FOREWORD BY JEFFREY SOMERS
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HEART RATE VARIABILITY

USING BIOMETRICS TO IMPROVE OUTCOMES IN TRAUMA-INFORMED ORGANIZATIONS

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HEART RATE VARIABILITY

Using Biometrics to Improve Outcomes in Trauma-Informed Organizations

Matthew S. Bennett

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Connecting Paradigms: A Trauma-Informed & Neurobiological Approach to Motivational Interviewing Implementation

Talking about Trauma & Change

Trauma-Sensitive Early Education: Helping Pre-School & Elementary Students Thrive!
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To Sarah. Thank you for believing in and supporting my dreams!
Foreword

Technology: the practical application of knowledge, especially in a particular area
(Merriam-Webster, 2020)

It was on a beautiful and sunny day in Denver, Colorado, in July 2019, that I first learned about heart rate variability or HRV. Matt had invited me to lunch to ask my opinion on a concept flowing around in his brain. As a fifteen-year tech-industry veteran who has helped numerous small software companies grow, my interest was piqued by his description of HRV. I had no idea the journey on which Matt and I were about to embark.

Over the course of three hours that day at “lunch”, Matt conveyed the undeniable science behind HRV; his frustration about the current application of HRV; his belief that everyone should care about HRV, not just athletes; and his vision to bring HRV into the helping professions.

Almost exactly eighteen years before this lunch, I first had the good fortune to become acquainted with Matt Bennett. We were both young, idealistic twenty-somethings who were long on ideas but short on experience. In our first few encounters, which were purely social in nature, I was impressed by several things about Matt. His passion and energy struck me first, as they are apparent from the very first conversation you will have with the man. His energy is infectious and genuine, and frankly, a trait that to this day still makes me a bit envious.

Beyond his passion for work and life, his intelligence and constant drive to learn struck me next. As the years of our friendship grew, I followed Matt’s careers as an executive in the social services and educational fields. Instead of being impressed by his accomplishments at such a young age, he was more focused on how he could provide better care for his clients and improve the work experience for his staff. He put the
individual work in required to do just that and got his MBA during his downtime (i.e., late at night and on the weekend).

Fast forward twenty years, and Matt’s passion for learning and making the world a better place got the better of him, and his constant drive for more took him in a new direction into my domain for technology. The large organizations I worked with throughout my career in technology often struggle to quantify the results of their business practices, lack the proper tools to evaluate their processes, and are not focused on employee health as a contributor to their success. Technology in the private sector is applied to help them solve problems and become a central cog in their operational machine.

In helping organizations, technology has played a supportive role in improving communications and record keeping. However, most of the actual work of helping occurs between people without much of a role for technology. While technology supports the administrative work, many helping professions struggle to implement it in a way to improve the interpersonal aspects of helping another person.

The opportunity to apply technology to revolutionize an industry is rare, and one that is both exciting and daunting at the same time. When Matt initially approached me with the concept of applying HRV to helping organizations, I was taken aback by the potential. While I was new to the helping professions, I quickly saw the ability to apply HRV within these organizations as a game-changer and potentially lifesaving. I think this will be a big motivator for you as you read on.

The more I learned about HRV, the more excited I got about the prospect of helping organizations leveraging HRV-based technology to provide better care, achieve improved outcomes, prevent self-harm and relapse, and support their employees more efficiently along the way. It became apparent that we needed to develop the technology to bring HRV to the helping arena.

After Matt and I worked tirelessly together to build Optimal HRV, it became very apparent that:

1) As when Matt introduced it to me, most people do not know what HRV is
2) Proper application of HRV in an organizational setting needs a bit more understanding and education than just applying it to an individual

Matt has a unique background to be able to provide context to both points, and thus this book was born. His understanding of trauma and how it impacts the brain and nervous system helps bridge the gap between a person’s individual journey of healing and how it relates to HRV. His experience as a nonprofit executive applies a very real-life lens to how HRV can assist an organization in outcomes for clients and better support to staff.

After being introduced to HRV, and through using the Optimal HRV app, my life has undoubtedly changed for the better. I am more aware of how impactful the “little” things are to my overall health. I make more of an effort to take better care of myself, as I see
the quantifiable results of those efforts every day. My family uses our HRV readings as a basis of conversation and to encourage each other to treat ourselves better.

I am converted, as they say, and look forward to utilizing the power of HRV in my daily life forever. As a reader of this book, I hope you not only share my personal experience with HRV, but you get inspired to bring this biofeedback technology to your organization and those you serve.

It is rare in life to be part of a revolutionary way of doing anything. It is our firm belief that applying HRV into your daily routine with your staff and clients is just that.

Jeffrey Somers
July 2020
Introduction

How do I know if my work is helping people?

This question has haunted me throughout my career as a therapist, administrator, and consultant. In mental-health and social services, I always felt like I was flying blind. I never fully trusted that assessments or questionnaires gave me a complete picture of the mental health or progress of my clients. At specific points in my career, especially in public health, lab results quantified the success of particular aspects of our programs, treatments, and interventions. While these lab numbers gave me data on patients' medical health, I craved similar data to demonstrate our service's effects on their mental and social health.

My motivation for a quantitative measure of mental health increased when my mentor Dr. Jerry Yager introduced me to the Adverse Childhood Experience Study in 2003. I quickly developed a passion for the evolving trauma-informed care movement. Trauma-informed care challenges us to integrate the research on trauma's impact on mental, medical, social, and cognitive functioning into how we view those we are helping, while guiding our interventions and program design.

The path Jerry started me down changed my world view. It provided me with an entirely new way to conceptualize behaviors, mental health, cognitive struggles, and a variety of other issues preventing people from living the lives I sought to help them achieve. While my understanding of those I was trying to help improved dramatically, my ability to measure the trauma healing process or post-traumatic growth remained elusive.

The aspect of my trauma learning curve that stands out all these years later is when I started to understand that trauma and stress changed how brains and nervous systems developed and functioned. Neuroscience demonstrated that people struggled not as a result of deliberate bad choices or because there was something inherently wrong with
them. Instead, people’s struggles were a result of how their brains and nervous systems developed differently because of the trauma inflicted on them as children.

I was asking the wrong question. Instead of asking, “What is wrong with this person?”, I needed to ask, “What happened to this person?”

My passion and curiosity led me to read hundreds of books on stress, trauma, wellness, neurobiology, epigenetics, and resiliency. I worked hard to build expertise in these complex sciences so I could share this paradigm-shifting and life-changing information with others through books, training, blogging, and podcasts. I have gotten to the point in my professional development where I can, and often do, speak for days on how research conducted in labs with expensive equipment demonstrates trauma’s impact on the functioning of our DNA, brains, and nervous systems.

I supplement this science with the growing body of research on how these biological changes manifest in mental illness, risky behaviors, medical conditions, and relationship struggles. My goal for these presentations is to use this science to provide my audience with a trauma-informed lens. This trauma-informed lens offers a new way to view behaviors, evolve programming to meet the needs of people with trauma, and advocate for societal changes to help ensure access to treatment and resources needed for better lives.

We are lucky to live in a time where our growing understanding of neurobiology is sparking a golden age in psychology. Technological advances provide a depth of scientific knowledge of the human condition that previous generations could not even dream possible. Unlike our predecessors, technology allows us to go under the skin and study the brain and nervous system in great detail.

Our technological advancements allow us to study the biological wounds of trauma. Tragically, these wounds result in inevitable struggles with mental health and engagement in behaviors that risk health. However, the same technology helps demonstrate the plasticity of the brain and its ability to heal with the right treatment and support.

Unfortunately, the cost and impracticality of the equipment used to quantify these biological changes has kept it out of the hands of those helping others. While it was powerful to learn the science behind trauma’s impact on participants in clinical and research studies, there was little I could do to help professionals use technology to understand the child in the classroom, the patient in the exam room, or the client seeking services. We were left hoping that what produced favorable outcomes for people in research studies could produce similar results for those we were attempting to help.

While I am old enough to remember when we helped people because it was a generous or morally correct thing to do, today everyone wants proof. One of the developments in this golden age is our decision to try to measure the impact of our services and interventions. The best-practice movement forced us to quantify mental health, behavioral change, and social functioning. We tried to borrow concepts from the quality movement in manufacturing. Many of us struggled with the difficult task of applying quality
approaches that effectively reduced errors in manufacturing cars or electronics to something as difficult to quantify as mental health, healing trauma, and social functioning.

Specific interventions achieved certain desirable outcomes, which were measured in behavioral changes or positive self-reported improvement. We started to call these “evidence-based best practices.” You were lucky if you worked in an organization that could afford to train their staff in these treatment modalities. One necessary aspect of these approaches was to implement the interventions with fidelity. Fidelity too often forces us into a “one-size-fits-all” treatment situation. The theory went: If you follow these guidelines precisely as prescribed, you will achieve similar results to those in the research studies.

Besides the cost barriers to getting staff trained in best practices, I always struggled to apply universal approaches to clients with dramatic differences in their trauma histories and cultural backgrounds, and with unique life experiences. A best-practice structure provided a handy road map, but the starting place for the individual varied tremendously, depending on their past and current struggles. Besides, we were still in the dark about how a specific intervention impacted the biology and brain functioning of the individual sitting across from us who was asking for help.

As someone who did a great deal of quality improvement work, I dreamed that one day I could find a tool to measure the effects of our work on the brains and nervous systems of those with trauma. Without these tools, I often felt like a physician who was trying to heal a physical injury without ever examining the injured body part. The golden age of psychology left those of us on the front line in the dark, with no ability to utilize technology specific to one person’s condition and healing journey.

Then one day, Curt Mower, my partner on many episodes of the Trauma-Informed Lens Podcast, brought up the idea of doing a series of shows on something called heart rate variability or HRV. As the person who organized most of the topics for the podcast, I was happy to hand over the reins for a few weeks. At the time, I had very little knowledge about HRV, outside of a few mentions in books on trauma.

My approach to the podcast was to pick a topic and organize a series of questions for Curt and Jerry, my mentor mentioned above, to discuss from our different perspectives. Curt, being a more detail-oriented person, made us read journal articles for shows he organized. The HRV podcasts hit at a hectic time for my training and book-publishing schedule. I admit that for the first few episodes, I just did a quick skim over the long articles.

As we progressed in the series, I started to see the potential in this science, which measured the small variation between heartbeats. When I get interested in something, I ask an annoying amount of questions. I started to wonder if HRV could fulfill my desire to quantify healing and post-traumatic growth. I peppered Curt and Jerry with tons of questions about the practicality of HRV in the fields of psychology, public health, and
education. My growing interest led us to do an episode in January 2019, appropriately titled "Matt Has Some Questions About This HRV Thing!"

One of the things I love and hate about podcasts is that your epiphanies and ignorance become forever captured in time. As I explored the possibilities of using HRV as a clinical tool with Jerry and Curt, I also started to see its potential as a tool to quantify self-care and organization health. I reached a conclusion that I never expected when Curt started us down the HRV road. I realized that everyone receiving or providing services needs to know their HRV!

I become obsessed with reading everything I could about HRV and figuring out how to bring it to the helping professions. I learned that while people have known about HRV for centuries, its importance started to emerge in a handful of studies in the 1960s. Researchers began developing sophisticated algorithms to measure HRV from readouts of electrocardiograms, or EKGs. Each algorithm provided a unique way to capture the messages the heart is communicating about health and wellness. In the decades since those original publications, interest and research in HRV increased dramatically.

As explored throughout this book, HRV is an incredibly powerful biometric when assessing one’s mental, medical, social, and cognitive health and wellness. So why, if HRV is such a meaningful measure, is it not utilized by every school, healthcare provider, and therapist? Even more so, why have so few people in these fields even heard of HRV?

Historically, the simple answer was technological limitations. There are dozens of research-based algorithms that effectively measure different aspects of HRV. Unfortunately, until recently, taking someone’s HRV required them to use an expensive EKG with a computer designed to run the complex algorithms that turn the heartbeats on the EKG into an HRV score. Due to the complexity and cost of the machinery, HRV existed primarily in research laboratory settings, limiting its usefulness as a clinical tool (Gentleman, Hornick, & Parmigiani, 2017).

In the past few years, smartphone technology, often paired with an inexpensive Bluetooth HRV reader, drastically reduced the cost of taking accurate HRV readings. In addition to putting the power of HRV into the hands of the masses, this technology gave people the ability to take measurements whenever and wherever they wanted. In just a matter of a few years, HRV went from an expensive and challenging-to-access measure to a practical and inexpensive tool for individuals and professionals.

Next, I started exploring existing HRV smartphone apps. I was very impressed with some of the available applications. However, most of the existing apps focused on helping elite athletes maximize performance and recovery. I could not find any that met the confidentiality standards or functionality that would allow HRV to become a practical tool for those in the fields in which I worked.

In the summer of 2019, I was about ready to give up. I figured that in the next few years, someone else would create an affordable HRV solution designed for the helping
professions. However, I am not a patient person. I struggle to let something go when I know its potential to improve our ability to help those suffering from the pain of trauma.

Before giving up and waiting for someone else to fix my dilemma, I decided to have lunch with a good friend, Jeff Somers. Jeff is one of the few people I know in the technology world. As a friend of nearly twenty years, I trusted he could guide me on whether or not I should drop the idea or help me see a path forward. I must give Jeff a ton of credit. Before our meeting, he had never heard about HRV. After listening to my passionate vision of how it could change the world, he agreed to explore the idea of developing an HRV solution for those in the helping professions.

The very next day, I met with a longtime friend, Maria Lopez. Maria and I worked together for many years in the HIV treatment field. She had started her own company and was working with Bytewave Digital, a Los Angeles technology company, to develop a smartphone app. Maria connected me with the great folks at Bytewave, and we started to plot how to turn my crazy dream into a reality. About seven months later, Jeff and I launched the Optimal HRV app.

Bringing this innovation to the helping professions is a highlight of my career. Next, I wanted to address another problem with HRV. HRV has a long history. Tens of thousands of articles exist in journals that almost no one reads. The few books that exist focus on the complexity of the science and algorithms of HRV and only discuss practical applications as an afterthought, especially when it comes to mental health. I wrote this book to fill that void in the literature.

My goal is to avoid getting lost in algorithms and complicated math, and to present HRV science in a practical and easy-to-understand manner. If you are interested in the different algorithms, a quick internet search or exploring the references at the end of the book will provide you with hours of reading. While I do not discourage you from exploring the math of HRV, it is beyond the scope of this book.

Instead, I strive to show how this simple biometric tells us so much about our mental, medical, social, and cognitive health, and how to utilize it as a clinical tool and quality measure. HRV helps us gather information on the health of the nervous system and brain, giving us the ability to customize our interventions and demonstrate outcomes like never before. By the end of this book, I hope you see the power of an HRV-informed approach to guide services, treatment, and care to those we serve.

Besides its possibility as a transformational clinical tool, HRV will revolutionize how we approach the self-care of the professionals delivering services. Our mental health and ability to bring our best self to work is a crucial driver of outcomes. As we integrate HRV as a self-care tool, it also provides an objective and scientific measure of the health of teams and organizations.

HRV gives leaders and managers a tool to help assess the mental and cognitive health of those they supervise. We know those in the helping professions burn out at alarming
rates. HRV provides both the individual professional and leadership with a measure of the mental, medical, social, and cognitive health and wellness of staff.

Later chapters will put forth the idea of an HRV-informed organization. This new vision for helping organizations uses biometric data to ensure that those they serve receive high-quality services while maintaining the health and wellness of the staff delivering those services. An HRV-informed organization uses data to create a laser focus on the practices and approaches that improve the mental, medical, social, and cognitive health of both staff and those in services.

Welcome to the future, and thanks for deciding to take this journey with me!
Section 1: What Is Heart Rate Variability?
Chapter 1: Listening to the Rhythms of the Heart

Your vision will become clear only when you can look into your own heart. Carl Jung

Before we enter the exciting intellectual landscape of heart rate variability, let’s take a moment to appreciate humanity’s intuitive understanding of the connection between wisdom, compassion, and love with the heart. While neuroscience works to explain emotions and intelligence by studying complex chemical changes in the brain, our poets and musicians write and sing about the affairs of the heart and its influence on the human condition. For an organ that seemingly just pumps blood throughout our body, the heart continues to play a crucial part in how we view ourselves as human beings.

Research is proving that our ancestors’ focus on the heart as the seat for human connection, emotion, and wisdom was not misplaced. It turns out that there is much more to our heartbeat than just a reassurance that our bodies are receiving the blood they need to stay alive. As we learn to listen to the messages of the heart, we find fascinating information on the health and resiliency of minds and bodies.
Why Is Variation Healthy?

To define HRV, let’s begin with the more straightforward and better-known measure of heart rate. Heart rate measures the average number of heartbeats per minute. A lower resting heart rate, which is a measurement of your heart rate when you are at rest and not exercising, is typically associated with physical health and a state of calm and relaxation.

The mathematical definition of HRV is the measurement of the differences in time between successive heartbeats over a set period. Many people believe that the heart beats consistently, like a musician’s metronome helping to keep a steady beat. However, hundreds of years ago, people discovered small variations in the rhythms of heartbeats, giving us the term heart rate variability.

Below is a sample EKG reading. The Q wave, R Wave, and S Wave, or QRS complex, show the variation in milliseconds between depolarization or contraction of the large ventricular muscles of the heart. This depolarization creates positive and negative electrical charges in the heart. Typically, the Q wave indicates a negative charge, the R wave is the positive charge, and the S wave is another negative charge.

One way to measure heart rate is to track the number of QRS complexes over 60 seconds. Heart rate variability measures the differences in time between R wave peaks or the R–R interval. Measured in milliseconds, tracking the differences between R–R intervals over a period gives you a measure of heart rate variability. As shown below by the numbers in the circles, there are small variations between R–R intervals.

While a low resting heart rate is usually a measure of positive health, a higher degree of variability between R–R intervals over time demonstrates a higher level of mental, medical, social, and cognitive health and wellness. Simple math indicates that fewer heartbeats per minute provide a greater opportunity for the variation to occur. In most situations, a lower resting heart rate will promote a higher HRV (Billman, 2011; Kamath, Watanabe, & Upton, 2012).
Initially, it might seem counterintuitive that variation or inconsistencies in human physiology correlate with health and wellness. In an age of machines and technology, we connect quality and performance with consistency and predictability. When a car, computer, or airplane operates in unpredictable ways, it results in anything from frustration to loss of life. In contrast, biology and psychology need the flexibility to adapt to changes in the environment and within the body. Heart rate variation is an indicator of that flexibility.

No one exists in a vacuum. Our environment changes throughout the day; we need to adjust to stress, relationship dynamics, intellectual challenges, and physical activities to survive and thrive. Similarly, our biological systems adapt to digest food, fight viruses, and sleep. Physical, psychological, relational, and intellectual success depend on our ability to respond to changing demands and tasks throughout the day.

**Stress, Homeostasis, and HRV**

The greater our capacity for flexibility, the better we maintain homeostasis. Homeostasis is the body’s ability to adjust, matching our internal states to the demands of our environment. Mostly an unconscious activity, our ability to maintain homeostasis provides us with the physical energy, emotional regulation, and cognitive ability to meet environmental challenges. As a metric of our physical and mental flexibility, HRV measures our ability to maintain homeostasis as external or internal demands change.

Stress results from disruptions of homeostasis. Stress requires a physical, emotional, or cognitive response. This response creates a new internal state to match the demands of the environment and reestablishes homeostasis.

We often view stress as an inherently negative thing. Much of the stress we experience throughout a typical day is actually favorable, something termed eustress. While eustress also challenges our homeostasis, we perceive eustress as a motivator and believe our response will lead to positive life results. Eustress gets us out of bed in the morning, leads us to read a book about HRV, and calls for us to be the best parents for our children. Eustress manifests as motivation to achieve something with positive results for us, our families, our community, or those we serve.

Negative stress, or distress, occurs when we cannot see the potential positive outcomes in a situation or feel that we do not possess the mental, financial, social, time, or other resources necessary to meet the challenge. The perception of the problem or event will determine whether we experience it as eustress or distress. If we do not find a way to manage distress, it will knock us out of homeostasis, leading to the negative emotional and physical consequences of stress (Moore & Elliott, 2020; Siebert, 2005).

Several variables profoundly influence our perception of distress. First, distress increases when the situation is unpredictable, and we feel we have little power to influence the potential negative outcome. Second, the negative consequences of distress increase if it
persists for a long duration of time where we do not possess the ability to eliminate the source of the distress. Third, if the outcome is important to us, we experience a higher level of distress. Things we care little about do not cause us much stress (Rock, 2009).

As distress increases, heart rate usually increases and HRV decreases, demonstrating a declining ability to maintain homeostasis. Allostatic load refers to increasing amounts of distress and the resulting declines in emotional regulation, physical energy, and cognitive functioning. When the cumulative allostatic load becomes greater than our ability to cope, we experience allostatic overload. Under extreme distress, allostatic overload becomes intense enough to traumatize someone.

HRV also measures the body’s ability to recover after a period of stress. Whether it is the stress put on the body from a hard workout, an argument with a loved one, or a tough day at work, HRV will show whether the stress continues to affect the body negatively or if we are bouncing back. The ability to handle the allostatic load, recover from hardship, or turn stress into motivation for success is a beautiful definition of resiliency. HRV provides a scientifically validated measure of our resiliency in the face of life challenges.

Remember, the mathematical definition of HRV is the measurement of the differences between successive heartbeats over a set period. The tens of thousands of articles and books on HRV allow us to translate this science into a working definition. Throughout this book, our definition of HRV is simply that HRV measures the person’s ability to handle or recover from stress. While this might sound very basic, there is a surprising amount of research on how to use this biometric as a measure of mental, medical, social, and cognitive health and wellness. There is also a great deal of research on practices that improve HRV and overall health and wellness (Moore & Elliott, 2020).

The Cause of Variation

When you experience distress, your body immediately jumps into action to maintain or reestablish homeostasis. The nervous system evolved to unconsciously react to stress, providing the energy necessary for an effective response. The nervous system contains bundles of nerves and specialized cells called neurons that transmit information throughout the body. The nervous system starts in the brain and moves down the spinal cord, eventually branching out to every part of the body.

Most of the biological changes needed to maintain homeostasis occur unconsciously or automatically. The autonomic nervous system controls processes such as blood pressure, body temperature, heart rate, digestion, and heart rate variability; its goal is to maintain homeostasis within the body. Encompassing over 80% of our body’s processes, the autonomic nervous system can use nearly the entire body to maintain homeostasis.

The unconscious nature of the autonomic nervous system keeps our lungs breathing, our heart beating, and our body temperature regulated without any conscious effort. While the automatic and unconscious nature of this system keeps us alive, it can also react to
distress before we can thoughtfully consider the consequences of the resulting behaviors. Especially when danger is present or when we are in allostatic overload, the autonomic nervous system sacrifices contemplation for immediate action.

One way the autonomic nervous system maintains homeostasis is through the cardiovascular system, in which the heart plays a central role. If the environment demands an active response, the autonomic nervous system increases heart rate, providing the body with the energy it needs to respond. Once the stress subsides, the autonomic nervous system slows the heart rate back to normal levels.

Building on our working definition above, we could write it as: HRV measures the person’s autonomic nervous system’s ability to handle or recover from stress. Variation in heart rate is a manifestation of the interaction of two parts of the autonomic nervous system, the sympathetic nervous system and parasympathetic nervous system. These parts work together to promote survival and manage stress.
Primarily located in the mid-spine region, the sympathetic nervous system mobilizes us for action by providing energy through increasing breathing and heart rate. During highly stressful events or trauma, the sympathetic nervous system takes over, allowing the person to escape the danger quickly, known as the flight response, or attack the source of the stress, known as the fight response. These intense reactions promote short-term survival by shifting energy typically used for mental processes, digestion, and other
activities that are not essential for immediate survival to the arms and legs, maximizing power for flight or fight (Ogden, Minton, & Pain, 2006; Seigel, 2011).

