumption upon which various forms of SOT have evolved. Thus, the current status of contemporary neuroscience provides a theoretical basis for treatments and investigations of SOT strategies within an integrated mind–body–brain theoretical model. Embodied methods could be useful in understanding difficult-to-treat conditions, such as autism, chronic pain, and medically unexplained symptoms – or in the diagnosis and therapy of neurodiversity.

An important point is that introducing the body into treatment means changing other aspects of the clinical treatment model, including diagnostic and prognostic criteria. This would lead to conceptualizing the healing processes within a relational dimension, including the role of touch, which is frequently employed in forms of SOT.

This means that one cannot casually attach bodily techniques to exclusively verbal therapies without radically changing their theoretical and practical structure. In other words, introduction of the body transforms psychotherapy into somatic psychotherapy.
Herbert Grassmann, PhD, is Chair of the Science and Research Committee of the European Association for Body Psychotherapy. He is Professor of Psychosocial Studies and Bodymind Healing, Fellow, Parkmore Institute, South Africa, Johannesburg, and teaches at Maltepe University in Istanbul. Scientific Advisory Board “Polyvagal Gesellschaft e.V.” He is the founder of the SKT Institute and Director of the European Institute for Somatic Trauma Therapy. He is currently training osteopaths and physical therapists in a method he developed called Polyvagal Embodiment Training (PET). His extensive research has focused on both the development and evaluation of interpersonal neurobiological models, and on bridging the gap between attachment and dissociation theories within a somatically-focused model of trauma therapy. As a trauma specialist, he has conducted trainings in South America (Brazil, Colombia, Mexico) on the treatment of trauma, with a particular focus on the phenomena of domestic violence and chronic pain.

Maurizio Stupiggia, PhD, is Professor at the Department of Clinical Sciences – Faculty of Medicine and Surgery, University of Milano, and has worked for many years as a body psychotherapist with individuals and groups. For several years, he worked at the Italian Ministry of Health, where he assisted the integration of immigrants. For the past ten years, he has supervised therapists and educators responsible for immigrant women from Africa who are victims of various traumatic abuse in war. With Jerome Liss, he is co-founder of the International School of Biosystemics. He has worked for 20 years in Japan with survivors of major earthquakes. With Rubens Kignel, he co-founded the Bio–Integral Institute of Body Psychotherapy in Tokyo. He has worked as a trainer in European countries, as well as Japan and Latin America.

Stephen W. Porges, PhD, is a Distinguished University Scientist at Indiana University, where he is the founding director of the Traumatic Stress Research Consortium. He is professor of psychiatry at the University of North Carolina, and professor emeritus at the University of Illinois at Chicago and the University of Maryland. Dr. Porges served as president of both the Society for Psychophysiological Research and the Federation of Associations in Behavioral & Brain Sciences, and has received a Research Scientist Development Award from the National Institute of Mental Health and the Pioneer Award from the United States Association of Body Psychotherapy. He has published more than 400 peer-reviewed scientific papers that have been cited in more than 50,000 peer-reviewed publications. In 1994 Dr. Porges proposed the Polyvagal Theory, which links the evolution of the mammalian autonomic nervous system to social behavior, and emphasizes the importance of physiological state in the expression of behavioral problems and psychiatric disorders. He is the creator of a music-based intervention, the Safe and Sound Protocol™, currently used by approximately 3,000 therapists to reduce hearing sensitivities, improve language processing, and increase spontaneous social engagement. He is the author of The Polyvagal Theory: Neurophysiological Foundations of Emotions, Attachment, Communication, and Self-Regulation, The Pocket Guide to the Polyvagal Theory: The Transformative Power of Feeling Safe, and Polyvagal Safety, as well as co-author with Seth Porges of Our Polyvagal World: How Safety and Trauma Change Us, and co-editor with Deb Dana of Clinical Applications of the Polyvagal Theory: The Emergence of Polyvagal-Informed Therapies. Dr. Porges is a founder of the Polyvagal Institute.
REFERENCES


