

## Preface

The idea for this book has emerged over the last two decades, during which we have had the privilege not only to observe the resilience and perseverance of traumatized individuals but also to bear witness to the stories of their suffering and their healing journeys. In serving as honored witnesses, we have come to see how the brain adapts to trauma.

Through the brave trauma survivors who have participated in our research, we have gained a wealth of knowledge into the effect trauma has on the brain, mind, and body. As one individual once told us after we looked at her brain scan together, “I now know that it is my *brain*—it is not me.” This statement inspired us and shaped our purpose for writing this book. Our aim is not only to help translate what we have learned about the brain to clinicians, showing how the brain in the aftermath of trauma drives the perception of the world and how we react to it, but also to provide clinicians with insights to use with their clients aimed toward the restoration of the self in the aftermath of trauma.

This book focuses on how trauma alters how sensory information is processed in the brain, thereby affecting individuals’ perception of themselves in the world. There are eight sensory systems processed in the brain: vision, hearing, taste, smell, touch, vestibular, proprioception, and interoception. We describe how traumatic experiences can be viewed as insults to the body’s eight sensory systems and how this directly shapes how individuals perceive both the internal world of their body and their external surroundings.

The book is divided into nine chapters, each focusing on a unique aspect of sensory experience in the aftermath of trauma. We recommend that you read the chapters in order, since each provides knowledge with a “Bridging to Practice”

feature that offers brain-guided healing tools that can be applied to clinical practice. We have also provided cases in each chapter, drawing on our own experiences and those of contributors.

**Chapter 1** describes the neuroanatomy of sensory experience and its relevance to trauma. It also provides some foundational knowledge about neuroplasticity and how it can facilitate healing from trauma. The “Bridging to Practice” feature provides tools for a sensory inventory of a client’s experience following trauma.

**Chapter 2** provides an overview of how sensations are processed, identifying key regions in the brain critical to processing different types of sensations. We also introduce how some of these structures work together to form networks that guide our attention when encountering these sensations. The “Bridging to Practice” feature offers guidance as to how individuals can become more attuned to safe sensations within their environment.

**Chapter 3** highlights how sensory experience is processed differently when one feels safe or unsafe. Critically, we discuss how feeling unsafe largely limits sensory experience to the lower preconscious level of the brain, causing an individual to react without thinking. The “Bridging to Practice” feature provides exercises that help individuals identify safe sensations that maximize the engagement of the cortex, therefore allowing them to experience a fuller range of human potential and providing the foundation for cognitive interventions.

**Chapter 4** describes how sensory experience can inform the nervous system’s line of defense. When these innate lines of defense are activated, the lower brain becomes the “decision maker” and orients to sensations from the threat in order to mount defensive responses that maximize chances of survival for the traumatized individual. The “Bridging to Practice” feature provides clinical insights into how to manage different types of defensive responses and how to avoid pitfalls that can frequently be encountered in a clinical setting.

**Chapter 5** shows how the sensory experience of balance is critical in shaping how safe an individual feels in the world. A sense of safety provides a springboard to freely experience the sensory environment, fostering curiosity, agency, and play. The experience of balance maps onto the brain’s vestibular system, which includes a dense network of connections involved with processing both the external world and the internal world of the body. The impact of trauma on the balance system and its brain networks is described. The “Bridging to Practice” feature provides exercises aimed at reclaiming one’s center of gravity after trauma.

**Chapter 6** introduces the sensory system of interoception and discusses how visceral sensations are experienced in the brain, mind, and body after trauma. The brain pathway for interoceptive sensations converges at the level of the insula, where individuals become aware of these interoceptive sensations that contribute to the feeling of being alive. This contrasts sharply with frequent descriptions of feeling emotionally numb and dead inside from traumatized individuals. The “Bridging to Practice” feature provides clinical insights that can support an individual through the process of identifying shifting visceral sensations and understanding how this

inner emotional turmoil is connected to their feelings of unsafety. Reinhabiting the body in this way fosters the feeling of being alive with one's self and others.

**Chapter 7** illustrates how the world is perceived through the eight senses and how they are all integrated to provide a unified perspective of the external environment. The translation of sensory information to key brain networks involved in the perception of the external world can be profoundly affected by trauma. Clinical insights in the "Bridging to Practice" feature help to link sensory experience with the window of tolerance discussed in Chapter 4, as a means to help facilitate embodiment and shift perspective of the world toward a felt sense of safety.

**Chapter 8** focuses on how an altered sensory perception of the internal body and the external environment can lead to a fragmented sense of self after trauma. After trauma, the sense of self may sometimes only be perceived as somewhat intact and alive when there is extreme sensory input involving hyperarousal, threat, and terror. Here, we discuss how brain networks dealing with trauma-related sensory experiences involving arousal and raw negative affect can become coupled with the brain network underlying the sense of self, creating a trauma-related identity. The "Bridging to Practice" feature provides clinical insights aimed at helping individuals feel whole and alive in the present.

Although the brain has adapted to trauma, **Chapter 9** describes how its innate malleability can lead to healing. This chapter explores how the integration of top-down and bottom-up therapeutic approaches can be tailored to each individual to restore the self and enable the individual to foster meaningful social bonds with others and build a sense of community. The "Bridging to Practice" feature provides clinical insights that support self-reflection on the part of the therapist, which in turn empowers traumatized individuals to harness their natural capacity to heal.

We hope that this book aids in making the invisible wounds of trauma visible, thereby reducing the shame and stigma that are so frequently experienced by trauma survivors. Our goal is to teach clinicians about the imprints of sensory insults on the brain and provide clinical insights aimed at restoring the self in the aftermath of trauma. Overall, we hope that this book furthers the study and application of personalized, neuroscientifically guided interventions that harness the neuroplasticity of the traumatized brain and support healing.