The parasympathetic nervous system conserves energy and decreases heart rate. In this book, we will focus on the 10th cranial nerve or vagus nerve, which is central to the parasympathetic nervous system. “Vagus” comes from the Greek for wandering or vagabond. The name is appropriate, as the vagus nerve winds its way from the neck to the face, through the upper chest and heart, and down to the gut. Central to the parasympathetic nervous system, it helps regulate heart rate, blood pressure, body temperature, digestion, immunity, respiration, and reproduction (Rosenberg, Porges, & Shield, 2017).

Cranial nerves start in the brain stem, which is located at the very bottom of the brain. One of these cranial nerves is the vagus nerve. As it emerges from the brain stem, the vagus nerve splits into two branches. The ventral vagus is located in the upper part of the body, specifically near the heart, lungs, throat, middle ear, and face. The ventral vagus is active when we feel safe and in homeostasis. It promotes emotional regulation, calm, and the ability to engage with other people socially.

Under extreme stress or trauma, especially when the option of flight or fight is not available, the dorsal branch of the vagus nerve, or the dorsal vagus, takes over. Located primarily in the gut, the dorsal vagus starts to put the body in a near-comatose state, referred to as the freeze or shutdown response. During this response, heart rate, breathing, and mental processing all slow dramatically, thus protecting the individual from experiencing the full scope of the psychological or physical pain associated with the trauma (Beauchaine, Gatzke-Kopp, & Mead, 2007; Breit, Kupferberg, Rogler, & Hasler, 2018; Porges, 2001; Porges, 2009).

The fight, flight, and freeze responses are extreme autonomic nervous system reactions to distress. The sympathetic nervous system and the vagus nerve are also active when we are in homeostasis. The sympathetic/vagus dance creates the variation in heart rate measured by HRV.

As you inhale, the sympathetic system becomes active, slightly increasing heart rate. On the exhale, the ventral vagus activates, putting a halt to the sympathetic activation and slowing heart rate. This ability for the ventral vagus to slow sympathetic activation is known as the vagal brake.

Sympathetic activation is a normal reaction to short-term distress. Unfortunately, long-term chronic distress increases baseline sympathetic activation and weakens the vagal brake. Over time, an overreliance on the sympathetic response leads to anxiety-related disorders such as attention-deficit/hyperactivity disorder, post-traumatic stress disorder, phobias, and generalized anxiety.

The troubles of maintaining homeostasis and chronic stress might also lead to increased dorsal vagal activation. As a result, the vagal brake prevents adequate sympathetic
activation, slowing the heart rate and decreasing the ability to take needed action. Long term, this can manifest as depression and relationship problems (Dana & Proges, 2018; Goldberger & Stein, 2017; Rosenberg et al., 2017).

A healthy autonomic nervous system relies upon a rhythmic dance between the sympathetic nervous system and the ventral vagus. When trauma or disease disrupts this harmony, the consequences are dire. As the autonomic nervous system struggles to maintain homeostasis, it begins to over-rely on either the sympathetic nervous system or the dorsal vagus. Over time, this imbalance increases the risk for mental, physical, social, and cognitive issues that can significantly impact a person’s health and quality of life.

**The Brain, HRV, and Autonomic Nervous System**

The brain physically and developmentally sits on top of the nervous system. While algorithms translate EKG information into a simple HRV score, this score reflects the cognitive capacity and emotional regulation of a complex brain. It is essential to gain a basic understanding of how the brain and nervous system process information and distress, and also maintain homeostasis, to gain a greater understanding of the information contained within an HRV score.

The human brain evolved to keep us alive and safe from danger. While some of us are lucky enough to experience little threat to our life or safety in a typical week, our ancient ancestors evolved in a much more dangerous time. Through millions of years of human evolution, we got very good at neuroception, which refers to the mostly unconscious process of determining whether the environment is safe or dangerous.

Neuroception occurs as the autonomic nervous system constantly scans the environment. When our neuroception senses safety, the vagal brake is applied, increasing HRV and ventral vagal activation. Neuroception, when it is part of the unconscious autonomic nervous system, occurs primarily in the brain stem.

The brain receives tremendous amounts of environmental information through our senses. Around 80% of nerve fibers connecting the brain to the rest of the body are afferent. Afferent nerves send information from the body to the brain, while efferent nerves send information from the brain to the rest of the body (Moore & Elliott, 2020).

The connection between the brain and the rest of the body occurs in the brain stem. The brain stem is often viewed as primitive and instinctual, and gets animalistic labels like “reptilian brain.” However, like most other areas of the brain, the more science learns about the brain stem, the more exciting and meaningful it becomes to our overall health and functioning.
The brain stem plays a central role in neuroception. As part of the autonomic nervous system and the origin point for the vagus nerve, the brain stem processes afferent information to maintain homeostasis. Much of the afferent sensory information passes through the brain stem to one of the central parts of the brain called the thalamus. The thalamus facilitates an interactive process among the cognitive, emotional, and sensorimotor centers of the brain to decide which of two distinct systems, termed the “high road” and the “low road,” will handle the stimulus.

If the neuroception determines that the stimulus is not a threat and the environment is safe, the thalamus directs the information to the prefrontal cortex. The prefrontal cortex is part of the larger cortex, which is the wrinkled outer layer of the brain. It has a considerable number of essential functions and features. We will use the term “high road” to describe the stimulus processed by the cortex and prefrontal cortex, since it physically
sits higher in the brain and manages more complex or higher functions (Goleman, 2006; Siegel, 2016; Wright, 2011).

The cortex provides meaning to stimuli by processing it through the lens of past experiences and related memories. If you have learned anything in the past about the brain, your cortex is doing this right now. The information you are reading is being sent through your cortex and interpreted through the lens of your existing knowledge on the subject (Siegel, 2007).

Toward the front of the head lies the prefrontal cortex, which is primarily responsible for making humans great thinkers and planners. The prefrontal cortex is central to executive functioning, meaning it plays a significant role in managing reasoning, flexible problem-solving, planning, memory, and aspects of emotional regulation.

As a later stop on the high road, the amygdala, in collaboration with the hippocampus and brain stem, provides the emotional context for the stimulus. Emotions and feelings for things and people create a more profound experience of the world around us. High-road emotions play essential roles in motivation and mental health (Bennett, 2017).

A quick note about high-road functioning: The above description demonstrates the process in slow motion. In the time it took you to read the previous paragraphs, your high road has consistently been at work processing each word, as well as anything else going on in your environment. In this brief time, billions of high-road journeys occurred. Also, the high road takes up a tremendous amount of energy. While the brain only accounts for about 2% of overall body weight, it uses 25% of the oxygen and energy derived from food to maintain executive functioning (Rock, 2009).

Allostatic load can build gradually when the high road starts to experience distress in the environment. As allostatic load threatens homeostasis, the prefrontal cortex can recognize the distress and implement coping skills. These coping skills decrease distress, reestablish homeostasis, and maintain executive functioning. If increasing distress is not consciously managed or overwhelms available coping skills, the amygdala starts to activate the hypothalamus, pituitary gland, and adrenal glands, also known as the HPA axis.

The HPA axis releases the stress hormone cortisol. If distress continues to build, the stress hormone norepinephrine, also known as adrenaline, releases. Cortisol and norepinephrine shorten the breath, increase blood pressure, and decrease HRV. In this state, the person is ready for action, as energy shifts from executive functioning to the arms and legs. The drop in HRV demonstrates a decreasing capacity for cognitive functioning and social engagement (Dana & Porges, 2018).

Let’s connect the above information on the high road in the brain with what we learned about the sympathetic nervous system and vagus nerve. The journey from the brain into the body begins at the brain stem. When neuroception senses safety, both the prefrontal cortex and ventral vagus become highly active. The brain is applying executive
functioning to the environmental situation, while the ventral vagus supports social engagement through activation of facial muscles crucial to effectively communicating with others. The ventral vagus is also applying the vagal brake to the sympathetic system, keeping the fight/flight response and anxiety at bay. The strong vagal brake on the high road manifests in higher HRV.

The high-road label also works for autonomic nervous system functions, as the ventral vagus sits above the sympathetic nervous system in the mid-spine, and the dorsal vagus sits lower, in the gut. As the allostatic load builds, the vagal-brake weakness and activation move from the prefrontal cortex and ventral vagus to the mid-spine, as the sympathetic activation prepares the person for a flight-then-fight response. If the sympathetic response does not return a neuroception of safety, the activation moves down to the gut for the shutdown or freeze response.

A simple analogy for the nervous system is a ladder. When neuroception perceives safety, we are at the top of the ladder, corresponding with the prefrontal cortex and ventral vagal activation. As allostatic load builds, activation moves down the ladder, first to the flight rung, then to the fight rung, and finally, to the freeze rung. As danger subsides, we move back up the ladder (Dana & Porges, 2018).

Distress is processed on the high road when it is not labeled as an immediate danger through neuroception. While the high road can still activate flight, fight, and freeze responses, it is a slower process. The high road provides opportunities for the prefrontal cortex to bring the growing distress into consciousness and apply coping skills to maintain executive and ventral vagal activation.

When neuroception detects extreme and immediate danger, the high road shuts down instantaneously, and a much shorter road activates to increase the chance for survival. While the amygdala sits toward the end of the high road, it plays a leading role on the low road. Instead of a gradual release of stress hormones, the amygdala immediately drops the person out of executive and ventral vagal activation. It moves down the ladder to the sympathetic nervous system. The sympathetic nervous system floods the body with cortisol and norepinephrine, activating the flight and, if needed, fight response (Goleman, 2006; Ogden et al., 2006; Siegel, 2011).

In most situations, sympathetic activation will continue until the threat has passed, and can lead to unusual levels of strength and stamina. Sympathetic reactions lack executive functioning, as systems such as the prefrontal cortex cease to receive energy, thus maximizing the energy sent to the muscles and senses (Siegel, 2011).

If the flight-or-fight responses fail, the last option is to shut down. The dorsal vagus slows breathing and heart rate, and HRV decreases. During an intense freeze response, the person can dissociate or lose connection to reality. This response limits the amount of physical or psychological pain felt during traumatic events, but makes recalling or making sense of the experience afterward tricky or impossible.
The third survival response, shutting down, might become the default response of people who experience repeated physical or sexual abuse. In these situations, they have little physical, social, or economic opportunity or power to flee or fight back. The only way they endure is by shutting down, and in extreme cases, dissociating from the situation to survive physically and psychologically (Ogden et al., 2006).

Let’s examine one last part of the brain that is essential in both the high road and the low road. On the low road, the hippocampus takes on a calming role. Once neuroception senses that the threat no longer exists, the hippocampus helps to quiet the amygdala, allowing the high road to reactivate, and cognitive and social functioning to return. A well-functioning hippocampus makes it possible to have a brief low-short road response, which might include fear or anger, but it does not allow these emotions to continue well into the future.

As part of the high road, the hippocampus works with the amygdala to provide an emotional context to the stimulus. Also, the hippocampus plays a significant role in the creation of new memories. One reason people often struggle to recall a traumatic event is that, during trauma, cortisol and norepinephrine disrupt normal hippocampus functioning, making memory formation difficult.

Measuring States and Traits

One of the most practical and powerful uses for HRV is measuring both states and traits of health and wellness. Traits are long-term trends or patterns of psychological, physical, relational, and cognitive functioning. They describe a person’s personality; their overall physical health, including chronic health conditions; how they function in relationships; and ways they problem solve and think about the world. A simple way to think about traits is that they answer the question, “Who is this person?”

Traits are a mix of strengths and struggles. Some people find themselves in one dysfunctional relationship after another. Others struggle with the cognitive flexibility needed to consider another’s political views. People who work out and eat a nutritious diet are generally healthy and fit. For those struggling with mental-health conditions, anxiety or depression becomes their dominant personality trait. People with chronic conditions like lupus, diabetes, or chronic pain structure their lives around best treating those conditions and create habits mitigating their symptoms.

States include moods, physical sensations, energy levels, and reactions to stress. Traits transcend the environment, whereas states change as situations and challenges shift throughout the day. State shifts occur to maintain homeostasis. Traits answer “Who is this person?”, while states answer, “How is this person doing right now?”

Initially, states allow a person to survive or thrive in certain situations. When specific behaviors or ways of thinking seem to help manage short-term distress, maintain homeostasis, or overcome challenges, the person will use that state again when
confronted with similar situations. Eventually, when repeated over and over, a state becomes a trait. While healthy states promote traits of wellness, distressed states might lead to unhealthy traits such as addiction, disease, and social problems.

The science of how states evolve into traits is fascinating. While beyond the scope of this book, we know our genes, brains, and nervous systems change throughout our lives to meet the demands of our environments. Epigenetics is the science showing how our DNA expresses itself differently to support the traits needed to survive or thrive in life. Neuroplasticity describes the flexible or plastic nature of our brains and nervous systems, which allows traits to evolve and change over time.

The critical thing to remember is that developing new traits requires time, practice, and patience as people’s biology and genetics evolve to support new behaviors and ways of being in the world. Creating healthy habits and healing trauma require changes in our DNA, brains, and nervous systems. The exciting news is that HRV is one of the best ways to measure improvements in states and traits (Lipton, 2006; Shenk, 2010; Wolynn, 2016).

Using HRV to measure improvements in states and traits will continue as a theme of this book. Hopefully, this brief introduction to the brain and nervous system gives you an understanding of the science behind HRV. In the next chapter, we will explore how to interpret HRV scores and what they tell us about the states and traits of those we are trying to help.
Chapter 2: What HRV Is Telling Us

Your heart knows not how to lie. It is great that it lays deep in your chest and not in your mouth. Kak Sri

Taking an HRV reading results in a simple number or HRV score. In isolation, this score does not tell you much. However, as someone takes more readings, a story begins to emerge. This story reveals compelling information about their past and present, and helps chart a future path to improved health and wellness.

In this chapter, we will explore what an HRV score tells us about states and traits. In these numbers, we learn a great deal about the condition of a person’s autonomic nervous system. As we track change over time, HRV provides us with feedback on improvement or declines in overall mental, medical, social, and cognitive health and wellness.

I will use my readings from the Optimal HRV app as an example throughout this chapter. This book is not about Optimal HRV specifically; however, I do need to give you some specifics on the app to help you understand the data we are interpreting.

Because we developed Optimal HRV for the helping professions, we wanted to present professionals with the most reliable data possible. RMSSD, or root mean square of the
successive differences, is the most common and best-researched of the HRV algorithms. When someone says the term HRV without providing a specific algorithm, they are usually speaking about an RMSSD score. Just to show you the complexity behind calculating HRV, here is the equation used to calculate RMSSD from heart rate (Moore & Elliott, 2020).

\[
RMSSD = \sqrt{\frac{\sum_{i=1}^{N-1}(RR_i - RR_{i+1})^2}{N - 1}}
\]

Did I mention that HRV is a rabbit hole of complexity? The critical thing to remember is that the increased variation between heartbeats results in higher RMSSD scores. Also, RMSSD produces a score measured in milliseconds, accounting for the “ms” after the reading number.

The graphic below is from one of my typical morning readings. It was taken about eight weeks after the launch of Optimal HRV. When you see my All-Time score, know that it includes around 100 readings spanning over about 60 days.
Population Norms

Because HRV has a long history, most measures, including RMSSD, have population averages or norms for groups, based on demographic information. Population norms provide information on how a person compares to a larger group with similar demographics. While population norms have their usefulness, they also have their limitations.

One study found that genetic influences accounted for 47 to 64% of a person’s HRV score. Large sample sizes used to calculate population norms account for some of these genetic differences. However, due to genetic factors, two people of the same age and gender might get very different HRV scores, even though they have similar levels of health. The individual’s original scores do not matter nearly as much as whether scores improve or decline over time, as these trends result from behavioral changes, treatments, or life changes, and less from genetic factors (Golosheykin, Grant, Novak, Heath, & Anokhin, 2017).

Second, most people in services live lives with more stress and trauma than the general population, resulting in lower HRV scores. In creating Optimal HRV, we wanted to avoid making people feel like they are defective or abnormal because their HRV falls below population norms. A quick comparison to population norms might help the professional understand where the person is when they enter services. After that, the professional wants to help the person focus on improving their score as compared to their longer-term averages, and not worry about population norms.

Below are the population norms for RMSSD. Unfortunately, there is no data for transgender or gender-fluid people, so we are left with the male and female gender types only. To read this chart:

- Identify age and gender for the person.
- The RMSSD is the average score for those demographics.
- The standard deviation shows the positive and negative range, where 68.2% of the population falls.

For example, the average score for a female aged 50 is 26.3 ms. In this demographic, 68.2% of people have averages that range from 12.7 to 39.9 ms. In other words, scores within the 12.7-to-39.9-ms range are typical for females aged 50. Someone might fall above or below these ranges because of genetic, behavioral, physical health, or psychological reasons. Population norms provide insight but few answers.
Now let’s compare my scores and averages to the population norms. At the time of this writing, I am 45. The average RMSSD score for someone my age and gender are 23.0 ms, with a range of 13.9 to 33.9 ms.

First off, the score I just took was 49.41 ms, well above the average and even substantially above the standard deviation, 33.9 ms, for my demographics. It is safe to say I was having a good day!

While less impressive, my Last Week score, an average of the last seven days, is 35.93 ms, just above the standard deviation of 33.9. My Last Month score, an average of the previous 30 days, is 37.78 ms, and my All-Time average, in this case, an average of 100 readings, is 36.79 ms, which is also just above the standard deviation mark.

So what? The graph below shows the typical bell curve used to chart out standard deviations. The $\sigma$ symbol represents standard deviations. My 7-day, 30-day, and All-Time averages fall between one and two standard deviations of the norm in a positive direction. In other words, my averages are at least higher than 84.1% of those in my demographic group.

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Gender</th>
<th>RMSSD (ms)</th>
<th>Standard Deviation (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 – 34</td>
<td>Male</td>
<td>39.7</td>
<td>±19.9</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>42.9</td>
<td>±22.8</td>
</tr>
<tr>
<td>35 – 44</td>
<td>Male</td>
<td>32.0</td>
<td>±16.5</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>35.4</td>
<td>±18.5</td>
</tr>
<tr>
<td>45 – 54</td>
<td>Male</td>
<td>23.0</td>
<td>±10.9</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>26.3</td>
<td>±13.6</td>
</tr>
<tr>
<td>55 – 64</td>
<td>Male</td>
<td>19.9</td>
<td>±11.1</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>21.4</td>
<td>±11.9</td>
</tr>
<tr>
<td>65 – 74</td>
<td>Male</td>
<td>19.1</td>
<td>±10.7</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>19.1</td>
<td>±11.8</td>
</tr>
</tbody>
</table>
I am happy with this outcome. Let’s see how population norms provide an excellent example of what insight these numbers give us when we remain curious about our results. During my two months of taking measurements on Optimal HRV, I had and then recovered from COVID-19. Knowing that, even with illness, I outperformed my demographics. This feedback shows that my focus on health and wellness is producing tangible results, even when under the stress of illness. While I can only speculate how my strong HRV helped me through COVID, I remain curious about my recovery process as time passes and I get more data.

My curiosity must also account for being at the very young end of my demographics. As you can see from the table above, HRV drops with age. Being 45, I am just one year removed from the 35-to-44 age group. I look much more average when you compare my scores to someone in the demographic one year below mine.

In the end, population norms give us some data to ponder and direct us to ask questions about an individual’s scores. Why are your scores above or below the population norms? If your scores are significantly below the population norms, what medical or psychological conditions might account for your scores? And should you consider seeking advice from medical or other professionals to make sure more significant issues do not exist?

While I caution people from putting too much stock into comparing an individual’s HRV with population norms, the norms are useful when comparing groups of people to these norms. Organizations might ask questions, such as:

- How do the group averages for those in our services compare to population norms? What accounts for these differences?
- How do the average scores for our staff compare to population norms? What accounts for these differences?
To make these comparisons, you need to do some math. This math needs to account for the age and gender of the members of the group compared to the population norms. Luckily, many HRV apps will calculate this for you automatically.

**Single Readings**

What does a single HRV reading tell you? Not much in isolation. For example, my 49.41-ms reading looks excellent. If all you knew about me was that score, you could assume that I am one of the fittest and healthiest people in the world, when compared to others in my age and gender demographics. However, when I was struggling with COVID-19, my lowest score was 9.1 ms. If you just saw that score in isolation, you might call me an ambulance!

When you start looking at my 49.41-ms score against my longer-term averages, the assumption goes from my being the healthiest person on the planet to being a reasonably fit person having a great day. So many factors go into a score that you do not want to get too excited or depressed over one single reading. As you build the longer averages, these daily scores will have a greater context for interpretation.

Most HRV apps, including Optimal HRV, allow for the comparison of recent readings. Comparing a Latest to Previous score measures the effects of recent activities such as exercise, a therapy session, a work shift, sleep, or meditation. Remember our working definition of HRV from Chapter 1: HRV measures the person’s ability to handle or recover from stress. When the Latest score is lower than Previous, it provides a measure of current allostatic load. The amount of the drop in the Latest score since the Previous score indicates how much the allostatic load is decreasing physical stamina, mental health, and cognitive ability.

A higher Latest score versus Previous score shows recovery and increased energy since the last reading. When improvement happens, it demonstrates recovery from the allostatic load and a readiness to take on more challenging or energy-intensive activities. Simply put, when our Latest score is higher than our Previous score, we possess considerably more energy to take on the challenges that face us. When our Latest score is lower than the Previous score, we possess less energy for those challenges.

Longer averages will provide additional context for these scores. For example, let us say your Latest score is 10 ms higher than your Previous score, but 5 ms lower than your 30-day average. You know that your body and mind are doing a good job recovering from the short-term stress that lowered your Previous score. However, you are still not fully recovered, and your performance or energy level might still lag behind what it is on a typical day.

Another feature most HRV apps allow you to track are tags. Tags allow you to track how specific activities impact HRV. Tags allow you to sort scores over time by related
activities, such as exercise, therapy sessions, taking medication, sleep, mindfulness, drinking, etc. After taking several scores tagged with a particular activity, you can do a quick search for the tag and see scores associated with that activity. Tags include the activity and a second label of "pre" or "post."

The pre and post function helps to isolate the impact of an activity and its effects on HRV. Tags help build motivation to continue by quantifying the short-term gains in physical and psychological health. Tags also help show the adverse effects of other behaviors, such as drinking or drug use. As with changes that improve health, sometimes it is hard to identify how specific actions negatively affect wellness. Seeing how behaviors crash HRV scores provides short-term feedback on health that could help build insight and motivation to change.

**Longer Baseline Averages**

Longer baselines unlock the real benefits of HRV. These averages provide a unique context to interpret an individual’s scores. They also demonstrate the positive effects of interventions, programs, behavioral changes, and treatment.

Ideally, a person would take a reading first thing every morning. Morning readings are preferred because fewer variables are influencing the score beside the restorative effects of sleep. As a person moves throughout their day, a variety of stressors, interactions, choices, behaviors, and physical activities influence their scores. While taking scores throughout the day is fine, a consistent morning reading helps set a baseline in which to compare future readings. At a minimum, a person should strive to take at least four morning readings a week (Moore & Elliott, 2020).

Let’s look at some ways to use longer baseline averages. A 7-day average, the Last Week score, is enough time to begin seeing small positive or negative effects of changing a behavior, changing one’s diet, taking a new medication, trying a new self-care practice, or other interventions. Some actions that will improve long-term HRV, such as a new exercise program or engaging in emotionally intense mental-health therapy, can decrease daily scores and weekly averages before realizing their future positive benefits and eventually improving HRV. The key is to stay curious about what the Last Week scores might indicate.

The Last Month score, or 30-day average, is enough to start establishing a medium-term baseline for traits associated with mental, medical, social, and cognitive health and wellness. This average incorporates the ups and downs of daily and weekly variations, providing a number that represents traits of overall health and functioning. For those working to improve health and wellness, a steady increase in Last Month averages helps demonstrate progress toward these goals.
The All-Time average provides a long-term baseline of trait improvement, especially when taking consistent readings over several months. In creating Optimal HRV, we wanted to provide short-term feedback with Latest, Previous, and Last Week scores. Last Month provides medium-term feedback, and All-Time provides a long-term baseline for comparison.

Let’s dive a little deeper into the insight that score comparisons provide us. Each Latest HRV reading compared to a 30-day or greater baseline allows a measure of how the nervous system is handling or recovering from stress, and answers the question, “How is this person doing right now?” Similarly, comparing the Last Week average to the longer baseline helps answer the question, “How is this person doing this week?” (Moore & Elliott, 2020).

For someone struggling with psychological or medical issues, the goal becomes two-fold. First, they want to implement strategies to help their short-term HRV readings, the Latest or Last Week average, to outperform their longer baseline averages. This result demonstrates their mind and body are in a healthy state to take on more significant challenges and handle stress.

Second, the person wants to improve their Last Month and All-Time averages gradually. Depending on the behavior, it takes roughly two months to form a habit or turn a new mental or behavioral state into a trait. As daily readings gradually improve, the 30-day average starts to outperform All-Time averages, demonstrating measurable improvement in psychological and biological functioning (Gardner, Lally, & Wardle, 2012).

In the next chapter, we will explore the connection between trauma and HRV. Decades of research prove HRV’s effectiveness in measuring mental, medical, social, and cognitive health and wellness. Yet, HRV remained on the sideline due to expensive and bulky equipment. As research in neuroscience, epigenetics, and trauma expanded exponentially, HRV played a supporting role in supplementing research conducted in well-funded laboratory studies.

HRV is emerging from a supporting to a starring role. While it remains expensive to take a brain scan or measure epigenetic expression, reliable HRV data is available for just a few dollars a month. HRV allows those providing treatment and care the data that brings to life the internal and mental health of those they are helping to heal and thrive.
Chapter 3: The Science of HRV and Trauma

Go to your bosom: Knock there, and ask your heart what it doth know
William Shakespeare

My interest in HRV evolved out of my passion for helping those struggling with trauma. The trauma research, along with the parallel development in neurobiology and epigenetics, gave me a scientific and intellectual foundation to conceptualize behaviors, deliver treatment, and develop programming. When I discovered HRV, I quickly saw how it provided a way to take research and apply it to an individual in care. Because of HRV’s potential to measure the devastation of trauma and the path to post-traumatic growth, I believe HRV integration is the next step forward in our effort to create trauma-informed programs, treatments, and organizations.

Trauma and stress prevent too many people from living a happy and meaningful life. People struggling with trauma and distress present with a range of emotional, behavioral, medical, social, and cognitive issues. When people understand that untreated trauma causes an injury to the nervous system, it starts to destigmatize the fears associated with mental-health treatment that exist in many communities.
It is impossible to talk about trauma without acknowledging the devastating effect it has on ourselves, our family members, and those we serve. Increasing our understanding of trauma helps us work with people to find pathways out of their suffering. As we take this journey together, please know that it is vital to take care of yourself.

I view the exploration of trauma and suffering as a roller coaster ride. We must go down into the pain to understand it, but always hold on to the goal of coming back up and asking, “How can I use this information to help people change their lives?” On the way down, if it gets too close to home, take a break, a deep breath or two, or a walk around the block, or share the experience with a friend or loved one.

If you feel like you might be struggling with the lasting effects of trauma, please consider talking to a mental-health professional. Seeking this help is far from a sign of weakness. Instead, it is an opportunity to build strength and wisdom. Trauma touches us all, and the support we receive will determine if the trauma continues to have power over us or if we will transform it into the wisdom of post-traumatic growth.

**Defining Trauma**

Trauma is a little tricky to identify because the person’s reaction to the trauma is more important than the event itself. People experiencing the same highly distressful event will react very differently. What traumatizes one person, another might experience as distress. Also, a trauma that affects one person throughout the rest of their life may serve only as a minor setback to another.

The key differentiation between distress and trauma is that trauma overwhelms the person’s ability to cope. Trauma elicits a sympathetic nervous system or dorsal vagal survival response that stays with the person long after the event ends and the danger subsides. Examples of traumatic events that might trigger this response are physical, emotional, and sexual abuse; racism or other instances of direct discrimination; a household disruption separation, such as an arrest, divorce, or death; a natural disaster; an accident; and other events experienced as overwhelming and threatening to the person [Centers for Disease Control and Prevention (CDC), 2016].

Trauma forces people into survival states. Many get the help and support they need to recover and return to normal functioning. These people will see a momentary significant drop in HRV before experiencing a return to previous averages. Tragically, many people experience repeated trauma or do not get the help they need to recover. These people are at risk for their survival states to become traits, resulting in HRV scores well below population norms.

A less-recognized form of trauma occurs with constant exposure to intense distress over an extended period. Chronic trauma is not as evident to the professional, as the person often adapts to their highly distressful life situations. The prolonged nature of chronic
trauma causes epigenetic and biological changes that promote survival but cause difficulties in other aspects of life.

Trauma from extended distress can result from poverty, neglect, or struggles with a chronic mental or medical condition. Additional significant prolonged trauma might come from having a loved one with a severe medical condition, military deployment, medical or mental illness, addiction, systematic racism and discrimination, living in a dangerous neighborhood, threats of violence, and homelessness. Traumatic events coincide with a specific time and place; chronic trauma lacks this specificity but has an equally devastating effect (Lewis, 2006; Nakazawa, 2016; Siebert, 2005).

As an example to show the relationship between traumatic events and chronic trauma, let’s use someone experiencing homelessness. The person experiencing homelessness is assaulted at 3:30 pm on a Tuesday while trying to sleep in the park. Her assailants steal all her belongings. She goes to the emergency room due to the life-threatening nature of her injuries. The assault and theft constitute a traumatic event, as we can point to a time and place where it happened.

Now let’s examine how the person experiences chronic trauma in the period leading up to the traumatic event. The years before the trauma, she never knows with certainty where or if she will be able to get a meal, whether she will be safe taking a nap in the park, and whether she will get a shelter bed at the end of the day or must sleep outside in the cold. Surviving homelessness requires neurobiology and epigenetics to support certain traits. Because of her ability to adapt, surviving homelessness becomes part of her ordinary existence. If you met her on the Monday before the assault, you might notice some effects of the prolonged stresses of homelessness. However, you probably would not consider her as being in the midst of a traumatic event in the same way you would if you met her in the emergency room.

The dangers and lack of safety and security that create chronic trauma have similar biological and psychological consequences as traumatic events. When one experiences homelessness, war, or living in a violent neighborhood or home, there might not always be an event at a specific time and place that we can identify as traumatic. However, the constant threat of a possible trauma becomes traumatic in and of itself.

Complex trauma is trauma that occurs over time and involves a combination of traumatic events and chronic traumas. Complex trauma dominates the life of the person. The brains of those experiencing complex trauma develop around surviving their situation, robbing energy from developmental processes that support emotional regulation and cognitive ability (Bloom & Farragher, 2011; Herman, 1997).

Traumatic events and chronic trauma have similar effects on HRV, brain functioning, psychological health, medical well-being, and relationships with others. Throughout the rest of the book, I will use the word trauma to describe both traumatic events and chronic trauma unless otherwise noted. Whether a trauma happens as a significant event or
affects the person over time, the result is a life dominated by the pain and suffering associated with the experience (Nakazawa, 2016).

**Impact of Trauma**

The psychological, medical, social, and cognitive effects of trauma stand as a barrier for many to reach the outcomes that will help them live a more fulfilled life. The trauma-informed movement challenges us to consider healing the trauma as part of service delivery in order to remove this barrier. As the nervous system heals from trauma, HRV improves as the person learns new ways to relate to themselves, other people, and the larger world.

As stated above, the complex trauma experienced by many seeking services turns sympathetic or dorsal vagal survival states into traits. Psychologically, those with an overactive sympathetic nervous system struggle with anxiety. These struggles often manifest in attention-deficit/hyperactivity disorder, post-traumatic stress disorder, phobias, conduct and oppositional defiant disorder, and always feeling on edge. More dorsal vagal activation associated with the freeze or shutdown response accounts for problems with depression, lack of motivation, and social anxiety. Tragically, trauma also increases the likelihood of self-harm and suicide as these psychological issues progress (Dana & Porges, 2018).

Trauma and the resulting psychological struggles lead to the creation of a negative view of self. The trauma of abuse or neglect sends a clear message to the person that they have no value as a human being; otherwise, why would others hurt them. A sense of unworthiness and shame develops, leaving the person with little self-confidence. Without self-confidence and a sense of unworthiness, there is little motivation to improve their situation in life. The person is left feeling like no matter what they do, they will fail and that they do not deserve anything better than their current situation (Herman, 1997).

Physical health also declines with trauma. A healthy autonomic nervous system and strong vagal brake promote a healthy immune system. While the immune system fights off disease, it also is vital in reacting to injuries. One of the powerful weapons available to the immune system are proteins called cytokines. If someone cuts themselves, cytokines are released and rush to the cut, creating inflammation, which helps stop the bleeding. Similarly, when a virus or infection is present in the body, cytokines go to work fighting off the disease.

Increased sympathetic activation as a reaction to distress or trauma also releases cytokines. When neuroception identifies potential danger, the body releases cytokines to limit the impact of any injury that might result. While a useful survival strategy in the short term, if anxiety becomes a trait, it weakens the vagal brake, resulting in a constant release of cytokines. Too many cytokines in the body cause inflammation of the gut and brain.
Because the gut plays an essential role in immune function, inflammation inhibits an effective immune response. Inflammation in the gut also results in leaky gut syndrome. Leaky gut syndrome is an accurate description of this terrible condition. Inflammation causes cracks in the intestines. Waste in the intestines leaks into the body, creating a range of digestive and immune problems, including celiac disease, Crohn’s disease, and irritable bowel syndrome (Nakazawa, 2016).

Besides the pain and discomfort caused by inflammation in the gut, the brain also inflames. Research is starting to demonstrate the connection of brain inflammation to a range of mental illnesses. Chronic stress and trauma threaten to destroy both psychological and medical health (Dantzer, O’Connor, Freund, Johnson, & Kelley, 2008).

As a measure of immune functioning, HRV correlates with many disease risk factors, including hypertension, obesity, glucose intolerance, insulin sensitivity, and inflammation. Not surprisingly, significant drops in HRV correlate with nine out of the ten leading causes of death in the United States. These include heart disease, cancer, respiratory disease, stroke, Alzheimer’s disease, diabetes, influenza and pneumonia, kidney disease, and intentional self-harm/suicide (Moore & Elliott, 2020).

The psychological and physical pain from trauma leads many to struggle with drugs and alcohol. Self-medicating provides a short-term respite for their depression or anxiety. Unfortunately, trauma sets up the nervous system as fertile ground for addiction to take hold. This biology puts those with trauma at a much higher risk for turning the relief of getting high into a trait of addiction, where their whole life becomes structured around their use (Mate & Levin, 2010).

Socially, trauma makes forming and maintaining healthy relationships with children, partners, or friends difficult. Those with more dorsal vagal activation will socially withdraw and isolate as their fear makes it difficult to trust people. Others with more sympathetic activation will actively seek out relationships, but feel increased anxiety with intimacy, and struggle to establish healthy boundaries. Unfortunately, those with trauma are at higher risk of being in relationships plagued by intimate partner or domestic violence, or of experiencing problems with the social aspects of school or work, and are more likely to go through a divorce and other relational issues. Instead of providing safety and joy, trauma turns people and intimacy into a threat to fear (Cozolino, 2006; Cozolino, 2010).

The cognitive functioning needed for success in school and employment also is a struggle for many with trauma histories. Academically, those with trauma are more likely to fail a grade, need special education, and get expelled or suspended. occupationally, people with trauma struggle with unemployment, which leads to a variety of other issues, such as a higher rate of poverty and homelessness. While some of these issues are related to the motivation problems mentioned above, brain scans demonstrate that the areas associated with memory, problem-solving, goal setting, expressive and receptive language, focus, and delaying gratification are less active and even physically smaller in people with repeated trauma (Bloom & Farragher, 2011; Craig, 2016; Nakazawa, 2016).
Trauma and the Nervous System

Most people seeking help and services come with a history of traumatic experiences. Untreated trauma dramatically changes how the brain and nervous system operate. This impact manifests in lower HRV scores. The good news is that if someone gets the support and treatment they need to heal, the pain and suffering of trauma transform into the strength and wisdom of post-traumatic growth. Because HRV helps measure the post-traumatic growth journey, which we discuss in detail in Chapter 5, it is essential to understand trauma’s impact on the brain, autonomic nervous system, and neuroception.

People living in highly stressful or traumatic environments rely on low-road states to survive. Fleeing, fighting, or shutting down helps vulnerable people survive abuse, poverty, war, and other traumas. Over time, epigenetic expression turns these low-road states into traits that give the person the best chance to survive. Unfortunately, living on the low road carries a terrible cost to mental, medical, social, and cognitive health.

Stress and trauma can result in changes in how neuroception identifies danger. First, a nonthreatening stimulus gets misinterpreted as dangerous. The person goes into a low-road response, resulting in extreme behaviors that, to an outside observer, seem illogical and excessive for the situation. While these reactions disrupt the life of the person and those around them, if we step back, we can understand why this happens.

If something causes you harm, you naturally want to avoid anything that shares characteristics similar to that dangerous person or thing. A common saying in neurobiology goes, “It is better to run away from a stick, thinking it was a snake, than to pick up a snake, thinking it was a stick.” The brain prioritizes survival over everything else. We might look silly running from sticks, but we stay alive (Cozolino, 2010).

The other effect of trauma on neuroception occurs when the person misses environmental clues that most anyone else would immediately recognize as dangerous. Those with traumatic histories are at a higher risk of experiencing additional trauma, due in part to their reduced ability to sense when a situation might become harmful. Too often, they are so afraid of the reoccurrence of something similar to their previous trauma that they will miss the danger right next to them. For others, like those who grew up in abusive homes, they learn that abuse is how people treat one another. When they start looking for friends or romantic partners, those with controlling and harsh characteristics help fulfill this learned expectation, leading them to repeat the patterns of their childhood (Mate & Levine, 2010).

Neuroception triggering the stress reaction in inappropriate situations explains why many people struggle with the relational dynamics of the workplace, romantic relationships, friendships, and helping relationships. They also often experience severe consequences because of these struggles, including unemployment, intimate partner violence, social isolation, and imprisonment, and may experience failure in systems such as school, healthcare settings, and social-service environments (Cozolino, 2010).
The amygdala is also affected by the experience of trauma. Brain scans show that the amygdala in individuals with traumatic histories increases in activation and grows physically more substantial in size. An overactive amygdala enhances the likelihood that the low-road response will be triggered. Trauma makes it difficult to perceive one’s self, relationships, and the world as safe. When this becomes a trait, more information gets processed down the low road, taking the prefrontal cortex offline (Nakazawa, 2016; Siegel, 2011).

As a central player in the creation of emotions, the amygdala contains a high density of endorphin receptors. Human bodies have naturally produced opioids called endorphins. Endorphins create a sense of physical and emotional well-being. For endorphins to positively impact mood, emotions, and pain reduction, they need open receptors on brain cells or neurons.

Trauma decreases the number of active endorphin receptors, reducing the positive response created by endorphins. Endorphins are critical to relationships, so damage to the amygdala interferes with a person’s ability to develop healthy connections to their children, friends, and romantic partners. Another unfortunate consequence of decreased opioid receptors is a higher chance of developing an addiction to opioids, such as heroin or prescription opioid medications (Cozolino, 2010; Mate & Levine, 2010).

In many ways, the hippocampus is the counterbalance to the amygdala. While the amygdala can bring the low-road response and energy to any situation at any time, the hippocampus attempts to regulate this response and quiet it once the danger has passed. Trauma impairs the hippocampus, but in the opposite way that it does the amygdala.

Where the amygdala becomes overactive, the hippocampus weakens and becomes physically smaller in individuals with untreated complex trauma. This weakening inhibits its ability for emotional regulation, resulting in psychology dominated by the fear-based emotions of the amygdala. Small microscopic changes in these two central brain parts have real-world consequences for the trauma survivor (Nakazawa, 2016; Ogden et al., 2006).

When overwhelmed by stress chemicals released during a traumatic event, the hippocampus, as well as the thalamus, struggles to assign the correct meaning to experiences, further fragmenting memories concerning the traumatic event. This fragmentation leaves the person disoriented as they struggle to make sense of what happened to them and the resulting pain and suffering.

Long term, a smaller hippocampus will struggle with day-to-day memory creation. The hippocampus plays a central role in short- and long-term memory formation. Complex trauma weakens the person’s ability to create long-term memories, leading to struggles in learning, memory recall, and problem-solving.

The cortex and prefrontal cortex come online when the high road processes stimuli. The stress from the traumatic experience and the continued amygdala-dominated processing
can physically affect the health of these executive centers. Because the prefrontal cortex is less active, it becomes weaker and physically less developed. A weaker prefrontal cortex limits cognitive ability and makes it harder for it to regulate the amygdala’s emotional reactions (Ogden et al., 2006; Siegel, 2011).

Retraumatization is another way that traumatic experiences affect the cortex. Retraumatization is re-experiencing the emotions of the traumatic event(s), usually triggered by a stimulus in the environment. This trigger can be something that reminds a person of their past trauma, including noises, a touch on a particular part of the body, visual stimuli, or something that happens while interacting with a professional or someone else in the organization or the community. The trigger brings back the intense emotions the person experienced during and after the traumatic event.

While retraumatization can harm the person’s ability to engage and maintain relationships and succeed in services, its core purpose is to keep them safe. From a biological perspective, it makes sense to apply the same emotional response and repeat actions that helped them survive a previous trauma when something triggers these memories. The brain unconsciously uses the same strategies, hoping to escape what it perceives as another traumatic event.

A post-traumatic stress reaction is another word for retraumatization and is a prominent symptom of the mental-health diagnosis of PTSD. Many of the extreme behaviors that get people in trouble with the law or kicked out of programs result from behaviors associated with retraumatization. Unfortunately, uninformed professionals and others view these unintentional reactions, whose biological purpose is to keep the person safe, as intentional actions where the person chooses to put others’ safety at risk.

**Window of Tolerance**

Another way to view the interaction between the high road and the low road is the concept of the window of tolerance. When people on their high road are effectively managing their allostatic load, they are said to be inside their window of tolerance, and will exhibit behaviors related to the executive functions of the prefrontal cortex and the social engagement of the ventral vagus. To simplify the complexity of neuroscience and bring the window of tolerance to life, I developed a simple cup analogy to help people understand how distress and trauma affect our thoughts, feelings, and behaviors (Bennett, 2018; Ogden et al., 2006; Siegel, 2011).

The cup analogy has two parts; the first is the size of the cup. The bigger the size of the cup, the more resilient we are to the effects of distress, and the longer it takes to go into allostatic overload. Factors such as self-confidence, healthy relationships, practicing mindfulness, healthy diets, age, and exercise increase the size of our cup. As a representation of the health of the autonomic nervous system, a high capacity to manage stress results in high HRV.
Conversely, a poor diet, long-term distress from poverty, unresolved trauma, traumatic brain injuries, drug use, struggle with employment or at school, and unhealthy relationships decrease the size of the cup. Unfortunately, due to trauma and intense distress, many people in services come in with a limited biological ability to handle distress, as demonstrated by lower HRV scores. While not a reflection on them as a person or even something they have much control over, most people we work with come in with small cups that quickly fill with distress, resulting in allostatic overload.

Typically, the capacity of the cup stays consistent over time if we do not experience significant life changes. The exception to this rule is trauma. The overwhelming nature of trauma reduces capacity quickly, and if healing does not occur, it can keep capacity low over long periods of time (Siegel, 2007; Siegel, 2011).

The size of the cup represents traits associated with resiliency and robustness. We mentioned earlier that resiliency is a person’s ability to recover from hardship. Robustness speaks to our ability to bring the energy we need to succeed in life. HRV scores measure both our ability to recover from distress and the available energy we can apply to the day’s challenges and activities.

HRV helps us translate cup size to an objective measure. For the professional, comparing a person’s 30-day HRV average to population norms provides some insight into the person’s resiliency based on others in their demographics. They can then compare their 30-day average to their overall average to determine whether their cups are increasing or decreasing in size.

The second component of this analogy concerns the water in the cup. The water represents stress in our body at any given time. For the sake of the analogy, you can describe the water as representing the amount of cortisol in the body. While the cup analogy is useful to show the accumulative effects of distress, we can describe a traumatic event as dropping your cup into a bucket full of water, where the amount of stress immediately overwhelms all ability to cope.

As a measure of the effects of distress, HRV helps bring this analogy to life. Taking an HRV reading and comparing the score to a 30-day or longer average helps show how much water is in our cups. A significantly lower HRV score versus these averages shows that our cups are filling up. We are struggling to manage the stress we are facing and risk going into allostatic overload.

Ideally, when our cups start to fill, as measured by decreases in HRV, we realize that stress is building and apply coping skills like deep breathing, exercise, or talking to someone about our distress. Initially, the distress increases heart rate and HRV decreases as the water fills the cup; then we apply a coping skill, and heart rate and HRV return to normal levels. During stressful times, an HRV reading provides insight into our mind and body’s resiliency to distress in the environment.
The window of tolerance will help us understand how distress affects our thinking and behaviors. The space between the top of the cup and the level of water represents the window of tolerance. When we have adequate space between the level of water in our cup and the top, we can say that we are in our window of tolerance, and our thinking and behavior are motivated, adaptive, safe, social, energized, and stable, indicated by the acronym MASSES. If MASSES describes your state, it is a strong indication that you are successfully managing your allostatic load (Ogden et al., 2006).

When your allostatic load increases and starts to fill up your capacity, your state becomes more rigid or chaotic. These responses are an effort to control the stressful situation before going into crisis. Some people react to stress by trying to organize and manage their world, which indicates a rigid response (Siegel, 2016).

When we are in a rigid state, we might start bossing people around or putting unrealistic expectations on ourselves or others. We might also feel a great deal of anxiety or sadness when things frustrate us and do not go exactly how we want them to go. Another rigid response is obsessing or ruminating over something, even if it is not that important. When we are rigid, it is hard to think creatively, and we often automatically rely on behaviors we used in the past, even if they have had negative consequences.

The chaos state is a reaction designed to create distance between us and what is filling up our cup with distress. We often achieve this distance by yelling, threatening, or using intimidating behaviors or words. Unfortunately, we often say things that hurt others and get us in trouble. Even though we are just trying to get space, others experience our behavior as dangerous and disrespectful (Siegel, 2011).

If rigidity or chaos does not eliminate the stress, the cup overflows, and we experience allostatic overload. In a crisis, we operate in the sympathetic survival mode of flight, and if we cannot run away, in the fight response. Energy gained through the flooding of cortisol and norepinephrine allows us to take intense and decisive action. If the cup overflows, it collapses in on itself. The result is the dorsal vagal freeze response.

Take a moment to appreciate the problematic biological and psychological situations in which many people we serve live their lives. Due to past trauma and stress, their brains and nervous systems struggle to keep them in their window of tolerance, in MASSES, even in the face of distress. Also, think of the amount of daily distress many people face. Homelessness, violence, poverty, food scarcity, and stigma all quickly overwhelm what limited capacity does exist in their window of tolerance.

Humans adapt traits to survive and thrive in their environment. Unfortunately, too many people live on the edge of their window of tolerance, learning to rely on rigid, chaotic, flight, fight, and freeze behaviors to survive their reality. Short-term HRV measures help track distress’ impact in the present moment. Long-term HRV improvements demonstrate increased cup capacity, which should translate into motivation, adaptations, safe behavior, social engagement, energy, and stability, all of which help them succeed in services and the larger world.
Assessing Levels of Stress and Trauma

Quantifying the suffering of trauma provides information on the devastating effects of violence, neglect, poverty, homelessness, and other community problems on the individual. Research such as the Adverse Childhood Experience Study and HRV studies demonstrate the effects of pain and suffering on mental, medical, social, and cognitive health on large cohorts of people. HRV provides the person and the professional with data on how their stress and trauma affect their health and wellness (CDC, 2016).

For the professional, comparing a person’s HRV to population norms translates their pain and suffering into an objective and quantifiable number. We know trauma changes how brains and nervous systems operate, and HRV demonstrates the extent of this impact on a specific person’s functioning. Establishing a five-day baseline provides enough information for the professional to begin to compare the person’s score to population norms.

Comparing the person’s baseline to population norms gives the professional a valid measure of health. One could assume, with a fair amount of confidence, that most people with untreated histories of trauma or under the distress of poverty or homelessness will have baselines far under population norms. However, getting the baseline helps provide a more in-depth understanding of the functional level of the individual. In the next section, we will explore how to use this starting point to inform how services are delivered.

HRV demonstrates that there is not something inherently wrong with a person. Instead, it shows the biological changes associated with trauma. Something happened to them that changed how their nervous systems work and respond to the environment. There is some excellent news with regards to that.

When someone gets the right mix of treatment, resources, and support, trauma heals. Increases in HRV precede or accompany improvements in psychological, physical, social, and cognitive health. HRV helps to measure the wounds of trauma and the journey to post-traumatic growth. Unlike healing from other injuries, when someone experiences post-traumatic growth, they do not go back to some previous state before the injuries. When someone heals from trauma, they gain strength, resiliency, and wisdom that will serve them well throughout the rest of their life (Levine, 2008; Ogden et al., 2006; Van der Kolk, 2014).
Section 2: Helping Others with HRV
Chapter 4: HRV Integration

*When your heart speaks, take good notes.* Judith Campbell

The journey to a better life is a roller coaster of positive steps forward and setbacks both big and small. Healing past trauma and considering significant life changes are incredibly intense psychological experiences. As a person progresses on their journey, their HRV should gradually improve over time as they build resiliency and post-traumatic growth.

While HRV provides a scientific way to track progress over time, it also identifies where the person is at in a specific moment in time. This insight into the state of the person becomes an essential variable in deciding how to structure interactions. Daily readings also provide insight to help in the times between meetings, when you do not see or have contact with the person. In this chapter, the strategic integration of HRV improves the quality of interactions and program design in a variety of settings.

As mentioned earlier, many people with trauma histories struggle to put their internal experiences, emotions, and psychological states into words due to the neurobiological injuries of trauma on the language areas of the brain. Checking in verbally with a person might not provide adequate information on what is happening with their nervous system. Early in the healing journey, people will find it especially challenging to communicate their internal experiences.
Besides the biological struggles with verbal communication, there are additional challenges in getting accurate information from people. Some people want to please the professional and tell them what they believe they want to hear. Others skew the truth to avoid a lecture or criticism. Still others might provide inaccurate information out of a fear of vulnerability, legal or programmatic consequences, or embarrassing themselves. While HRV does not replace assessments, surveys, and self-reporting, it does provide critical supplemental data to structure short-term interactions and track long-term improvements and outcomes. The objective nature of an HRV score transcends the relational dynamic.

Section 3 explores how integrating HRV into programming and service delivery improves the quality of services delivered by the professional, while providing the person receiving services with crucial insight into their health and wellness. HRV provides an accurate way to answer the question, “How is this person doing right now?” It also helps to measure progress over time. As an objective outcome measure, heart rate variability opens up the possibility for a range of innovations as we gain a fuller understanding of those we serve.

**Filling in the Space in Between**

In most situations, there exists a great deal of time between contacts between a person and a professional. People see a therapist once a week. They will check in with a case manager, social worker, or probation officer once a month. For those in medical care, months will pass between visits. A lot happens in the time between meetings and calls. Just because the professional does not see the person does not mean the person is not struggling and in need of support.

Daily HRV readings, when shared with the professional, provide a transformational step forward in how we support people. The technology now allows a professional to check their caseload’s HRV scores as part of their daily routine. Data and insight replace wishing and hoping for the best. This new level of knowledge not only improves the professional’s ability to help the person; it is potentially lifesaving.

One of my biggest frustrations with existing HRV platforms was that they did not provide the professional with the ability to view those on their caseload in a manner that complied with the Health Insurance Portability and Accountability Act or HIPAA. As we developed Optimal HRV, we wanted to give the professional the ability to view the HRV scores of their caseload in a simple dashboard.

The Optimal HRV dashboard allows the professional to see the HRV scores of multiple people in one glance. It sorts them by those trending in a positive direction and those trending negative. Optimal HRV also provides averages for group scores. While not important for all situations, those working with people in residential, school, and other settings with natural groups; this data helps measure the health of the entire group.

Below is a screenshot of the Optimal HRV dashboard. I will use this as an example to demonstrate how to implement HRV as a powerful clinical tool.
A single low HRV score, 30% below a person’s All-Time average, alerts the professional that they should track the next few days of readings to determine whether that single low score is just an isolated event or the start of a more significant negative trend. Many things might impact a single reading, and not all of them require an immediate response. A bad night’s sleep, a sick child, a hard day at work, a challenging workout, or even an unhealthy meal might account for a short-term drop in HRV.

Depending on what the professional knows about the person, a single low score is usually not a cause for concern. However, if the professional knows that the low score is associated with a potentially stressful event, such as the first day in a new job, a supervised visitation with child welfare, or a difficult transition into a new program, then reaching out could make a big difference. Offering a few minutes of support might relieve distress and help the person recover. A quick conversation could also provide the professional with critical information to schedule an in-person meeting, offer suggestions, or make appropriate referrals that turn a setback into a successful experience.

In most situations, the professional wants to pay attention to drops in multi-day or weekly trends in HRV scores and averages. The longer a negative trend continues, the more confidence the professional has that the person is not adjusting well to distress in their lives, thus risking allostatic overload. For our Optimal HRV users, we suggest reaching out to people with a significant decline of 30% or more over three days of daily scores when compared to All-Time averages. We encourage professionals to take the HRV scores as one data point to help inform their clinical intuition along with the other information they know about the person. Directed by this knowledge, a smaller drop, say 15%, or a single-day drop of over 30% triggers the professional to reach out.

A quick check-in with a person experiencing a drop in HRV is a small investment of time with huge payoffs for the people and resulting outcomes. Because the person taking daily readings is also seeing their scores drop, it opens up an opportunity to provide support, helping the person identify what might account for the drop and brainstorm ways to help them and their scores recover. A professional and a person should never view drops in HRV as a negative or a problem. Instead, approach the drop with curiosity and with the goal of implementing strategies to help the score recover.

The check-in is a positive opportunity to offer support and help apply healthy coping skills before broader behavioral, medical, or psychological issues manifest. Adverse outcomes, some potentially life-threatening, occur when the mind and body are struggling to handle distress. The greater the struggle to manage their allostatic load, the lower the HRV and the higher the possibility of a person engaging in a behavior that puts their treatment, health, and others at risk. With what we already covered about the role of distress and trauma on mental health, it is not surprising that a drop in HRV indicates that people are at higher risk of behaviors such as relapse and suicide (Wilson et al., 2016; Witteman et al., 2015).
Early intervention after several low scores might provide the support needed to stop a downward cycle that could end up putting the person and others at risk. Unfortunately, without a shareable biometric like HRV, too many professionals are in the dark about how life and distress are impacting a person’s functioning between visits. Taking just a couple minutes of checking HRV scores daily, people get the support they need, thus leading to better outcomes for the person and the professional.

Where to Start?

Successfully providing support and help depends on matching our communication style to the current state of those we are trying to help. Challenging a person already on the edge of their window of tolerance might push them into a sympathetic or shutdown response. Talking about a difficult topic when someone’s cup is already full will create resistance and slow down the change process. Doing relaxation techniques with a person feeling drained from a bad night’s sleep can exhaust the little energy they had to engage in conversation around crucial issues.

One of the most practical utilizations of HRV is to access the person’s state before a session or meeting. A person whose pre-meeting reading is at or above their Last Month or All-Time average is likely in their window of tolerance and ready to work. In this state, the professional can challenge them to think deeper or work hard on tasks. A person with a score lower than these averages will need some support to bring them back into their ventral vagus and prefrontal cortex and gain the social, cognitive, and emotional energy to maximize their time with you.

Here is where an analogy, such as the cup comparison presented earlier, helps the person label their state. Simply asking, “I am wondering how full your cup is today,” provides a moment for reflection. Their answer, along with their pre-meeting HRV score, helps determine how to structure the early part of the interaction. “I hear that your cup is full right now and it looks like your HRV is a little low; tell me about what is going on.”

HRV and a simple check-in help the professional to structure the session or meeting in a way that matches the person’s current state. Pre-meeting HRV readings assist the professional by making the time more productive, avoiding pushing the person beyond their window of tolerance, and minimizing the chances for retraumatization or allostatic overload. If a person with a low HRV expresses feeling anxious, nervous, or frustrated, a few minutes of mindful deep breathing or other relaxing activity helps apply the vagal brake to calm the sympathetic nervous system. While time is always precious, just a few minutes helps shift states from one that could quickly grow into anger and withdrawal to a state supporting the goals of the meeting.

A lower pre-meeting HRV score might also indicate that the person’s dorsal vagus is more active. If they report being low energy, depressed, or not feeling like talking, it might mean they are in dorsal vagal activation. The professional should suggest some active movement and coherent breathing, which we will discuss in Chapter 6, to help balance
the autonomic nervous system. If you and the person are comfortable, a few seconds of jumping up and down, listening, or even singing an upbeat song, or if possible and appropriate, spending some time walking and talking outside might provide the energy needed for a successful session.

Whether helping the person energize or relax, check in again after the activity. While these short strategies often help get the person back in their window of tolerance, sometimes their stress might need to become the focus of the meeting. The professional might find it challenging to put their goals aside. For long-term outcomes, it is much better to offer support to someone on the edge of their window of tolerance than to add a small amount of distress that then pushes them into allostatic overload.

Another Warning Sign

The hope is that taking daily morning readings becomes a habit for people. As part of their morning routine, the person gets an idea of the energy they possess for their day and can plan or strategize accordingly. The professional tracks trends and reaches out when appropriate.

What if the person stops taking readings? There are countless reasons that a person might miss a reading. These include reasons such as the reader’s batteries died, the person just forgot, they woke up late and did not have a few minutes necessary to take a reading, and a whole range of other possibilities.

However, several missed readings for someone in the habit of taking them every morning could indicate something more substantial is going on with the person. They might have relapsed, be struggling with increased depression, or distress and anxiety could have led them to forget to take their readings. The professional should view missed readings in a similar light as several days of lower scores.

Depending on the person, if the professional sees the person has not taken a reading in several days, they should reach out to ensure they are safe and doing okay. This check-in might help prevent larger issues, and the support will help the person overcome any minor setbacks. It also allows the professional to offer any technical support that the person might need with the reader or app. While there are numerous reasons for missed readings, they provide an alert so the professional can offer crucial support, possibly meaning the difference between success and failure in services. It also allows the professional to intervene before more significant problems emerge.

HRV gives those providing one-on-one services the ability to track caseloads and structure meetings in exciting new ways. The rest of this chapter will focus on different settings and how HRV also can support innovation in those environments. As HRV technology continues to improve and costs continue to drop, the helping professions will become a fertile ground for innovation. I hope that these next sections begin a
conversation with the helping and healing community as we collectively find new ways to improve services through the implementation of HRV.

Supporting Families with HRV

Like many others in the helping professions, when I learned about attachment theory, it became central to my work with individuals and families. Attachment describes the power of the relationship between parents and caregivers and their children. This early relationship teaches the child many valuable lessons about how people treat each other. In a healthy home, the child learns that people are a source of safety, love, security, and joy. In struggling households, they learn that relationships and other people will hurt you and you should not trust others.

A significant number of variables lead to the creation of a secure and healthy attachment between caregiver and child. A healthy attachment requires an engaged and healthy caregiver. When the child becomes dysregulated, the caregiver’s response is crucial. An emotionally regulated caregiver responds with love, sending signals of safety, caring, and nurturance. This caring response helps the child to recover from the distress. The caregiver’s responses over time to their child are the foundations for a healthy secure attachment.

In HRV language, a caregiver with healthy HRV will possess the psychological and relational health to raise a child with healthy HRV and the mental, social, and cognitive capacity to succeed in life. While successful parenting requires a range of skills, all these skills rely on the caregiver being able to regulate their emotional state to respond effectively to their child’s state. Unfortunately, due to distress, trauma, the absence of role models, and a lack of parenting skills, many caregivers struggle with the mental and emotional health necessary to create and maintain a healthy attachment.

Parenting is stressful for everyone. Yet, there are few ways to help caregivers measure their distress and alert them when their brain and nervous system are struggling to stay within their window of tolerance. Too many parents struggle to survive the dirty diapers, lack of sleep, and crying, without ever thinking about the importance of their wellness as a crucial factor in raising a well-adjusted child.

Every caregiver could benefit from the insight provided by HRV. A new caregiver should expect a drop in HRV with the demands of a new child. HRV helps to quantify this distress, providing the caregiver with insight into their state before reacting in ways that might cause psychological or physical harm to a child. HRV accompanied by some education on self-care and attachment helps caregivers see the importance of their wellness to the health of their child. Instead of focusing on surviving the stress of raising a child, the caregiver creates a strategy to keep themselves and their child safe and healthy.

While measuring health and wellness is a significant step forward in supporting caregivers, tracking a child’s HRV helps the caregiver identify when a child is stressed
and needs support. The caregiver can measure the effectiveness of particular approaches and strategies by measuring their impact on their child’s HRV. Working with children to learn the skills to manage distress helps develop the psychological, social, and cognitive capacity to succeed in school and beyond.

All families could benefit from the insights provided by HRV. I am especially excited about how HRV could support foster and kinship families. Most of these family situations were not intentional and resulted from some sort of trauma where the child’s birth parents were not able to care for them or provide a basic level of safety. A fabulous foster or kinship caregiver is worth their weight in gold!

HRV provides a new level of insight for both the caregiver and professionals working with the family to provide a safe and stable home. Daily family readings give caregivers information on the wellness of the child as well as their own health. Because many children enter these homes from traumatic experiences, their HRV will likely start well below population norms for their demographics. As they build trust with their caregiver, one goal is to see improvement in HRV.

Family readings also help professionals support the family. One of the tragedies of our modern child-welfare system is how many children get shifted from one foster home to the next, with stays in residential treatment mixed in. The daily family readings alert the professional when the family system is experiencing increased distress. The hope is that if the professional is informed, they can suggest proactive interventions to support everyone and hopefully prevent behaviors that threaten the placement.

**HRV in Medical Care**

For those in the medical professions who might not see patients for months at a time, HRV still provides valuable insights. As mentioned earlier, 9 out of the 10 leading causes of death in the United States correlate with a drop in HRV. Not only does an HRV app help a person monitor their health, but it also alerts their medical provider to potentially dangerous declines in their condition. Seeing significant drops in HRV over a couple of weeks, assuming there are no other stressful events in the person’s life, becomes an alert for a medical follow-up (Moore & Elliott, 2020).

Integrating HRV into medical care is especially useful for those with preexisting conditions. Declines in autonomic nervous system health might indicate a progression in their disease that might require adjustment to treatments or behavioral interventions. Even if the professional reaches out and discovers that life stress, not medical issues, accounts for the drop in HRV, it allows them to offer mental health or other support. While the psychological and not medical issues accounted for the decline, a high level of distress and increased sympathetic or dorsal vagal activation puts those with preexisting conditions at higher risk of adverse health outcomes, as their immune system and autonomic nervous system struggle (Schneiderman, Ironson, & Siegel, 2005; Thayer, Yamamoto, & Brosschot, 2010).
Daily HRV readings add potentially life-saving data to a medical-provider diagnosis and treatment process. Taking temperature, weight, pulse, respiratory rate, and blood pressure before the visit provides one level of data. Unfortunately, most data gathered for diagnosis and treatment purposes just gives a snapshot of how that person is doing at that moment in time.

The traditional gathering of vitals provides limited information to answer, “How is this person doing today?” and even less information on “What is the overall health of this person?” Many short-term factors influence vitals. An unhealthy meal, a bad commute to the clinic, a lousy night’s sleep, or a frustrating call they took in the waiting room could all negatively affect vitals. Similarly, other factors might produce positive results that are not fully representative of the person’s health.

Looking at a person’s HRV averages over the last couple of months gives the medical provider a much greater depth of assessment of physical and mental health. With a simple query, the provider can generate a report comparing longer HRV averages to HRV scores from when the person reports their symptoms started. This comparison helps the provider understand how the condition is impacting overall health. Once the medical provider prescribes a treatment, daily HRV scores track the efficacy of treatment as symptoms and HRV improve over time. HRV’s role in health care provides ongoing feedback between visits and helps the medical provider make more informed decisions throughout the course of care.

**HRV in Schools**

Along with the family, school plays a crucial role in a child’s psychological, intellectual, and social development. The understanding of how mental and social health impact a student’s ability to learn has been demonstrated by the efforts to integrate social-emotional instruction into the school curriculum. HRV provides schools with a way to measure the effectiveness of these efforts and to support students who are experiencing trauma and other stressors at school, in the community, or at home.

One essential aspect of social-emotional learning, especially in the earlier years, involves helping students gain insight into their emotional states. There are a variety of great programs available for schools and educators in teaching students about their emotions. The goal of most of these programs is to help the students label their emotional states, communicate their feelings to an educator or other adults, and develop strategies to match their state with environmental demands.

Shifting states from recess to math to lunch to science to reading requires a great deal of self-regulation. Many students, due to young age or trauma, struggle to make the state shifts needed to meet the changing demands of the school environment throughout the day. Social-emotional programs help students learn about states while providing educators with a structure to support social and emotion regulation with the hopes of increasing academic performance.
While these programs are a huge step forward for our educational system, HRV helps address the inherent weakness of these programs for many students. Presently, these programs rely on student self-report of their emotional states. As mentioned earlier in the book, trauma can impact the development and functioning of the Broca’s and Wernicke’s areas of the brain associated with expressive and receptive language, respectively.

Asking a young child or a student with trauma to express their emotions through language is inherently difficult for many. While the practice of this skill is essential, their self-report does not provide the educator with adequate information to give these students relational support to help them succeed behaviorally and academically in the classroom and other school settings. HRV helps make these social-emotional programs more scientific and increase their effectiveness.

With current technology like Optimal HRV, older students and the professionals working with them could utilize HRV morning readings to assess their health and wellness. These students could also take readings at strategic times throughout the day or before events like tests to evaluate their state and apply coping skills if needed. Adding HRV to existing social-emotional instruction provides a new level of insight and understanding into a student’s psychological, social, and cognitive functioning.

HRV provides middle schools, high schools, and universities with a tool to support student health and academic success. As an example, let’s examine how colleges could utilize HRV to help increase student achievement. While we will use a college experience here, middle and high schools could apply similar strategies for their students.

Ideally, a new college student begins learning about and taking HRV measures a month before starting their educational experience. Establishing a baseline before the transition would help to measure the impact of the significant life change of beginning college. As they transition and start their education, the college integrates learning on HRV and self-care as part of the freshman curriculum. While a student’s HRV scores remain confidential, the cumulative scores help college administrators evaluate how well they are transitioning new students.

As students get comfortable with HRV, they can choose to share their data with advisors and mental-health professionals to further help them succeed in their lives and academic pursuits. When students determine their major, HRV helps specific departments support the wellness of their students. HRV allows departments to track the effectiveness of advisors and teachers to balance academic challenges with the mental health of their students, and to support students through milestones such as midterms, finals, internships, and graduation.

As students enter their professional careers, a collegiate focus on HRV helps them carry these tools and insights into the rest of their lives. These skills help them successfully transition into employment and other aspects of their post-college life. HRV provides colleges and universities with the ability to not only educate the minds of their student,
but to help set them up with the emotional and social capacity to succeed throughout their lives and careers.

Next, let us imagine a future HRV-informed classroom and school. Young students often do not carry smartphones or possess the patience or attention span to take an HRV reading at school. In some school settings, requiring students to carry smartphones and an HRV reader are not practical or possible. Fully integrating HRV into education would require some small technological innovations. While the technology does not yet exist to support this vision, at the time I am writing this book, it is not far away.

Students in our future school all wear HRV monitors. These monitors will likely look like watches, measuring HRV throughout the day and giving students real-time feedback on their HRV scores. The monitors will also connect via Bluetooth or allow the teacher and other school staff to monitor their students' HRV at any time.

As students transition into the classroom, the teacher will have the ability to view their students’ HRV on a tablet or other mobile device. Through simple green (good), yellow (caution), or red (warning) color coding, visuals will help the teacher know which students’ brains and nervous systems are in a green state, where they are ready to learn. Seeing that some students are in yellow or red signals to the teacher that individual students are not biologically prepared to cognitively engage and are likely to exhibit disruptive behaviors if pushed into an activity that does not match their state.

HRV supplements the use of social-emotional programs that rely on self-report by helping the educators identify how effective students are in their ability to identify their current state. It also provides teachers with the ability to customize their approach in real time. If there is a lot of excitement in the hallway or at lunch and half the class is in yellow and red, doing some mindful breathing will help regulate many of the students. The teacher will track these state changes through the visual on the tablet in real time.

Students who remain in yellow or red need additional social support or emotional regulation to avoid behavioral issues. A quick check-in or other support will help students avoid getting in trouble and increase learning efficiency and retention. The HRV classroom helps address many potential problems before they occur, promoting safety and learning in the classroom and school.

The HRV monitor will also display information to help the student gain insight into their states. As students learn about their HRV and stress response, they will learn what helps them regulate and stay in their window of tolerance. Educators work with students to share information and develop a set of strategies to implement when their HRV drops from green to yellow or red.

Tracking HRV helps staff identify certain activities and times throughout the day that push individual students or groups of students out of their window of tolerance. Identifying environments that negatively affect HRV helps school staff provide additional proactive support, helping to avoid behaviors that disrupt the learning experience and threaten
safety. Most actions that get students in trouble are reactions to specific stressors in the environment. Rarely do students weigh all the consequences before acting. HRV monitoring provides a proactive way to address many of these stressors and support the student before the behavior occurs.

HRV provides crucial data for school administrators. Student HRV helps them identify times, environments, and classrooms that dysregulate groups of students. Some teachers might need support with classroom management skills to create a safe environment for learning. Also, certain activities, such as the bus ride, a school assembly, or an active shooter drill, might cause allostatic overload resulting in negative unsafe behaviors.

Understanding the connections between events and behaviors helps administrators support students instead of punishing them for actions resulting from their stress response or retraumatization. HRV helps schools identify more significant environmental causes behind student behaviors and struggles with learning. Addressing environmental causes will decrease punishment and suspensions while improving academic performance for all students.

HRV will also impact the quality of education by improving the wellness of school staff. Teachers and principals are #4 and #5 for occupations experiencing burnout. Schools fail students when they put them in classrooms with burned-out teachers. HRV provides a way for everyone in the school environment to focus on their health and to work together to create a socially safe and emotionally healthy environment where both staff and students thrive (Carver-Thomas & Darling-Hammond, 2017; White, 2020).

Complementary Therapies and Best Practices

Choosing a trauma treatment is quickly becoming overwhelming. With our expanding understanding of trauma, treatment options cover the entire range of the body. Neurofeedback measures brain states. Eye Movement Desensitization and Reprocessing (EMDR) activates healing with the eyes. Cognitive-behavioral and psychodynamic therapy heals through talk. Craniosacral therapy heals through movements of the neck. Somatic bodywork, yoga, and acupuncture help overcome trauma through full body-based approaches. A rich person could go bankrupt trying all these approaches to find the right one to heal their trauma.

Trauma treatment innovations challenge us to rethink treatment beyond traditional talk therapy. The increasing number of new therapies expands our conception of healing while providing many options to help people on their journey to post-traumatic growth. Many of these approaches get the labels of complementary or alternative therapies. As research begins to support many of these healing practices, HRV helps answer the question, “Is this the right therapy for this individual?”

HRV evens the playing field between different treatment options. HRV does not care if the intervention is thousands of years old or invented yesterday, whether the intervention
is widely accepted or on the fringes of modern psychology. HRV measures whether the intervention improves the person’s autonomic nervous system functioning.

As HRV research expands, best practices will emerge for specific conditions and populations. While a treatment might show promise for a particular presenting problem or age group, the individual’s history and situation require us to find the specific interventions that work for their unique condition. In the coming decades, HRV will evolve how psychology views best practices. While sophisticated research studies will continue to play a crucial role, HRV provides an additional level of data to evaluate what works for the individual.
Chapter 5: Tracking Resiliency, Post-traumatic Growth, and Motivation

*I took a deep breath and listened to the old bray of my heart: I am, I am, I am.*

Sylvia Plath

Resiliency, or the ability to recover after a hardship, is something we witness every day. Despite trauma, poverty, and systematic challenges, many people we serve wake up every morning only to confront daily realities that would traumatize most people. When chronic trauma dominates someone’s life, resiliency and a reliance on the sympathetic and dorsal vagal responses keep them alive. Unfortunately, this constant struggle to get back up from the hardships of the day does not leave much energy to focus on improving mental health or motivation for making the behavioral changes necessary to better their life situations.

It is nearly impossible to help someone gain insight into the consequences of their thinking and behavior when the pain of trauma and surviving life consumes all their time, focus, and energy. While they may appear unmotivated to an outsider, our knowledge of neurobiology provides empathy for their struggle. The apparent absence of motivation is
more than a psychological lack of will if one must live outside their window of tolerance. In their sympathetic or dorsal vagal state, they will struggle to find the ventral vagal and prefrontal cortex capacity needed to gain insight into their behavior and contemplate a path to a better future.

One of the goals of services or treatment is to help people turn the resiliency they use to survive into motivation for positive change. For many carrying the pain of complex trauma, achieving their goals requires them to find the motivation to change behaviors and thinking while engaging in treatment to address their past trauma. In this chapter, we will explore how we can use HRV to help people transform their resiliency into motivation to change, while tracking post-traumatic growth as their body and mind heal from the trauma of their past.

**Measuring Resiliency**

*Resiliency: The capacity to recover quickly from difficulty; toughness* (Google Dictionary, 2020)

The word resiliency gets thrown around a lot. However, just because someone is resilient does not mean they are changing their thinking and behaviors in ways that will lead to a better future. I would argue that the most resilient people in our society are those surviving homelessness, war, addiction, poverty, and other traumatic situations, such as abusive relationships inherent to intimate partner violence or child abuse.

Every day, these people wake up and face a tremendous level of pain, suffering, and hardship. They quickly recover from one difficulty to confront the next traumatic situation. If you want to see *the capacity to recover quickly from difficulty or toughness*, visit a homeless or domestic-violence shelter, methadone clinic, refugee camp, residential childcare facility, or neighborhood devastated by gang violence. For many in these situations, *recovering quickly from difficulty and toughness* become the focus of their everyday existence.

Most people entering services are already incredibly resilient when it comes to surviving traumatic events and chronic trauma. Unfortunately, struggles with mental, medical, social, and cognitive functioning make it difficult for many people to see the strength they developed by surviving their trauma and distress. One central task of building motivation is to help people recognize their resiliency and value as a counter to the trauma narrative of worthlessness and shame.

In most cultures, we celebrate the ability to soldier on in the face of adversity. If we just try harder or keep going, everything will turn out great. This mindset helps some get through tough times. But what about those whose tough times never seem to end? While society continues to expect them to soldier on and try harder, HRV shows us that their nervous systems are in a constant state of survival.
When I talk to people in services about trauma’s impact on mental, medical, social, and cognitive health, I find that helping them understanding the biological injuries of untreated trauma is liberating and often life-changing. Many feel that there is something inherently wrong with them, as trying harder does not yield positive results in their lives. Presenting them with the science on trauma shows that their struggles are not inherent flaws, but a consequence of something that happened to them. This crucial insight helps them recover their self-worth and builds motivation to engage in trauma treatment.

When compared to population norms, HRV helps to quantify this struggle. When comparing a person’s score to population norms, we want to reinforce their resiliency in the face of trauma. Yes, the pain and suffering of trauma are negatively affecting their nervous system and wellness. Yet, we want to celebrate their ability to find the strength to survive and even thrive in certain areas, despite the psychological and biological injury inflicted on them.

**Trauma Recovery**

*Recovery: A return to a normal state of health, mind, or strength; the action or process of regaining passion or control of something stolen or lost* (Google Dictionary, 2020)

Beyond demonstrating the trait of resiliency, HRV helps track the recovery process after a stressful event or even a trauma. Unfortunately, people do not stop experiencing trauma once they enter services. While post-traumatic growth describes a longer-term psychological healing process, recovery is a short-term return to previous functioning, which is possible because the person is already receiving professional support. HRV helps the person and professional measure the impact and recovery from distress and trauma occurring while the person is in service and tracking HRV.

The initial goal of recovery is to return daily HRV scores and weekly averages to the baseline of 30-day or longer averages. If a person successfully recognizes their struggle, utilizes effective coping skills, and gets the social support they need, they can watch in real time how these strategies help their HRV recover. It is one thing to feel a little better after some mindful deep breathing or a supportive therapy session. It is much more powerful to see your HRV improve 15 or 20%.

HRV provides the professional with insight into whether or not an event rose to the level of traumatizing the person. As mentioned before, trauma is a little tricky, because what traumatizes one person might just stress out another. Significant drops in HRV over a period of weeks might indicate that the person does not possess the skills to handle the amount of allostatic overload they are experiencing.

Distress rises to the level of trauma when it overwhelms our ability to cope, forcing us out of our window of tolerance without the ability to recover within a few hours or days. Not possessing the ability to cope is far from a negative judgment about the person. Each of
us has a level of resiliency, or the size of our cups, and a certain level of distress will traumatize anyone.

Many people enter services without useful coping skills. Significant drops in HRV for a week or more alerts us that the person may need additional support, treatment, or coping skills to return to baseline. The objective nature of HRV helps to remove the shame or stigma associated with the person’s struggles with trauma. Instead of viewing the setback as a character flaw, the conversation can focus on why HRV dropped and how to work to improve scores over time. Whereas “overcoming trauma” is ambiguous, finding ways to bring HRV gradually back to baseline is something that is easy to understand, quantifiable, and achievable.

After a traumatic event, the immediate goal is not a quick return to baseline, but a gradual improvement over days, weeks, or even months. The nature of trauma is that it is mentally and physically devastating. Whether recovering from recent trauma or a lifetime of hardship and pain, post-traumatic growth helps provide a light of hope in the darkness of trauma.

**Post-traumatic Growth**

*Post-traumatic Growth: Positive psychological change experienced as a result of adversity and other challenges in order to rise to a higher level of functioning* (Tedeshi & Calhoun, 2004)

The ultimate goal when working with people with a history of unresolved complex trauma is to help them achieve post-traumatic growth. With post-traumatic growth, a transformed person emerges out of the pain and suffering of trauma. There is a burst of energy and motivation that comes from understanding that if one can live through the hell of their traumatic past, they can start building a new and better life.

Post-traumatic growth takes time, support, and resources, and every person’s journey will be unique. Some people have been under the weight of trauma for decades, and it is unrealistic to expect this transformation to happen in six sessions or by only taking a pill. To transform trauma into strength and wisdom, the person first needs to get back on their feet, which requires shifting their self-concept from that of a victim or a person with little worth to seeing themselves as a person of value with something positive to contribute to their community.

Surviving being knocked down by life is resilience. The ability to gain strength and wisdom from the experience of getting up is post-traumatic growth. Each person who walks through the door comes in with an incredible amount of resiliency. However, most have not had the opportunity to translate their ability to survive tremendous hardship into the type of wisdom that would help them put their pain behind them and start living a more fulfilled and happier life. Those stuck in survival mode are limited in their ability to utilize their resiliency to realize meaningful change and heal from their trauma.
HRV provides feedback to both the person and the professional on the progress of trauma treatment. Because trauma treatment is psychologically tasking, after a therapy session, the person might experience drops in HRV that continue for hours or days. However, as HRV gradually increases through the healing process, the person sees the work’s tangible improvement in psychological health, helping to build momentum and motivation to keep moving forward.

For those with complex trauma histories, raising HRV scores to population norms is a longer-term goal. The decision of whether it is clinically appropriate to share their HRV comparison with population norms in order to demonstrate resiliency is up to the clinician. Regardless, increasing HRV to population norms serves as a long-term goal for the professional, who meanwhile keeps the person focused on improving short- and long-term personal baselines.

The beautiful thing about HRV is that it provides a clinical tool to show progress on the journey to post-traumatic growth. Whether this journey takes a few weeks or several years, HRV quantifies the impact of the work. As HRV improves, we should see positive trends in mental, medical, social, and cognitive health. Let’s break down how this improvement manifests during the post-traumatic growth process.

As mental health improves, higher HRV scores will usually correlate with reports of feeling less anxious or depressed. It is useful to track HRV with these self-reports. Showing a person that their HRV is trending in a positive direction as self-reports improve helps support their overall efforts to better their psychological health.

Improved HRV might also manifest in the person reporting an overall sense of feeling better. Oftentimes, psychological and medical health overlap in trauma treatment with the prescription of psychotropic medication. Medication can help manage symptoms while someone works with a therapist to heal their trauma. Because most drugs directly affect the autonomic nervous system, HRV provides a measure of the effectiveness of these treatments to regulate brain chemistry and the sympathetic/vagal balance.

People will also often experience improvement in the quality of their relationships as their HRV and ventral vagal functioning improves. One of the most important relationships is with the professionals helping them improve their health and wellness. For many people, their relationship with professionals is the first healthy one in their lives. As they build healthy friendships, find support groups, and repair relationships with loved ones, their nervous system will grow more resilient, resulting in gradual improvements in HRV. We will discuss the connection between the helping relationship and HRV more in a moment.

Cognitive health will also improve over time. As mentioned earlier, many of the brain areas responsible for cognitive functioning are underdeveloped if someone experiences repeated trauma, especially in childhood. As safety and social health improve, the person will rely less on the survival areas of their brains and nervous systems, allowing the prefrontal cortex and memory centers to heal and gain strength.
People will report better focus and the ability to think clearly as HRV scores improve. They will also gain a greater ability to contemplate significant life changes and find insight into their situation. Many people face not only overcoming their traumatic past, but also a range of choices about how they are living their lives. Successful change requires a great deal of contemplation and planning; a traumatized brain and nervous system will struggle to focus on these activities. As HRV improves, the professional should notice an increased ability for these cognitive tasks and motivation, making life changes more accessible to many people (Miller & Rollnick, 2012).

**Motivation**

*Motivation: The reason or reasons one has for acting or behaving in a particular way; the general desire or willingness of someone to do something* (Google Dictionary, 2020)

Motivation is another term thrown around a lot in the helping professions. Too often, we see people as either motivated or not. This simple all-or-nothing thinking fails to appreciate the complexity of motivation and the role of the professional in determining whether someone possesses motivation for action.

Think about a change you are trying to make in your life. Some days you might make remarkable progress; other days, you might take several steps back. You might wake up motivated in the morning, totally lose it in the afternoon, and then regain it in the evening. Motivation is not a stable personality trait that we have in the same amount each day or even minute to minute. Instead, motivation is a state, one that we can help people achieve with a strategic approach.

There are emotional, cognitive, and social components to achieving a state of motivation. Emotionally, the desire for change must overcome the fear and anxiety of what is lost or a lack of self-confidence. Cognitively, the person must contemplate whether a reason or need for change is worth the effort, and then create a plan to make the change a reality. Socially, the relationship with the professional and the support and empathy provided will dramatically impact the overall outcome of the change effort. As a measure of mental, cognitive, and social health, HRV helps identify the person’s capacity to engage in a change conversation and apply motivation to the life challenges confronting them (Miller & Rollnick, 2012).

At its core, making a difficult life change requires the person to confront and resolve ambivalence. Ambivalence is wanting more than one thing at the same time. For example, John wants to lose weight, but might also be dying for the donut in the break room, which leads to the second aspect of ambivalence: the diet and the donut are incompatible with each other. Everyone knows that if they want to lose weight, they need to reach for an apple and not the donut. Donuts do not facilitate weight loss, but boy, do donuts taste good! Resolving ambivalence involves the emotional and cognitive tasks of contemplating the positives and negatives of the change, and the person’s self-confidence that they can successfully achieve the outcome.
A great model to help understand the relationship between change and HRV is the stages-of-change model developed during the late 1970s and early 1980s by James Prochaska and Carlo DiClemente. Prochaska and DiClemente demonstrated that change is not an event; it is a process. If we can identify where the person is in the stages, we can implement strategies to help the person move to the next stage and one step closer to their change goals (Prochaska, DiClemente, & Norcross, 1992).

**Pre-contemplation Stage**

At the beginning of the change journey, there is little or no insight that a change is needed, and motivation is nonexistent. Maintaining patience might be hard when you see the negative consequences the person’s behavior is having on themselves and others, but pushing them into the planning or action stages will lead to frustration and resistance. Many people in this stage have some vague sense that something needs to happen.

In pre-contemplation, you want to identify any desire, need, reason, and confidence the person possesses for making a change. Research demonstrates that the more a person talks about their desire, reason, need, or confidence, the more likely they will progress through the early stages of change. Desire is the emotional pull that the person possesses to change. Reason is the person’s intellectual justification for considering the change. Need involves external consequences that loom for the person if they do not make the change or the positive outcomes if they are successful (Miller & Rollnick, 2012).

An HRV reading before a session helps identify whether the person has the cognitive and emotional capacity to move from pre-contemplation into the next stage of contemplation. Considering a significant change for the first time is highly stressful. The professional will need to make sure the person’s pre-session reading is close to or higher than their 30-day or all-time averages; this demonstrates they are in their window of tolerance and likely will be more open to discussing a potential life change. Talking about difficult change for
the first time will push many people to the very edge of their window of tolerance, starting in an initial regulated state that allows for movement to contemplation.

**Contemplation**

Once a person begins to consider change, they move from the pre-contemplation stage into contemplation. The word contemplation has significant philosophical and religious meaning and refers to the process of thinking deeply about a subject of great importance. Contemplation requires more exploration of the person’s desire, reason, need, and confidence around the change. Again, the more they talk about the change, the more motivation for action they build.

Like with the pre-contemplation stage, HRV needs to indicate a person is in their window of tolerance to ensure they possess the cognitive capacity and emotional regulation to engage in contemplating a change successfully. Starting in the window of tolerance is crucial, because in contemplation stage, the person acknowledges that a problem exists and confronts their ambivalence. For people with traumatic pasts, this insight often carries with it an elevated level of anxiety, shame, and guilt. This emotional reaction can be extreme enough to push the person to the edge of their window of tolerance and into denial.

**Preparation**

Once the person builds enough desire, reason, need, and confidence to get through pre-contemplation and contemplation, commitment becomes a primary focus. Commitment signals readiness for planning for action. If one person tells another they are committed to changing, the likelihood for success increases dramatically. If we hear the person talking about committing to an action, we should explore this thinking further (Miller & Rollnick, 2012).

Preparation is primarily a cognitive and social task as you problem solve with the person. Even though they progressed beyond the more emotional stages, ensuring they are in their window of tolerance through HRV is still essential. Motivation changes minute to minute and day to day. Anxiety about a change can quickly push someone back to an earlier stage. A pre-session reading helps to ensure the cognitive capacity exists to adequately plan for action.

In preparation, you work with the person to create a plan that helps them name their targets. Initially, these targets might take the form of fairly ambiguous long-term goals. These provide a general direction for the change conversations. As time passes, the long-term goals become more tangible, and you can work with them on creating concrete objectives to implement in the action stage.

**Action–Maintenance–Stable Behavior**

The next stages are action, maintenance, and stable behavior. In the action stage, people implement their plan and begin to modify behaviors that will help them reach their long-
term goals. The action stage often entails the person being tested and tempted, and they may struggle with past demons and feelings of self-doubt.

Once they start to form habits and traits supporting the new behaviors, they enter the maintenance stage, where they work to further integrate positive behaviors into their daily routine. You may notice that a person in the maintenance stage has increased confidence and will start to consider additional life changes. The action and even maintenance stages are ones of starts and stops for most people.

They may still have some conflicting feelings as they start to give up things they like about the old behavior. They might encounter expected or unexpected challenges like needing to form new friendships with those who support the change, facing consequences from previous actions, and withdrawal symptoms from substances. Eventually, new behaviors become just a part of their daily existence and require little or no conscious attention, signaling that they have reached the final stage of stable behavior.

Helping them monitor HRV in these stages helps support the progress from initial action to developing traits to support a new stable behavior. Most meaningful change will positively impact mental, medical, social, or cognitive health. This improvement should result in gradual increases in HRV over time. Conversely, drops in HRV serve as warning signs that a relapse might occur, and additional social support will help keep the person moving in a positive direction (Wilson, et al., 2016; Witteman et al., 2015)

**Relapse**

Relapse to a previous behavior or substance use can happen at any point in the process of change. Often, relapse is precipitated by a multi-day drop in HRV. Many people relapse for simple reasons, such as being tired, hungry, or frustrated with a person or event, or because of some random event, such as running into someone with whom they used to get high. Self-confidence may erode, and hopelessness can sink in. Relapse can be one of the toughest aspects of helping and can feel like a collective failure for both the person and the professional (Witteman et al., 2015).

Due to the shame, anxiety, depression, and effects of drugs in the case of substance use, there is also a substantial drop in HRV after the relapse behavior, which might predict further relapses in the short term. It is vital to communicate to the person that relapse into old behavior is a normal part of the change process.

Instead of viewing relapse as a failure, you can reframe it as an opportunity to learn. You can assist the person in normalizing relapse and understanding it as a part of the process of change. Use this experience to help them tweak their plan to address any triggers that might have led to the relapse and strategize how to avoid them in the future.

Focus on the accomplishments and successes in the action and maintenance stages more than the negative consequences of the relapse. One way to refocus after a relapse is to assist the person in strategizing how to bring their HRV back up to levels from before
the relapse. A focus on HRV avoids some of the shame of the relapse and helps them rebuild the cognitive and emotional capacity to return to the action stage.

One last important note about the stages of change is that a person can go back and forth from action to relapse to preparation. Change is not a linear process, which can make it seem illogical at times. It is common for people to jump around the stages of change or to not seem to fit nicely in one particular stage.

**Struggles for Trust and Safety**

Resiliency, recovery, post-traumatic growth, and motivation are not individual experiences. For someone to experience healing and change, they must feel supported through relationships founded on trust and safety. Trust and safety provide the person with the social support, or co-regulation, needed to gain insight and eventually control their states. Unfortunately, engaging people with a history of trauma is a complicated task. Outcomes are dependent upon our ability to build a relationship with someone who often has little experience of what it means to be in a healthy relationship.

A healthy relationship has boundaries, expectations, and limits. Many people with complex trauma histories create dysregulated relationships without appropriate boundaries. Establishing a healthy, helping, relational structure with the person provides them with a new model for relationships that can translate into other aspects of life.

Those who experienced trauma in relationships often feel distressed when getting close to another person. Distress often results in anxiety that pushes them out of their window of tolerance and leads to verbal or even physical aggression if they enter the fight response. Another person’s distress will trigger the flight response, leading them to disengage and drop out of care when they start feeling close to someone.

Some others will feel a strong pull toward the professional. As the trust builds, they cycle into a feeling of fear and want to disengage or exhibit chaotic behavior to escape their growing anxiety connected with their vulnerability. These people will seem very disorganized and difficult to read. Eventually, many people with this relational trait get a personality disorder diagnosis (Bloom & Farragher, 2011; Cozolino, 2006).

Still another challenge to building trusting relationships is that many people have been let down, bullied, and even abused by government bureaucracy, education, healthcare, and criminal-justice systems that were supposed to help them. While relationships are crucial for changing behavior, for gaining insight into behaviors and emotions, and for healing from trauma, it takes a great deal of time and effort to work through all their past experiences and struggles. When most people begin their work with us, their autonomic nervous system floods with dihydrotestosterone or DHT.

DHT, along with cortisol, is released when the person distrusts the professional, organization, or system. DHT adds to a person’s allostatic load, making it hard to stay inside their window of tolerance. Humans have a natural tendency to categorize people
as friend or foe; in other words, we see people as trustworthy or as potential threats. Due to past abuse by others, the person, especially early on the relationship, may see the professional as a foe, even though the professional’s job is to assist them in some critical way. The resulting DHT release can significantly compromise the person’s engagement and lead to less-than-ideal outcomes (Restak, 2006).

**Power of Co-regulation**

DHT and cortisol can lead to retraumatization, aggression, and disengagement. All these traumatic responses make it difficult to engage people in services and, even more so, around changing behavior or healing from trauma. Luckily, there is a powerful tool to help calm this sympathetic or dorsal vagal response. While every helping relationship will have its difficulties, trust provides a foundation for safety, insight, hope, change, and healing.

As trust builds, oxytocin replaces cortisol and DHT. Oxytocin is crucial to bonding in any relationship. Oxytocin accounts for the good feeling we experience when we connect deeply with someone. Research demonstrates that oxytocin increases a person’s HRV, improving their ability to remain in their window of tolerance and stay socially engaged (Kemp et al., 2012; Mate & Levine, 2010).

Richard Restak (2006) provides a perfect summary of his findings concerning the chemical effects of DHT and oxytocin as trust builds in relationships:

> Think of the experiments on trust as demonstrating the existence of two physiologic ‘levers’ in our brains (oxytocin and DHT) that activate in response to our interactions with other people. By creating an atmosphere of trust we enhance the oxytocin levels in the brains of those we come into contact with, and vice versa. Alternatively, if we signal distrustfulness, we activate the second ‘lever’ and increase DHT along with the accompanying likelihood of an aggressive response directed towards us.

As trust builds, HRV trends upward, and the person is better able to contemplate difficult changes and events for more extended periods without falling out of their window of tolerance. Co-regulation describes the feelings of contentment, calm, and safety that result from trust and oxytocin release. These feelings build a secure base, allowing for introspection and consideration about the harmful consequences of their current ways of thinking and behaving.

Trust is a two-way street. If we want the person’s trust, we must trust the person and treat them with respect. It helps to understand that many behaviors of the person, even those that seem illogical and counterproductive, are survival techniques at their core. Trust means that we believe the person is doing their best in the face of past and present challenges.

Without co-regulation and trust, there is no safety, and without safety, there is almost no chance for change and healing. For many people, safety is elusive, as the dangers of
domestic violence, addiction, homelessness, and lack of basic needs steal their ability to enjoy any real security in their lives. Without safety, the person will exist in survival mode and on the edge of their window of tolerance. The sense of being unsafe keeps people stuck in rigid or chaotic states, as they desperately try to establish as much safety and control as possible in their day-to-day lives.

Safety, in this context, is defined as freedom from hurt, injury, or loss. There are two types of safety you should consider when helping a person make a difficult change or heal from past trauma. The first is physical safety.

In general, future thinking, goal setting, and prefrontal-cortex functioning are nearly impossible without physical safety and security. If a person must focus on food or shelter, this will dominate their attention. Similarly, an adult or child in a violent home or community situation will focus the vast majority of their energy into creating as much physical safety as possible, usually through rigid or chaotic thinking and actions (Bloom, 2006).

The second type of safety, which is central to co-regulation, is psychological safety. Psychological safety provides the person with the confidence that you will respect their feelings and emotional well-being. This safety emerges from the trust we establish through our strength of character, consistent support, and follow-through. A psychologically safe relationship directly challenges the belief born out of trauma that all people are dangerous (Bloom, 2006; Herman, 1997).

Establishing both physical and psychological safety is a primary focus of any care setting. Without physical safety, there is little or no chance for meaningful change, as the person needs their states and traits to support survival functioning. Without emotional safety, people will struggle to see hope or to have the energy for insight beyond stress-based, rigid, and chaotic thinking. While our resources and referrals improve physical safety, a spirit of partnership, compassion, and acceptance provides focus areas for building and maintaining psychological safety.

Why You Are So Important

*Recovery can take place only within the context of relationships; it cannot occur in isolation. In her renewed connections with other people, the survivor re-creates the psychological faculties that were damaged or deformed by the traumatic experience* (Herman, 1997).

Many people, especially those experiencing trauma in their homes as children, never developed the biology to self-regulate their emotions. The lack of self-regulation makes it nearly impossible to feel safe with one’s self. Imagine walking around the world feeling like there is a time bomb of explosive emotions inside of you, and you have no control over when the bomb goes off and the consequences that will result.

Going through life without the ability to regulate emotions creates other tragic consequences. When traits of anxiety or depression develop, it becomes difficult to focus
and find motivation for academic or employment success. Then they meet you, the professional.

Study after study over decades finds that the most critical factor in determining outcomes in services is the quality of the relationship between you, the professional, and the person. As author John Murphy (2008) states, “Research has consistently indicated that a positive person—counselor bond, or ‘alliance,’ is the strongest and most reliable predictor of successful outcomes.” As trust and psychological safety increase, oxytocin brings on a sense of calm, providing people with the ability to feel what being in their window of tolerance feels like, often for the first time in their life (Bloom & Farragher, 2013).

The relationship provides a secure base and co-regulation for the person to gain insight into their own emotions and behavior. It is essential for anyone in the helping professions to understand that time spent building a healthy relationship is time well spent. Whether it is healing from trauma or making a significant life change, the relationship will provide the base where resiliency, hope, self-confidence, and motivation will rise (Dana & Porges, 2018; Herman, 1997; Miller & Rollnick, 2012).

Self-regulation is a skill that develops over time. Think of the co-regulation you provide as the training wheels giving safety and stability. These training wheels allow the person to slowly master the balance and agility needed to manage their emotional states. In time, they will develop new traits and ways of being in relationships and the world. HRV provides the metric to measure progress on this powerful journey from dysregulation to co-regulation to self-regulation.
Chapter 6: Innovations in Healing

It is only when we silent the blaring sounds of our daily existence that we can finally hear the whispers of truth that life reveals to us, as it stands knocking on the doorsteps of our hearts. K.T. Jong

The goal of this chapter is simple yet powerful: Help people improve HRV.

On the one hand, HRV provides an outcome measure for interventions and program effectiveness. If programs, therapies, and treatments are successful, those receiving services will improve their HRV. If an intervention is not improving HRV or decreasing it over time, the professional should strongly consider changing the course of treatment.

On the other hand, there exist decades of research into simple wellness approaches that improve HRV. Most of these noninvasive and inexpensive approaches can supplement any existing treatment approach or program’s intervention to improve outcomes. Strong research backs each of the strategies presented in this chapter, and most have few risks or side effects. However, everyone is different. Please consult with a medical or mental-health provider when appropriate before implementing new wellness approaches.
Power of Insight

*Pearson’s Law: That which is measured improves. That which is measured and reported improves exponentially* (Hay, 2015).

Until HRV, it was difficult to give people daily feedback on improvements to their mental, medical, social, and cognitive health. Adapting Pearson’s Law to HRV, when we measure health and wellness, it improves. When we share our HRV scores with someone we trust, health and wellness improve exponentially.

Using Pearson’s Law, a straightforward strategy to improve mental, medical, social, and cognitive health is to measure HRV daily. One consequence of existing on the edge or outside the window of tolerance is a loss of connection to self. Thoughts and feelings take on a life of their own. Behaviors seem to happen spontaneously with little way to preempt them, no matter how dire the consequences. The physical body screams with pain yet seems disconnected from any sense of self.

As survival states develop into traits, insight into emotions, ways of thinking, and behaviors become difficult. Taking time to look internally and ask, “How am I doing today?” is nearly impossible when all your energy goes toward getting through the next hour and surviving the day. Taking an HRV reading provides people with a moment to pause, be still, and listen to their heart speak to their current condition.

Most methods for measuring HRV take three to five minutes. Ideally, the person sits or lies down in a still position as a device sends information to a smartphone. For many people, these few moments are the only time they stop in the course of their day to focus on their wellness.

As a complement to other interventions or treatment, increasing their HRV becomes a powerful motivator for many. As the person works to beat their previous scores and averages, they learn which behaviors improve or hurt their HRV and adjust their life accordingly. Working with an empathetic professional, the person begins to take control of their treatment and health. The power of insight alone justifies the small investment needed to use HRV as a complement to existing treatments and programming.

One thing that is crystal clear in the HRV research is that the basics of wellness dramatically impact HRV. Historically, psychology, education, and even medicine have all but ignored wellness when working to improve mental, medical, social, and cognitive health and performance. No matter how advanced or innovative the intervention or treatment, without quality sleep, a healthy diet, and movement, the nervous system will not function at an optimal level.
Sleep

As mentioned earlier in the book, taking a morning HRV reading for most is the best time to get a snapshot of the energy the person possesses to take on the challenges of the day. The quality of sleep from the night before is one of the most significant determinants of a morning HRV score. HRV complements a growing awareness of the importance of sleep on physical, mental, and cognitive functioning.

Sleep helps to reset the autonomic nervous system to ensure the optimal performance of the body and mind. A good analogy to demonstrate the power of sleep is thinking about a cell phone, where the autonomic nervous system is the Android or iOS operating system that helps everything to function flawlessly. Eventually, due to the number of apps running, memory capacity, and just everyday use, phones slow down. In most cases, the solution to the problem is a quick restart. During the reboot, the phone closes apps, installs updates, and ensures everything is operating correctly.

Sleep is like restarting a phone, but for the mind and body. Everyone knows how great a good night’s sleep feels. While research shows that most adults need a full eight hours of sleep a night, the average person gets only 6.7 hours. There is a lucky minority of people who need slightly less sleep than eight hours. Someone waking up feeling refreshed after six or seven hours of sleep might find themselves in that group, but most people do need the full eight hours (Rath & Harter, 2010).

Beyond just being tired, insufficient sleep has a devastating impact on well-being and cognitive functioning. Lack of sleep has much the same effect as drinking. Like drinking too much, lack of sleep increases the number of mistakes people make and decreases productivity and intelligence. When sleep-deprived, people do and say things they usually would never say or do and might regret later. While those around them might notice the change in behavior, they remain unaware of how impaired the lack of sleep has made them (Stulberg & Magness, 2017).

Lack of sleep also hinders our ability to learn. During sleep, the brain files information learned throughout the day with similar knowledge gained in the past. Sleep is where many long-term memories form. Without sleep, the person fails to retain knowledge. If you ever crammed all night for a test in college, you probably did okay on the test itself, because you had the information in your short-term memory. But what did you remember a few weeks later? Probably not much (Schwartz, 2010).

Now it gets alarming as the research shows that lack of sleep over long stretches leads to weight gain, type 2 diabetes, and even early death. Sleep deprivation leaves the person more likely to reach for food or drink that is high in sugar and calories. Because the brain lacks the energy of a good night’s rest, increased calorie consumption provides the short-term energy it craves.

A recent study by the National Institutes of Health showed that sleep-deprived people consume 549 additional calories a day. Eventually, these extra calories put people at risk
of developing type 2 diabetes, which decreases lifespan. In addition to preventing type 2 diabetes and premature death, sleeping eight hours per night has been shown to facilitate healthy weight loss (National Sleep Foundation, 2019; Schwartz, 2010).

Unfortunately, many people in services fall short when it comes to healthy sleep. Especially for those with increased sympathetic arousal, the resulting anxiety, fear, and nightmares from past trauma make healthy sleep difficult. While the mind prevents many from getting to sleep, physical surroundings, living conditions, or lack of resources make sleep hygiene difficult to practice.

It is imperative that professionals feel comfortable discussing sleep hygiene. As sleep quality improves, HRV trends will quantify the impact of sleep on overall health and wellness. Let us look at some research that can help those who struggle with sleep.

Turn off all electronics about an hour before trying to sleep. Unplugging includes phones, computers, tablets, and TV. The visual field holds the light from these devices for about an hour after viewing them. Also, things like social media and email excite many areas in the brain. This excitement can prevent one from relaxing, thus keeping them awake longer.

A cool, dark, and quiet environment promotes sleep. For someone living in a shelter, institution, or noisy urban environment, help them access resources to control these factors as much as possible. The power of sleep on physical and mental health makes small investments in eye masks and earplugs money well spent.

While alcohol helps bring sleep on, it lowers the quality of sleep dramatically. Drinking and many other drugs often lead to waking up in the middle of the night and reducing the amount of deep restorative sleep. If someone is invested in their health but not ready to give up their use of drugs or alcohol, encourage them to use earlier in the day, if they are open to it. Allowing for a few hours for the adverse effects of the drug to process out of the body leads to a more restorative night’s sleep.

There are a few cheap or free strategies that improve sleep hygiene. Blinking eyes quickly for several minutes (basically making them tired) signals to the brain that it is time to sleep. Reading can also help tire the eyes. Choose reading material that is not too engaging. Magazine articles are perfect as they are short and do not tempt you to read the next chapter, like a good book will.

Research shows that waking up and going to sleep at the same time every day trains the brain and helps promote getting to sleep faster, as well as increasing sleep quality. Sleep consistency is one of the best strategies to help people who struggle with sleep. We will cover mindfulness in more detail in a moment. Practicing mindfulness near bedtime releases many neurobiological chemicals that promote sleep (Graves, 2008; Schwartz, 2010).

Sleep is crucial for optimal nervous-system functioning. If the person is only sleeping for a few hours a night, even the best treatments and intervention will fail to realize their true
healing potential. Even getting another hour or two a night could provide the energy needed for the person to reach their treatment goals.

Using HRV to measure sleep quality is simple. Have the person take a reading before going to bed. Then have them take another reading first thing in the morning. A restorative night’s sleep will increase, usually substantially, the Latest score over the Previous score taken the night before. If the inverse is true, it demonstrates that the person’s sleep quality needs improvement. The strategies listed above could help enhance the quality of sleep, give them more energy for the day, and improve short- and long-term HRV.

Movement and Exercise

Sleep refreshes the body’s systems and sets the body and mind up for a great day. Movement and exercise help manage allostatic load accumulated throughout the day. Movement is a must to maintain health under stress!

Due to the economic struggles of those we serve, exercise usually does not make it into many treatment conversations. Even for someone without access to a gym or the time or resources to join a fitness class, helping them find time to move will dramatically improve their physical and mental health. Because moving and exercise provide a powerful method for stress management, it is not surprising that adding them to a person’s practice is one of the best ways to improve overall HRV over time.

Exercise and HRV have a tricky relationship, especially for someone doing strenuous workouts. A good workout stresses the body physically. This stress lowers HRV after the training, demonstrating that the body needs time to recover from the strain. It is during this recovery process where muscles repair and get stronger.

If a person’s HRV morning score the day after a hard workout is lower than their 30-day average, it shows that the body is still in recovery mode. If the person then does another hard workout before their HRV is back to normal, it puts them at a higher risk for injury or illness. It might seem counterintuitive, but HRV is challenging many elite athletes to prioritize their recovery as much as pushing themselves physically. While intense physical exertion lowers short-term HRV, it improves longer averages over time as the body realizes the benefits of gains in strength and stamina (Moore & Elliot, 2020).

Let us return to the cup analogy for a moment. Visualize exercise as a release valve at the bottom of the cup. As cortisol fills the cup throughout the day, increasing allostatic load, a good workout opens the release valve, and the cortisol flows out the bottom. If cortisol is not released, it just sits in the cup and accounts for many of the medical, occupational, and psychological effects of distress (Rock, 2009; Stulberg & Magness, 2017).

Cortisol and stress prepare the body for physical action. Throughout human evolution, stressful events required a sympathetic nervous system response to run away from a
predator or fight an enemy. Human physiology has not caught up with today’s more sedentary lifestyle, where stressful situations require an intellectual and emotionally regulated ventral vagal and not a physical response.

While the physical benefits of exercise are well known, the effects on the brain are just as powerful. Not moving allows cortisol to remain in the body and become toxic. Over time, this leads to long-term physical, mental, and social problems. Eventually, cortisol starts to kill off brain cells associated with memory and intellectual functioning. People who exercise have larger prefrontal cortexes. In addition to creating healthier and larger prefrontal cortexes, exercise helps create new neurons in the brain, a process called neurogenesis. Neurogenesis and the removal of cortisol help improve learning and memory creation, as well as protect the brain from injury and aging (Kharrazain, 2013; Rock, 2009; University of Texas Southwestern Medical Center, 2010).

Movement and exercise deliver emotional benefits as well, and serve as a useful coping skill for many people. Think for a moment about how it feels to run, walk in the park, or take a bike ride. That good feeling is the release of endorphins or the natural opioids. Regular exercise improves overall mental health by lowering allostatic load and decreasing cortisol in the body (Fernandez, 2006).

Studies conducted with those suffering from depression document the power of exercise. Getting 30-45 minutes of vigorous exercise six days a week can lower depression and anxiety as effectively as psychotropic medication. While this is not a suggestion to stop medications, it does show that exercise powerfully improves mental health. Exercising promotes overall happiness and provides the energy to live a fulfilled life (Rock, 2009).

For most people, the goal is to build up to exercising several times a week at an intensity that works up a good sweat. This consistency may seem like a distant goal for many. Help the person to start small and remember that the important thing is movement. For those who are not currently active, start by walking around the block, taking the stairs instead of the elevator, or jogging for a bit and then briskly walking the rest of the way for a mile. The key is to do something active and try to build up more and more stamina. The positive effects will show in the body and brain almost immediately.

**Diet**

Another crucial aspect of physical health with a considerable impact on HRV is diet. Due to individualized needs, allergies, and rapidly evolving research on diet, here I examine approaches to nutrition shown to improve HRV. Generally, the challenge with diet is to think about how it impacts energy and mood during the day. Eating a healthy meal versus an unhealthy one can improve short-term HRV, while working on healthier eating habits in general will increase long-term HRV averages.

A healthy diet helps a person maintain a healthy weight. Besides leading to plenty of other health issues, obesity reduces HRV, as the additional weight puts stress on the body and
nervous system. The good news is as someone works to lose weight, they will see improvements in HRV.

Earlier in the book, I discussed the role of stress and inflammation on the gut and the terrible disease leaky gut syndrome. The sympathetic response to distress and trauma disrupts healthy digestion, which is primarily a parasympathetic activity. One often overlooked component of healthy digestion and the intake of nutrients is stress management (Dana & Porges, 2018).

Nutritional science demonstrates that certain foods increase or decrease inflammation. Even if someone has their stress under control, their diets might threaten to increase inflammation to unhealthy levels. One thing professionals should consider providing for people they serve is a food allergy test. While we know particular foods cause inflammation, an allergy to dairy, gluten, or other foods will significantly impact the autonomic nervous system, immune system, gut health, and cognitive functioning. These tests are getting more and more affordable, making it possible to help improve people’s HRV and overall functioning by identifying and removing any harmful foods from their diet.

Here is a list of known foods that cause inflammation and should be limited in a healthy diet.

- Processed foods
- Sugar, sugar substitutes, and artificial sweeteners
- Refined carbohydrates such as bread and pasta
- Alcohol
- Bad oils and fats such as seed oils and margarine
- Soda and sugar-sweetened beverages
- Grain-fed red meat
- Processed foods
- Monosodium glutamate or MSG

Here is a list of foods with anti-inflammatory properties

- Green leafy vegetables
- Probiotic foods
- Bone broth
- Sweet potatoes, yams, beets, broccoli, tomatoes, and peppers
- Blueberries, raspberries, and strawberries
- Wild-caught fatty fish
- Chia and flax seeds
- Extra-virgin olive oil
- Turmeric, ginger, and cinnamon
- Walnuts and almonds
- Garlic and onion
- Green tea
• Dark chocolate and cocoa (Moore & Elliott, 2020)

Unfortunately, especially for those in poverty, eating a healthy diet is more expensive and less available due to food deserts found in impoverished areas. One of the powers of HRV research is that it demonstrates that a diet relying on processed food high in sugar, bad oils, and refined carbohydrates is detrimental to mental health, creates medical issues, and limits cognitive functioning. A poor diet is a barrier to a range of educational, social, and financial outcomes.

While life situations might make implementing a healthy and HRV-friendly diet difficult, there is another approach that, if deemed appropriate by a medical provider, could help decrease inflammation, improve stress response, reduce hypertension, and improve life expectancy. Caloric restriction, often called intermittent fasting, is something almost anyone can implement. The excellent news is that fasting, or not eating for a period of time, does not cost any money (Nicoll & Henein, 2018).

There are several different approaches to intermittent fasting. The easiest one for most people is to eat all meals within an eight-hour period during the day, and then fast for sixteen hours for men and fourteen hours for women before the next intake of calories. Like a good night’s sleep, fasting allows the body to reset. Food fully digests, balancing insulin and glucose levels. In addition to improved HRV, intermittent fasting also helps people lose weight and fat, improves mental clarity and concentration, reduces inflammation, promotes a healthy cholesterol profile, and increases the production of natural growth hormones. People also live longer with intermittent fasting. Ideally, someone should still avoid inflammatory foods when intermittently fasting (Fung, 2016).

There are other ways of implementing intermittent fasting, some of which include fasts of twenty-four hours and more. While these also achieve impressive results on health and HRV, they are significant changes for most people. If a person is interested in these longer fasting strategies, they should check with a medical provider first.

**Mindfulness**

How much would you pay for a pill that had the following benefits? This pill improves medical health and immune functioning and helps speed up the healing from injuries and illnesses. Also, the pill improves HRV and mental health, lowers stress levels, and improves work outcomes. This same magic pill also increases compassion and empathy, and even improves your marriage, friendships, and other relationships. Some studies are even showing that this pill increases the size of the prefrontal cortex. The side effects of this pill are just 10 to 20 minutes out of your day. (Davidson et al., 2003; Davis & Hayes, 2012; Goleman & Davidson, 2017; Langer, 2009; Rock, 2009; Siegel, 2011; Siegel, 2016).

What is this pill? It is the practice of mindfulness. The autonomic nervous system unconsciously works to maintain the bodily systems that keep us alive. There are not
many ways to consciously control the functioning of the autonomic system and the vagal brake. The one control we do possess is our breath.

As mentioned earlier, every time we inhale, we activate the sympathetic nervous system, providing energy and slightly increasing heart rate. On the exhale, we activate the ventral vagus, promoting relaxation, putting a brake on the sympathetic activation, and decreasing heart rate. Respiratory sinus arrhythmia is the term used to describe this variation in heart rate during the natural breathing cycle. The practice of mindfulness, primarily when focusing on consciously controlling the breath, provides a powerful tool to regulate distress and improve HRV both in the short term and over time.

A daily mindfulness practice helps people manage distress in the short term and change traits over time. As mentioned earlier, neuroplasticity shows us that the brain and nervous system is always changing and evolving to meet environmental demands. Those surviving trauma must rely on the reactive and survival systems strengthening those at the expense of systems supporting emotional regulation, social engagement, language, and cognitive functioning. A mindfulness practice calms the reactive systems while strengthening the areas underdeveloped because of trauma.

After practicing daily for over a decade and talking to people all over the country about mindfulness, I find three tangible benefits that most receive from sustaining a daily mindfulness practice. First, the longer a person practices mindfulness, the calmer they remain in the face of distress and the better able they are to manage their allostatic load. Mindfulness evolved from a state I learned to create by focusing on my breath during my daily practice to a mindful trait that helps me stay calm and emotionally regulated throughout the day.

Second, mindfulness allows a person to recognize when their cups are filling up, and their states begin shifting from ventral vagal to sympathetic or dorsal vagal. When they realize that their allostatic load is reaching the edge of their window of tolerance, they take conscious power over their response. Catching their increasing allostatic load allows them to quickly implement coping skills to release the distress and avoid allostatic overload. The more they practice mindfulness, the better they become at recognizing when their states are becoming more anxious or depressed.

The third tangible benefit is that mindful practice helps provides people with an easily accessible coping skill that brings a sense of calm and peace when distressed. A mindful breathing practice allows them to take a deep breath and bring the peace and calm that they feel when they practice breathing into that moment of growing anxiety. Over the years of practice, they benefit by being able to recognize their state shifts and then take a few deep breaths to keep emotions regulated and remain in the window of tolerance (Siegel, 2011).

For the professional, it is essential to view mindfulness and emotional regulation as skills that require practice and develop over time. Most people we serve who come from trauma never developed the skills to identify changes in states, enact coping skills like mindful
breathing, and take deliberate control of their behaviors. When we view behavioral struggles as skill deficits, it challenges us to identify what skills the person lacked to manage a situation properly.

If someone lacks skills to handle distress successfully, it forces them to rely on existing behaviors. These actions are often disruptive and inappropriate for the situation. Our task is to work with them to develop new coping skills to handle situations differently in the future. Seeing inappropriate or disruptive behaviors as skill deficits removes judgment and replaces shame with motivation to learn new ways of handling the situation in the future (Greene, 2008).

Learning to focus on the inhale-and-exhale rate helps the person gain the skill of controlling their vagal brake, which stabilizes short-term HRV. Sustained mindfulness practice increases baseline HRV over time, shifting traits from anxiety, depression, and hopelessness to ones that support mental, medical, social, and cognitive health. A daily practice also repairs damages caused by distress, trauma, aging, and addiction (Siegel, 2011).

It is vital to help people find the right practice for their lives. Individuals with trauma might struggle with methods where they try to clear their mind or pay attention to their body. While mindfulness rarely does permanent harm, it does run the risk of retraumatizing some people. More than once, I have heard some version of the following: “When I clear my head, that is when my traumatic memories come rushing back.”

Here are a couple of strategies to help avoid retraumatization. Start with doing short practices with the person to get them comfortable and support them through any adverse reactions. Begin by focusing on a movement like a yoga pose, counting breaths, or repeating a prayer or mantra. If they like the practice and feel safe, encourage them to increase their practice time. Always permit them to stop immediately if any traumatic or fearful memories or emotions come up during the practice (Treleaven, 2018).

A couple of practices that are both safe and help with HRV are 1-to-2 breathing and coherent breathing. The practice of 1-to-2 breathing is excellent for helping those who are feeling sympathetically active to get back in their window of tolerance by applying the vagal brake. The strategy is to exhale twice as long as the inhale. As mentioned above, exhaling activates the vagal brake. The longer exhale permits a greater ventral vagal activation while limiting the sympathetic response, thus promoting an experience of calm and rest (Burdick, 2013).

Coherent breathing is simply an equal inhale-to-exhale ratio. This strategy is great when people need energy. If someone is feeling low energy, a few minutes of coherent breathing helps to balance the energy of their sympathetic nervous system with the calm and social engagement of the ventral vagus (Hollocks, Howlin, Papadopoulos, Khondoker, & Simoneff, 2014; McCraty & Zayas, 2014).
Another mindfulness practice specifically designed to improve HRV is biofeedback. HRV biofeedback usually uses a phone app and an HRV monitor to give live HRV scores during a mindfulness session. The great thing about HRV biofeedback is that it helps the person learn how their breathing, mental state, and mood impact HRV in real time. Integrating HRV biofeedback as part of a treatment or program allows the individual to learn about themselves, their states, and how to activate their vagal brake (Moore & Elliott, 2020).

**HRV Hacks**

As people in a variety of fields recognize the power of HRV, new and exciting interventions are showing that certain practices, not usually considered in mental health and medicine, are successfully improving HRV. While some methods require additional funding, others are cheap, free, and relatively easy to implement. Here is a list of HRV hacks to improve short-term scores and long-term baselines.

**Bodywork therapies.** Physical injuries or weakness in the muscular and skeletal systems negatively affect autonomic nervous system functioning. Traumatic memories stored in the body, often referred to as traumatic energy, also impact the autonomic nervous system. As mentioned earlier, because of the chemicals released during the trauma, traumatic memories are often disjointed and beyond conscious recall. Certain parts of the body associated with the traumatic experience can hold these memories and, when touched, can elicit a retraumatization response (Levine, 2008; Smith, 2020).

A growing number of trauma-informed massage therapists, chiropractors, occupational therapists, somatic therapists, and craniosacral therapists understand trauma and its connection to HRV and autonomic nervous system health. While often an expensive intervention, these specialists help to assess and heal structural issues and release traumatic memories stored in the body that impact medical and psychological health (Rosenberg et al., 2017).

**Hydrotherapy.** The use of water can affect HRV. A body of research is developing that demonstrates the power of cold to improve HRV and overall health. Here are a few strategies that are free to implement, help to enhance autonomic functioning, and are great for providing energy.

Simply take a cold shower while maintaining steady coherent or 1-to-2 breathing. The cold creates a stress response, waking up the body and providing sympathetic energy. By focusing on the breath, a person supports ventral vagal activation in the face of the stress response. Over time, cold showers and breathing strengthen the ventral vagus and increase HRV.

Another form of hydrotherapy is to alternate between hot and cold. Take your typical hot shower. Then turn it as cold as you can stand it for a minute, switch back to as hot as you can tolerate for a minute, and continue alternating for at least five minutes, ending on cold water. Maintain steady, mindful breathing throughout. The cold creates the stress
response and draws blood into the center of the body. The hot brings the blood to the surface of the body, activating a parasympathetic response. Maintaining a calm mental state while your body is on the hot/cold roller coaster builds resiliency and increases HRV (Hof & Jong, 2017).

**Stretching and yoga.** Physical stretching is a healthy habit to integrate into a daily routine. Because the vagus nerve starts in the neck, a simple neck stretch is excellent for cranial nerve health. Keeping the face directed forward, tilt the neck to the right shoulder for a minute, then to the left shoulder for a minute. It might sound too simple, but a flexible neck and body promote vagus nerve health and a strong HRV (Rosenberg et al., 2017).

There are a growing number of trauma-informed yoga instructors. Trauma-informed yoga checks several boxes when it comes to HRV. First, it is a great workout. Second, the stretches promote vagal health. Third, a trauma-informed instructor helps to release traumatic energy, providing an excellent opportunity for healing. Fourth, yoga is an excellent form of mindfulness practice.

**Internal activation of cranial nerves.** Sing! Sing loud. Singing and humming activate the cranial nerves promoting ventral vagal activation and improving HRV over time. For people who enjoy singing, encourage them to join a choir. Not only does the singing help regulate their nervous system, the social connections and attunement with others is also a powerful way to experience synchronization with other people. Also, gargling each day helps strengthen the vagus nerve. Just a couple of minutes of singing and gargling improves health, wellness, and HRV (Dana & Porges, 2018; Rosenberg et al., 2017).
Section 3: Quantifying Worker and Organizational Wellness
Chapter 7: HRV Self-Care and Quality

*If you become a helper of hearts, springs of wisdom will flow from your heart.* Rumi

Our people are not the only ones struggling with distress, allostatic overload, and trauma. Let’s say you gathered an entire community together in a massive stadium to find and help those struggling with mental illness. The catch is that all you know about your audience is their occupation; who would you call up first to get help?

Physicians and nurses are numbers one and two on the list of the most burned-out professions. Yes, the very people we go to for health, wellness, and healing, and who often make decisions that keep us alive, top the list for those professions struggling with the trauma and distress of their work. Our healers are sick.

Next, those in the social-work professions would come forward. Even though they spend their days helping people find hope and heal from trauma, they struggle to keep themselves healthy due to the amount of distress and trauma inherent to their work. It is challenging to improve another’s mental health when your own is compromised. What does it say about a community’s capacity to help those in need when those providing the services are failing to maintain their own mental health?
The next group we would call forward are the people who spend their days educating our children. Our teachers, followed by principals, round out the top five occupations for burnout. Education is an investment in future generations. The system we fund to deliver on this investment is destroying the very people working in it.

Our criminal-justice system is not in much better shape, with attorneys and police officers next on the list. We spend a great deal of time talking about criminal-justice reform and community policing. Unfortunately, many of those making life-and-death decisions on our streets are struggle to maintain the mental and cognitive health that supports effective decision making under distress (White, 2020).

In this chapter, we will examine what is wrong with us. The real cost of work distress is not just on our personal mental and physical health. In the helping professions, burnout destroys our ability to provide the quality of services people need. Self-care is quality care. Just as HRV helps us measure the impact of distress and trauma on those we serve, it quantifies our self-care and wellness.

What Happened to Us?

One of the reasons those in helping roles dominate the top occupations for burnout is empathetic intensity. Empathetic intensity is the psychological impact of listening to someone else’s trauma, pain, and suffering. When empathetic intensity overwhelms our capacity to cope, or fills our cups, we find ourselves disoriented, anxious, depressed, hopeless, and confused. Over time, the hurt, suffering, and pain of others become our distress, especially when we feel powerless to stop the trauma and get the person the help they need. This gradual buildup of empathetic intensity in our cups is often called compassion fatigue or vicarious trauma (Bennett & Bennett, 2019; Bloom, 2006; Bloom & Farragher, 2011; Geller & Madsen, 2004; Stamm, 2010; Wilson & Lindy, 1994).

We are also at risk of experiencing retraumatization from our work. This trauma occurs when a person’s traumatic story connects with our past experiences. When we experience retraumatization, the emotions we felt during our trauma come flooding back, overwhelming us with fear, sadness, and pain. This form of retraumatization is called secondary trauma (Lipsky & Burk, 2009).

These traumatic reactions are authentic traumatic experiences. Without treatment and healing, they threaten our long-term mental, medical, social, and cognitive health. As our cups fill up, we get pushed out of our window of tolerance and into a survival response. While our behaviors and decreasing mental health might manifest in different symptoms than in the people we are helping, we experience the same biological reactions and damage to personal wellness.

Our responses might result in dorsal vagal reactions such as emotional numbing and an inability to experience fulfillment and joy from our work. We may feel detached from or
lose interest in our work or those we serve. We avoid emotionally intense subjects and withdraw from those we serve, our co-workers, and people in our personal lives.

Others might experience more sympathetic activation. Here we experience anxiety, which can include symptoms like difficulty concentrating and trouble being present with other people. We start having trouble sleeping as it becomes difficult to block out feelings of constant anxiety, irritability, or anger (Bloom & Farragher, 2011; Harris & Fallot, 2001).

Our work exposes us to the darkest sides of society and human nature. Trauma usually results from someone doing something terrible to another person. If we’re not careful, hearing repeated traumatic stories can quickly lead us to develop a negative view of people and the world. This negative perspective evolves into a sense of hopelessness as we start to believe we lack the ability to truly help people or feel like we can not even keep them safe. As distress fills our cups, the increased activation of our sympathetic or dorsal vagus limits cognitive flexibility and creativity, making it challenging to find innovative ways to help our people (Bloom & Farragher, 2011; Geisinger Health System, 2008).

Besides the emotional intensity of our jobs, many of us work in environments that lack financial security, adequate staffing, and the resources needed for success. Deadlines, reports, meetings, paperwork, and other administrative work become incredibly stressful when success or failure might determine whether or not a program remains open. Distress builds when we are continually trying to provide services in an environment of staffing and financial scarcity.

There is a great deal of research surrounding burnout and the long-term consequences of work distress. Here are just some of the findings on the severe nature of occupational distress and burnout (Achor, 2010; Fernandez, 2006; Hoopes & Kelly, 2004; Maslach & Leiter, 1997; Siebert, 2005).

Impact on physical/medical health:

- Heart disease
- Stroke
- Type II diabetes
- Musculoskeletal disorder
- Cancer
- Chronic fatigue
- Sexual issues
- Gastrointestinal problems
- Headaches
- Colds and flu
- Back problems

Impact on psychological health:
Feelings of incompetence and doubt
Negative attitude
Memory loss
Cognitive decline
Early-onset Alzheimer’s disease
Sleep problems
Shame
Mental fatigue
Anxiety and irritability
Depression
Guilt
Aggression

Impact on social/occupational health:
Social isolation or relationship issues
Poor job performance
Absenteeeism
Tardiness
Theft at work
Dehumanization of students
Turnover or leaving education
Grievances and complaints
Litigation
Low job satisfaction
Blurred boundaries

Quantifying Work Distress

Just as those in services struggle to gain insight when experiencing distress or trauma, work distress takes away our ability to recognize declines in our mental, medical, social, and cognitive health. HRV provides daily feedback on how work is impacting our wellness. HRV serves as an early warning sign, allowing us to take action before we experience the negative consequences listed above.

A daily HRV reading provides a great deal of useful information when compared to longer-term averages. A morning reading compared to 30-day or longer averages offers feedback on how the distress and the allostatic load of the previous day or days are impacting wellness, the energy you have for your workday, and how well your sleep restored your physical and mental health. Daily morning readings serve as an early warning of burnout.
Morning HRV readings also help people plan their days based on their current state of wellness. A lower-than-average score means you might not possess your usual energy and stamina for the day. While a low HRV score does not require you to call in sick, it does alert you to limitations on your emotional regulation and cognitive flexibility. You might want to focus on less challenging tasks, if possible. If this is not possible, make sure you do not make hasty decisions, ask co-workers to double-check your work, try to take small breaks throughout the day, and fall back on healthy habits, such as a salad for lunch, a jog after work, and some quick mindfulness practices.

The inverse is also true. If your HRV score is at close to or above baseline, you are ready to take on new challenges and push yourself if necessary. A strong HRV score does not permit you to slack off on healthy habits; in fact, you might want to do a harder workout, as your body is both physically and mentally ready to perform.

In high-stress occupations, HRV also quantifies the impact of the allostatic load accumulated during the workday. Taking a reading before work, for many their morning reading, and then a reading after work provides insight into the effect of the workday on your wellness. The goal with before- and after-work readings is not to show improvement in HRV scores, as the typical workday in a stressful job will decrease HRV.

Instead, the goal is to gain insight into how the allostatic load of the day is impacting wellness and use this information to utilize self-care strategies after work. If successful, these strategies will promote recovery, allowing you to bring your best to work the next day. For a moderate drop in HRV, a workout, a healthy dinner, a quick mindfulness practice, and a good night’s sleep will set you up for a great day tomorrow.

If your after-work score is significantly lower, it is a sign that your body is struggling, and a hard workout or intellectually strenuous activity might increase the risk for illness or injury. If your energy is crashing, practice mindfulness, go for a walk in nature, eat a healthy dinner, and try to get to sleep early. These restorative practices help our bodies and minds recover, and our HRV also should improve as a result.

It is not uncommon in our helping occupations for devastating or traumatic events to occur. Unfortunately, too many of us in these fields have experienced a person getting angry and attacking staff, committing suicide, harming another person, passing away, overdosing, and other events that are traumatic for the individuals and teams working with vulnerable populations. HRV provides both insight into how these events impact our wellness and whether our strategies are helping support our recovery.

Trauma experienced at work is still traumatic. A trauma will result in a dramatic drop in HRV. Whether we experience a traumatic event, vicarious trauma, or secondary trauma, we go into a sympathetic or dorsal vagal survival response. Our mental, medical, social, and cognitive health are now at risk.

Many professionals feel like if they admit to experiencing trauma at work, it is an indication of weakness. Instead, it is a sign that we are a caring and compassionate human being.
working in a field where we are at a high risk of psychological harm. Many of us want to think we are getting better over time and do not need to worry about our mental or physical health. Our HRV will not lie. The objective scores will tell us if the pain is still with us and threatening our wellness. If HRV does not recover, we should view it as an indication that we need to access mental-health services to aid our recovery.

**What Is in My Cup?**

For those in the helping professions, there are three primary sources of stress filling our cups daily. One is distress in our personal lives. The one piece of self-care advice I received in seven years of undergraduate and graduate education in human services and psychology was to “Leave work at work and home at home.” The goal of this advice is useful, as ideally, distress at work would not impact our personal lives and vice versa.

Unfortunately, no one gave me a separate cup for personal distress and work distress. Instead, allostatic load builds throughout the day regardless of our environment. If we are going through trauma in our own lives, it is nearly impossible to prevent it from impacting our emotional, cognitive, and social functioning at work. While we should do everything possible not to let distress in our personal lives affect our work quality, if our cups come into work full, our quality will suffer. Let’s not pretend we possess a superhuman capacity to drop all personal stress before entering work. Instead, we need to acknowledge that our ability to live happy and healthy lives directly impacts the quality of our work.

The second source of stress is the empathetic intensity discussed above. The connection between the top occupations for burnout is not the inherent difficulty of the work itself, although these are not easy jobs by any stretch. What connects these occupations is the emotional nature of the work and resulting empathetic intensity. As mentioned earlier, uncertainty and importance are two things that increase the negative experience of distress. Empathetic intensity is such a powerful driver of burnout because we care deeply about those we serve.

Besides the importance of caring about those we are helping, the uncertainty of empathetic intensity makes it difficult to “leave work at work.” While good advice, no one ever prepared me for the level of uncertainty I needed to leave at the door as I left work. I found it impossible to drop worries about people possibly committing suicide, harming others, staying with an abusive partner, dying from an overdose, or a child getting abused at home. Few human beings possess the capacity to forget the uncertainty of these life-or-death worries just because the clock says it is time to go home.

The final source of distress is simply all the other demands of the work environment: burnt-out co-workers, dysfunctional team or organization dynamics, infuriating bureaucracies, paperwork, grant deadlines, emails, meetings, and the rest of the list could fill the remainder of this book. Many of our work environments never seem to get adequate resources, leaving many professions with a workload that is nearly impossible to manage even on a good day.
Stages of Burnout

I will use the term burnout to describe a condition where empathetic intensity and work distress result in allostatic overload, negatively impacting our mental, medical, social, and cognitive health and functioning. A simple four-stage model of burnout helps demonstrate the escalating effects of distress and trauma on people's well-being. The four stages are 1) Exhaustion, 2) Guilt, Shame, and Doubt, 3) Cynicism and Callousness, and 4) Crisis.

As people progress through the stages, they experience the symptoms of the stage they are in, as well as those of previous stages. The higher the stage, the more anxiety, sympathetic activation or depression, and dorsal vagal activation, and the lower the quality of work. The goal is to stay out of these stages altogether. The secondary goal is when you do recognize the symptoms of the early stages, take action to get out of the stage before moving to higher stages (Maslach & Leiter, 1997).

Exhaustion

The first stage, exhaustion, is something almost every professional struggles with from time to time. While the goal is to stay out of the stages of burnout, the tremendous amount of distress we face makes it nearly impossible to go more than a few months without experiencing some level of exhaustion. Many of us exist a few tough days away from falling into this stage.

Identifying exhaustion is critical, because if people don't act to address it, they are at risk of quickly moving into more harmful stages. HRV helps warn of exhaustion when the 7-day average falls considerably below your 30-day or all-time averages. Recognizing that we are on the edge of exhaustion allows us to take small actions that help get us out of the stage and back into wellness.

Physical, psychological, and social triggers usually accompany significant drops in 7-day averages, generally around 15% or more. Along with HRV drops, triggers are signs that your work and overall allostatic load are starting to impact your wellness. Think of these triggers and significant declines in 7-day averages as your mind and body telling you that
something is going wrong with your current state and that it is time to take action before the state worsens, and you progress to later stages.

Notice your physical state. Physical triggers are often the easiest to identify. Common physical triggers include stiff necks, sore backs, strained muscles, headaches, colds that will not go away, and other little aches and pains that are more annoying than debilitating. An excellent way to distinguish the physical triggers associated with burnout from typical aches or pains is whether a drop in HRV accompanies the trigger. Most small injuries will not bring down the functioning of your autonomic nervous system, but physical triggers brought on by increasing allostatic load will show up as drops in HRV.

Psychological triggers indicate an increase in sympathetic or dorsal vagal activation and include dreaming about work, trouble sleeping, obsessive worry, ruminating about work, and minor depression or anxiety. These triggers are not at the level of a mental-health diagnosis unless someone is already struggling with a psychological issue. They do put you at risk of more significant threats to your mental health if you do not take action to get out of the exhaustion stage.

Physical and psychological triggers exist within your body. Social triggers show up in your relationships. In your personal life, social triggers include a lack of desire to connect with friends and family in meaningful ways and less patience with your children and loved ones. The good thing about social triggers is that these people might give you some feedback about how you are treating them. The key is to listen!

Unlike many jobs, helping is a highly social occupation. When you are in the exhaustion stage, you may find that it becomes harder to empathize and be present with people personally and professionally. Empathetic listening is an intense activity that takes lots of focus, energy, and attention. As exhaustion creeps in, you will find it harder to engage fully in conversation and connect emotionally to people, especially those speaking about their pain or trauma.

As with the other triggers in this stage, social triggers will not result in marriages breaking up, friendships ending, or getting fired from jobs. However, if unaddressed, these small changes in relationships often become more significant issues with greater consequences. The important thing with all triggers is to recognize when your mind, body, and behaviors are telling you that something is wrong and then act to correct the problem.

In exhaustion, healthier coping skills shift to unhealthy ones. Instead of jogging or going to the gym, you may opt for another glass of wine, binge-watching a new favorite television show, or spending hours lost on social media. While none of these activities is inherently bad, they should not be the primary coping skills to distress and exhaustion. The more time spent in the exhaustion stage, the harder it becomes to get out of bed in the morning, find excitement in work, and locate the energy for social interactions in your personal and professional life.
The good news is that if you identify that you are in this stage, a long weekend, a few great workouts, and some time with good friends can take some of the distress out of your cup. Finding your way back into wellness should result in improved daily HRV scores. If you fail to address burnout at the exhaustion stage, you are at risk of moving to the next stage: guilt, shame, and doubt.

**Guilt, Shame, and Doubt**

It is tricky to measure when exhaustion moves to guilt, shame, and doubt from HRV averages. People might stay in exhaustion for months, as their 7-day averages stay lower than longer averages without recovery. Guilt, shame, and doubt are psychological reactions to not being able to perform at your best. One possible HRV indicator is when your monthly average starts falling 5 to 10% below your all-time average. Let’s examine some other warning signs.

People need you at your best every day. It is uncomfortable to realize that exhaustion is decreasing the quality of your work. This realization leads to feelings of doubt about your ability to regain your former level of quality. A sense of guilt and shame usually accompanies this doubt, as you recognize you are not living up to your own standards and expectations, realize you are failing to give your best to those you serve, and do not possess the energy to be a good co-worker or teammate.

In this stage, you may have increased awareness and internal unrest about the privilege in your life. You may find that it becomes harder to go home and enjoy your family, friends, and life when you know that so many people you care about are homeless, hungry, or experiencing violence, racism, and other hardships. The sense of guilt resulting from this awareness starts to deteriorate your ability to get pleasure out of your work. If you do not feel like you are significantly impacting the situations facing the people you serve, you begin to feel like part of a system designed to manage these issues instead of solving them.

Another result of guilt, shame, and doubt is a sense of hypervigilance. Because your exhaustion prevents you from accomplishing everything you want at work, you start to work longer hours. Just because you are working longer hours does not mean you are getting more done. In fact, the opposite is true. The exhaustion from the long hours decreases your energy further. While you may technically work longer hours, these hours become largely unproductive and inefficient (Rock, 2009).

You may also have trouble disconnecting. You may start checking work emails at home in the evening and on vacation. You feel guilty because how can you disconnect when so many people need you? Then you feel shame because the quality of your work is terrible. These feelings of guilt and shame cause a dangerous cycle of emotional distress and may become noticeable in further decreases in productivity and effectiveness.
This cycle creates a sympathetic response, giving you a push to work longer. However, the exhaustion and sympathetic activation hinder cognitive capacity, so your quality suffers, and your energy for social engagement and the ability to emotionally regulate drop dramatically. The sympathetic push is short-term and is followed by a dorsal vagal crash where you have little or no energy for your family and personal life (Schwartz, 2010).

In the second stage, you may find that you need to talk to someone else to process these feelings. Often an empathetic co-worker, supervisor, or friend serves as an adequate source of support. If you exist in this stage for long periods of time, you might need to access mental-health therapy to resolve your guilt, shame, and doubt. Time off is a good idea. In the second stage, you might need two weeks off to recover from the exhaustion and regain your mental health.

**Cynicism and Callousness**

People can only hold guilt, shame, and doubt for so long before they trigger a defensive reaction, leading to the third stage of burnout: cynicism and callousness. Cynicism and callousness are a natural reaction to continuous experiences of exhaustion, shame, guilt, and doubt. Whereas the first two stages are state-dependent, cynicism and callousness become traits that transcend the work environment.

As traits, cynicism and callousness usually take months and even years to develop. Obviously, it takes a great deal of HRV data to show progression to this later stage. At best, we could speculate that seeing a year-over-year drop of 20% or more in HRV scores might indicate that someone has moved to this later stage of burnout.

Many people in this stage experience a dorsal vagal response. This response results in their withdrawing empathy, as their sympathy and caring dissolve into a cynical view of the work, the people they serve, and co-workers. Other experience a sympathetic response where increased anxiety leads to disrespecting people they serve and co-workers by gossiping and acting passive-aggressively. Those existing in this stage for long periods will display a toxic mix of dorsal vagal and sympathetic responses throughout the day. In cynicism and callousness, these behaviors and emotions become traits in both their work and personal lives.

While most of the people I meet in the helping and healing fields are caring individuals, I must acknowledge that cynicism and callousness are way too prevalent. While our professions do not attract mean or cruel people, burnout leads many once empathetic and passionate people to end up unable to find the kindness and patience needed to work with people successfully. Unfortunately, because they did not get help in earlier stages, they are left in a dark place and create an unhealthy environment for those they serve and co-workers.
The devastation of stage 3 demonstrates why we must address burnout in stages 1 and 2, before they progress to cynicism and callousness. Everyone finds it challenging to work with people at this stage. Negative experiences with cynical and callous people make it hard to recover without drastic action. Individuals in this stage cause real harm to others. Resentment and frustration grow beyond the point where a simple apology gets everyone back on good terms.

Usually, mental-health services are needed to recover from stage 3. Exhaustion, guilt, shame, and doubt are states that change back with some effort. Cynicism and callousness become personality traits that impact relationships at work and in their personal lives. If you find yourself in this stage, know that the path back to wellness will take time and considerable effort. HRV will help you monitor this journey.

**Crisis**

The final stage, crisis, is where no person wants to end up professionally or personally. People in the crisis stage are actively experiencing trauma from work. Due to high levels of distress, allostatic overload, and trauma over long periods, they are no longer able to function, either personally or professionally, from a healthy place. If the person in crisis somehow manages to keep their job, they most likely isolate themselves from their co-workers. Rarely can co-workers maintain a healthy working relationship with someone in so much pain.

The trauma of crisis transcends the work environment and prevents the person from being a decent spouse, partner, friend, or parent. Divorce and other extreme relational issues often happen when someone is in crisis due to work distress. Addiction is not uncommon and makes all the person’s difficulties much more intense.

Heart disease, cancer, mental illness, Alzheimer’s, relationship issues, and the other scary impacts of work distress should not be the price we pay for dedicating our professional lives to the service of those in our communities. Unfortunately, the distress and trauma associated with working with people with trauma threaten to take years, if not decades, off our lives.

**Staying Healthy with HRV**

Integrating HRV into self-care is a strategic approach to maintaining wellness while maximizing productivity and effectiveness at work. HRV does more than demonstrate the adverse effects of work distress. It also helps you assess whether self-care strategies are working.

In high-stress professions, self-care strategies must be both proactive and reactive. Proactive strategies are daily and weekly practices that maintain health, as measured by HRV. I challenge you to think of yourself as athletes or musicians who must prepare and
train before their performances. The goal of proactive strategies is to bring your best self to work every day.

HRV provides daily feedback to measure the effectiveness of these proactive strategies to mitigate the negative impact of work and personal distress. For someone beginning to measure HRV, it is useful to compare scores and initial averages to population norms and set some concrete goals. If your HRV is performing well compared to people in your demographics, your goal is to maintain these high scores over time. If your scores are at the low end, what strategies, behavioral changes, and healthy habits will help you raise your scores gradually? Again, do not get too worried or excited when comparing your score to population norms. Your primary focus remains on improving your averages over time.

The strategies mentioned in the last chapter that improve HRV also work for self-care. Stay curious, try out new approaches, and measure their effects with daily readings. Baseline improvements show that your strategies are working and positively impacting the health of your body and mind. Be kind and patient with yourself. The long-term health benefits are worth the work!

Everyone needs reactive strategies at the ready for when HRV drops due to overwhelming distress at work or in their personal life. It is much easier to plan how to get your HRV scores back up before you experience burnout than to try to do it when your energy and cognitive functioning are less than optimal. To help you create a reactive plan, answer these questions:

- What strategies am I going to implement if my 7-day average is significantly lower, 15% or more, than my 30-day or all-time averages?
- What are my strategies if my 30-day average is significantly lower, 5 to 10%, than my all-time baseline?

One of the best ways to recover is to take time off, as it disconnects you from work distress and allows you to engage in activities that bring you joy and relaxation. As a strategy to overcome the early effects of exhaustion, a significant 7-day drop might recover with a three-day weekend. The longer you wait, the longer the extended break you will require to help your mind and body recover.

Here are some strategies to help maximize your time off. Make it proactive as well as reactive. Scheduling frequent long weekends and regular vacations will keep you healthy and productive.

Plan healthy time off. Too often, people replace work distress with other strain on their bodies and risk returning to work more exhausted than when they started their time off. During time off, people might drink more and eat less healthy; while it is important to have fun, do not overdo it, as drinking, drugs, late nights, and unhealthy food will lower HRV in this time of recovery.
Another key to healthy time off is managing physical exertion. If you are taking time off for recovery, balance physical activities like skiing, watersports, and other strenuous activities with relaxation. These activities are great if HRV is in a good place, but adding physical exhaustion to mental exhaustion limits the therapeutic nature of time off.

Disconnect from work when you are off. Let’s return to the cup analogy for a moment. Whether it is after a day at work or when you are on vacation, time away from work does two essential things. One, you stop adding additional work distress to your cup. Two, if you are relaxing or engaging in healthy activities, you are getting distress out of your cup.

Unfortunately, our modern technology makes it difficult to leave work at work. If you check email outside work hours, over the weekend, or on vacation, you do two harmful things. First, you stop the recovery process by re-engaging emotionally and cognitively in work tasks. By engaging in work, you lose the benefits of recovery.

Second, you add more allostatic load to your cup, as emails require you to respond or complete a task, or might upset you emotionally. We believe our technology is making us more efficient. However, plenty of research shows that, if misused, it will prevent us from recovering and bringing our best to work when we return (Rock, 2009: Schwartz, 2010).

While time off is essential, think about other reactive strategies to help you recover when HRV drops. Some strategies could include increasing connections to people you love and who bring you joy, seeking mental-health support, and increasing healthy coping skills such as mindfulness, exercise, and healthy eating, while minimizing drinking, drugs, and other behaviors that threaten to decrease your wellness further.
Chapter 8: Leadership and Organizational Wellness

Let the rays of your heart shine on all who pass by. Terri Guillemets

Like many in the helping professions, I was promoted to a leadership position without any training, support, or even much knowledge about what I was supposed to do in my new role. As a young leader, I felt desperate to find a model that I could apply to an environment where staff got exposed to trauma and disruptive or dangerous behavior every day. Specifically, because I saw how common burnout was among staff, I wanted to know how you could support staff wellness, so we could provide the highest quality of services those we served needed.

The good thing about being promoted to leadership positions so early in my career was that I was still in my master’s program in counseling psychology. My psychology major was not extremely helpful when it came to managing healthy teams and programs. Fortunately, I attended one of the first universities in the country to offer a major in nonprofit management, something called executive development at the time.

I decided to spend a little more time in school to double major in executive development. After taking my first business class, I realized that while my background as a therapist gave me useful communication skills that I could utilize as a leader, I lacked the
knowledge and skill set to lead or manage others. While those classes only gave me an introduction to management and leadership, they did spark a passion that continues to burn bright today.

My major in executive development provided some much-needed knowledge. However, I was working in environments where my staff sometimes got physically attacked, spent hours listening to the horrors of child abuse and domestic violence, and often lost people we cared deeply about to gang violence, suicide, or drug overdose. No matter how much I searched the library or asked questions of my business professors, no one could help give me a model to keep staff healthy and productive in the face of the physical danger, psychological distress, and trauma associated with the work of assisting people in healing from complex trauma.

I wanted to become the leader my staff needed. My drive came primarily from witnessing what toxic work environments did to the quality of services people received in the unhealthy organizations I worked in early in my career. As a young therapist, I tried to help my clients find hope and self-confidence, and heal their trauma. While my clients were struggling, many times, my co-workers displayed much greater symptoms of mental illness and trauma.

People with psychological and behavioral struggles came to us for hope and healing. Instead of providing a safe and healthy environment to support healing, we spent time fighting with each other or dealing with our secondary trauma and burnout. Still struggling to figure out how I could create a healthy and high-performing work environment for staff and those we served, I enrolled in a master’s program of business administration with a healthcare focus, thinking maybe these professors could help me find answers.

Thanks to this program, I developed further as a leader. I could read a cash-flow statement and use quantitative math to solve organizational problems, and I also grew my understanding of a leader’s role in creating a healthy corporate culture. However, I had hard questions, such as, “My clients often attack my staff; how do I help a staff member recover from the assault and go back to providing empathetic services to the person?” Or “How can I help prevent burnout when we know several of our students are being abused every night at home and the state will not do anything?” Or “How do I keep morale up when we have a client so violent that I’m sending multiple staff members each week to emergent care because he keeps attacking them?” These all remained unanswered. I wish I had pictures of some of my professors’ faces when they heard my questions.

It was after graduating with the MBA that I was introduced to the concept of trauma-informed care. It was not long after I first heard the term “trauma-informed” that the idea of a trauma-informed organization started dominating my thinking. Like many others, when I started getting training on the research and science of trauma, I realized that not only were the people in our programs struggling with behaviors associated with unresolved trauma, most of the staff were exhibiting the symptoms of trauma as well.
I recognized that I was in a unique position, having training in both psychology and business administration. Tired of waiting on someone else to tell me how to create a healthy and high-performing organization, I decided to use my expertise and get to work on defining the concept of a trauma-informed organization. Fast forward a couple of decades, after thousands of hours of research and conducting hundreds of trauma-informed leadership trainings, I hoped that I had contributed some answers to the questions that haunted me earlier in my career.

Unfortunately, one problem remained. How do you quantify the organizational wellness necessary for the delivery of high-quality services, create financially stable organizations, and facilitate meaningful change in the communities we serve? Like most people with a passion for leadership, I had collected my favorite surveys and even created a few specifically for organizations working on their trauma-informed journeys.

Unfortunately, the cost and time needed to conduct these surveys meant that most could only happen once every six or twelve months. Questions like, “How are my staff doing today?” “Is that self-care initiative we started producing a healthier workforce?”, or “How well is our staff recovering after that violent incident on Monday?” remained impossible to quantify.

I cannot remember whether I first saw the potential of HRV as a clinical tool or an organizational wellness tool. As someone who thinks about both trauma-informed care and trauma-informed organizations, I saw how HRV could further both of my passions. HRV provides leaders and managers with a way to assess and support the wellness of their workforce, not once every six months, but every day.

**Leadership and Team Health**

In the last chapter, we discussed the connection between self-care and quality services. Distress, trauma, and burnout threaten to destroy quality, as those in the organization deliver less than optimal services. The inverse is also true. Staff wellness creates the energy that fuels successful clinical and organizational outcomes.

The actions and words of leaders determine the importance of staff health in an organization’s culture. Most leaders support staff taking care of themselves outside the work environment. Traditionally, these leaders view self-care as a non-work-related activity, even though the emotional distress of the work threatens their employee’s mental, medical, social, and cognitive health.

Imagine a fire department not providing their firefighters with proper protective equipment or a construction company not giving their workers hard hats and safety goggles. Because of the risk inherent to the work, these organizations have a legal obligation to ensure the physical safety of their workforce. With those in helping professions dominating the top occupations for burnout, we must begin to prioritize psychological health and safety the same way we do physical safety.
While I hope all leaders genuinely care about the wellness of their staff, creating a healthy workforce is necessary for the delivery of quality services. A person experiencing burnout loses the cognitive and relational capacity to fulfill the organization’s mission. The fact that physicians, nurses, social workers, teachers, and principals dominate the top five occupations for burnout demonstrates a failure in these systems and their leadership, and is a call for a new approach to staff wellness (Schwartz, 2010; White, 2020).

I believe that staff wellness and a structural focus on self-care serve as cornerstones to any organization’s attempt toward becoming more trauma-informed. A trauma-informed leader focuses time and energy on their staff’s health, and a trauma-informed organization prioritizes staff health and wellness as one of the most important metrics when evaluating a leader’s job performance. While leaders should never utilize HRV in a punitive way against a struggling employee, I fully support evaluating leaders on the health of their teams as quantified by HRV.

For most teams, comparing the team’s HRV average to population norms provides a reliable measure of the team’s health. For teams, a focus on 30-day averages helps the leader answer, “What is the health of the team?” If the team’s 30-day average is below population norms, the leader’s goal is to work with the team to increase HRV to match or outperform the population norm. If the team’s 30-day average meets or exceeds the population norms, the leader’s goal is to maintain this level of wellness or find ways to make small improvements.

Comparing team averages to population norms is a little more difficult, due to the mix of different ages and genders represented in the team. If the app does not provide this comparison automatically, the organization needs to find the population norms that fit the demographics of each member of the group and average them together to establish a meaningful comparison. Once able to do so, the comparison of team and organizational averages versus population norms provides an excellent measure of the overall health of the team and the organization as a whole.

HRV provides daily feedback to the leader. Whereas individual daily HRV scores do not give the leader much actionable data in most situations, daily team averages inform leaders about the health and wellness of their teams. A significant drop in a team’s daily average signals the leader to check in with the team and its members if possible. The first goal is to identify the cause of the drop. After identifying the issue, the leader can provide support and address any problems. This action, if followed by a recovery in HRV, will prevent momentary struggles from escalating and negatively impacting the emotional health and motivation of the team.

Once establishing a 30-day average for a team or organization, HRV provides data on the success of efforts to improve health and performance. Some efforts might dramatically improve the health of specific teams, while resulting in adverse outcomes for others. HRV allows leaders to customize organizational efforts to the unique needs of particular teams.
HRV data enables the leader to reinforce changes that produce improvement in HRV and discontinue efforts that show a reduction in group averages.

**Improving Individual Employee Health**

In the helping professions, where distress, trauma, and burnout are so prevalent, staff need the support of leadership to create and implement a concrete self-care plan. Trauma-informed leaders play supportive roles and hold staff, and themselves, accountable to these plans. Prioritizing self-care and ensuring every staff member has a plan integrates staff wellness as a central component to an organization’s culture where everyone understands the connection between their health and quality services. As mentioned in Chapter 7, this plan should include proactive and reactive strategies.

The proactive components of a self-care plan clearly state what the employee will do on a daily, weekly, and monthly basis to maintain their health and wellness. If an organization is serious about self-care, they need to offer staff time and space throughout the workday to practice mindfulness, take breaks, and practice other strategies. Self-care is not just about the individual’s health. It is about maximizing their performance at work.

Leaders should work with staff to identify times and strategies throughout the day to help them disengage from the distress, even if just for a few minutes. A room dedicated to mindfulness, healthy food choices, supporting lunch breaks and short breaks throughout the day, and access to exercise opportunities before or after work or at lunch are just some of the ways organizations are supporting self-care at work. While the self-care plan also details strategies for outside of work, supporting self-care at work shows that the organizational culture truly values employee health and sees it as essential to accomplishing their mission.

HRV and identifying physical, psychological, and social triggers are a crucial part of the self-care plan. Individual staff members will work with the leader to set HRV goals and identify strategies to take when drops in HRV become a cause for concern. Again, population norms help direct whether the strategy needs to address improving or maintaining HRV averages. Sharing triggers with a trusted leader allows the leader to point out when they might identify these triggers, even if the staff member does not possess the self-awareness to see them because of increasing allostatic load.

When the staff member sees significant drops in their HRV scores or starts experiencing triggers, they need to have created a set of reactive strategies to implement in order to get out of the exhaustion stage. As with the proactive measures, the reactive plan should include personal strategies to maximize physical, psychological, and social health. The supervisor also can support the individual with organizational strategies, such as supportive supervision, therapy through an employee-assistance program, and use of paid time off.
The final part of an HRV-directed self-care plan is professional development. When staff works on improving themselves professionally, staff not only increase the quality of their work, but it helps put the distress of the work in perspective. If a person solely focuses on surviving their day, a bad day becomes all-encompassing. When someone sets goals to improve themselves and grow professionally, they view a difficult day as part of their more-extensive professional journey.

When people connect their work to a larger purpose, they experience improved well-being, endurance, energy levels, creativity, problem-solving, learning, and confidence. In other words, purpose creates resiliency in the face of distress and difficult work situations. There is more good news: those who live their purpose maintain better mental and physical health as they age (Duckworth, 2016; Duhigg, 2016; Dweck, 2006).

Establishing a self-care plan with a leader helps to increase accountability. This accountability needs to go both ways. The psychological, social, and cognitive health of the leader is one of the most potent determinants of staff wellness and performance. Burnout manifests in states of negative emotions, thinking, and moods. A leader’s mental state is highly contagious, as a burned-out leader will burn out the staff they supervise.

Talking about and sharing self-care strategies, triggers, and HRV scores put the staff in a potentially vulnerable position. A good leader supports the integration of self-care into the organizational culture by sharing their self-care plan with their staff. If the leadership is holding their staff accountable to self-care plans, the staff need the power to keep their leaders accountable for their plans as well. The leader should also consider sharing their HRV scores with their staff. Again, this strategy promotes accountability and the supportive nature of HRV use in trauma-informed organizations.

Once staff establish self-care plans, the leader focuses on monitoring staff health. HRV dashboards provide daily feedback on the wellness of individuals and teams. The leader should also schedule time, at least every two weeks, to check in with staff. This check-in allows the leader to review HRV, identify triggers, and adjust self-care plans to provide support to struggling staff. This scheduled time for check-ins helps build trust and operationalize self-care into the organization’s operations.

**Monitoring Staff HRV**

HRV provides a language for organizational conversations on wellness and performance. When everyone in an organization begins to take an HRV reading every morning, as staff monitors the HRV of those in services, and leaders start tracking staff HRV daily, the attention and focus on wellness increases dramatically. Implementing an HRV program for services, self-care, and leadership immediately provides a focus and language that brings mental, medical, social, and cognitive health to the forefront of everyone’s mind.
Remember how we adapted Pearson’s Law to HRV in Chapter 6. When we measure health and wellness, it improves. When we share our HRV scores with someone we trust, health and wellness improve exponentially.

When staff establishes their first 7-day average, a comparison with population norms provides a context to view this initial score. The leader and staff should approach this initial average with curiosity. While the first week of readings provides a reasonably accurate baseline, a couple of really good or bad scores might skew the data in a way that will correct itself once establishing a 30-day average. The first week of HRV at an organization will create excitement and nervousness. Leaders should try to meet with staff individually during this week to talk about what their initial baseline is telling them and what they are learning about themselves.

For staff, establishing a 30-day average and comparing data to population norms helps answer “How is this person handling the distress of their personal and professional life?” The staff and leaders then compare 7-day averages with 30-day or longer averages to answer, “How is this person doing this week?”

A staff within a standard deviation of population norms is likely doing well both at work and personally to manage their allostatic load. Their goal is to keep their 7-day average within a consistent range with their longer averages and population norms, while finding ways to improve over time gradually. For healthy staff, HRV provides a gauge to whether distress is impacting them negatively, as demonstrated by drops in their 7-day averages over multiple weeks.

For staff with lower HRV scores, leaders should stay curious and supportive. Remember, genetic factors alone might account for higher or lower scores with staff. Leaders and staff do not want to overreact to the score when establishing initial baselines. Regardless of the starting point, the question always remains, “How do we help improve health and wellness?”

The above approaches work well when implementing HRV for existing staff. What about a new hire? New staff should receive training on HRV as part of their orientation. Their leader or human resources department needs to ensure that they feel comfortable with the technology and assist them in taking an accurate reading.

Ideally, a new employee would begin to take readings as soon after getting hired as possible. Establishing a 7-day average before starting work helps the organization assess their onboarding process and provide emotional and social support for new staff. These initial readings will inform their discussions with their leader as they develop their self-care plan.

**Daily Scores**

Daily HRV scores provide the professional with feedback on their health and how behaviors and events improve or decrease mental, medical, social, and cognitive
wellness. In most situations, leaders want to avoid getting in the weeds of daily readings. Instead, leaders best utilize HRV when they offer support and encouragement around improving 7-day and longer averages.

The main problem with daily readings is that a single reading might drop for a variety of reasons. Healthy behaviors such as a long run, an intense bike ride, or an extended fast can lower short-term HRV as the body recovers from the stress, while improving overall health once recovery happens. Another reason leaders should avoid looking at daily readings is that personal events might decrease HRV. A fight with a spouse, a sick child, a Saturday night of heavier-than-normal drinking, or a bad night’s sleep reduces daily scores.

As long as the employee shows up and performs to expectation, these personal events are not the concern of leadership, as long as 7-day averages stay consistent. While a daily score can predict productivity and effectiveness on the job, most people manage to perform consistently through one or two days of lower scores. HRV is useful as a leadership tool when it supports medium- to long-term wellness and health, as longer averages factor out the ups and downs of daily events that only have a limited impact on overall wellness and productivity.

There are a few situations where daily HRV monitoring allows the leader to offer an additional level of support. When the leader does regular monitoring of daily HRV, the leader should work with the staff in deciding what and when data is shared. Involving staff in the decision-making process helps to position HRV as a supportive wellness tool and avoids it feeling like a punitive measure.

Sharing daily scores is helpful when the leader is supporting an employee’s recovery from a highly distressful or traumatic event that occurs at the organization. When disruptive events happen, distress will likely show up as a significant decrease in HRV. The leader’s goal is to provide the support and resources necessary to help the staff recover. HRV offers an objective measure of the recovery process and allows the leader to gauge the effectiveness of the support and resources.

In certain occupations where lives hang in the balance, such as surgeons, construction workers, pilots, and first responders, significant drops in daily HRV might indicate a reduction in the capacity for effective decision making, physical dexterity, and the ability to read critical social cues. Leaders and staff should proactively strategize different interventions when these significant drops occur. Everyone should understand that any action taken after a considerable reduction in HRV occurs for everyone’s safety.

When an abnormally low HRV score occurs, the employee should take another reading shortly after. While a good reader and app will provide accurate scores, there is always a chance for a technological glitch, a short-term physical event that goes away in an hour, or some other rare event that retesting could correct. Retesting ensures the justification of any action taken for safety reasons.
I admit I struggle with the above suggestion, as I know leaders need these critical workers to show up for work and do their jobs. I also know that most people want to work and often feel guilty when health and psychological issues prevent them from showing up for their teammates and organization. However, I also know the dire consequences HRV can help avoid. If these reductions in mental, cognitive, or social functioning put the employee or others at risk, daily readings might save lives.

If HRV is used to mitigate risk to the employee or others, the leader needs to ensure they use the intervention in a supportive way that avoids shame and stigma, and protects the confidentiality of the employee. Just as daily HRV tracking helps leadership make crucial decisions on how personal or professional distress impacts staff safety and readiness, daily readings also track recovery and show when the employee is safe to return to their work. I highly encourage leaders who supervise these high-risk positions to work with staff to come up with specific proactive and reactive self-care plans that promote a collaborative approach for recovery while prioritizing safety.

If you remember only one thing from this chapter, it is that leaders should never use HRV in a punitive way. No staff member should ever receive punishment for a drop in HRV. Providing HRV data to a leader puts the staff member in a vulnerable position. The only way HRV becomes a successful management tool is when it is used to support wellness and self-care. The minute that HRV is used to shame or punish staff is the moment it becomes useless. Loss of trust between staff and leadership will make HRV data less trustworthy or staff will stop taking readings altogether.

**Addressing Organizational Implementation Issues**

There are some challenges to organizational HRV implementation. Many people feel hesitation or even fear when thinking of their leaders getting their HRV scores. This reaction is in part due to the privacy issues of our modern society. HRV might seem to some like a big brother who monitors your social media and other communication, and now gets very personal information on your daily wellness.

The more common concern is that people do not trust their leadership to use the data to support them but assume they will use it to punish or fire them. Trust is one of the essential components of organizational success. While HRV is something personal, if the staff trusts that their leadership will use it to support their wellness, the hesitation usually transforms into collective curiosity. Often teams with high trust will set ambitious goals concerning their scores, share HRV scores freely before meeting to help others know how they are doing, and swap strategies that improve HRV scores (Kouzes & Posner, 2007).

Leaders need to communicate openly and honestly as to why they are collecting HRV, exactly how they will use the data, and what protections are in place to limit the punitive use of the data. Some organizations choose to restrict the information shared with leaders or allow staff to opt out of the HRV program. Some examples include supervisors and organization leaders only seeing team averages, instead of getting person-specific
information. Another strategy is to work with an outside party to monitor team HRV and produce reports that remove personal identifying information. A third option is to let people use nicknames that only they know. Leadership gets individual data but cannot identify whose scores are whose.

Sometimes the lack of trust is overcome with small incentives such as monthly gift cards or a reduction in the healthcare plan contribution. As HRV grows in notoriety as the measure for mental, medical, social, and cognitive health, more insurance companies are likely to partner with organizations that incorporate HRV into their wellness initiatives. With incentives, it is essential to find something meaningful for staff.

A final note about the hesitation of sharing HRV information with leaders: when leadership feels pushback because the staff does not trust them with their HRV data, it might indicate broader issues in the organizational dynamics. As someone who introduces HRV to thousands of people, I love the excitement that people get when thinking about implementing it with those they serve. If the excitement is not present, leadership needs to determine what the deeper problem might be in the organization.

When I start discussing the self-care benefits, there is a visceral reaction. Few people see barriers for clients to share information. However, many recoil at the thought of sharing their HRV with their leadership. Just as when a client stops taking HRV readings might indicate an issue to check in with them, staff not trusting their leadership with HRV data often points to significant organizational problems with trust and psychological safety.
Chapter 9: The HRV-Informed Organization

Does this path have a heart? If it does, the path is good; if it doesn’t, it is of no use.

Carlos Castaneda

We live in exciting times. Technological developments over the last three decades have changed how we communicate, view ourselves, and live our lives. Before technology helped us see the brain and nervous system in action, we relied on concepts such as libido, vapors, and humors to describe the human condition. While this technology sparked a revolution in knowledge, expense and practicality prevented the vast majority of us in the helping professions from using it to inform and improve our work.

Today, inexpensive wearable monitors and smartphone apps allow us to take everything learned about the brain and nervous system and apply it to those we are helping, ourselves, and our organizations. HRV enables us to measure what we could only speculate on before. We no longer need to guess about the impact of our interventions, programs, self-care strategies, and leadership initiatives.

In this final chapter, we will explore the concept of an HRV-informed organization. The description of this fictional HRV-informed organization might seem like a vision of a distant future. However, many organizations are currently taking steps to make it a reality, as all
of the technology described below already exists and is available at rates of less than one dollar a day per user. HRV is here and ready to become a tool for innovation.

A New Hire

Anna is excited about her new job. The multifaceted organization had a reputation for innovation, and she felt a sense of pride, as the hiring process was highly competitive. However, she is also a little nervous, as she knows its reputation as a very demanding place to work. For every staff member who loved working there, there was another story of someone who could not meet the high expectations.

Anna entered the administrative wing for her initial meeting with Human Resources. She thought it a little odd that this meeting got scheduled for a week before her official start day. Regardless, she was excited to get some of the paperwork out of the way and learn more about her job.

In the waiting room, she filled out the typical tax and contact information. After she finished, she handed it to the administrative assistant, who shot her a sly smile, “Good luck on your first reading; I’m outperforming my boss this week, though I doubt she will mention it.”

Anna was taken off guard by the comment. “Okay,” was all she could think of to say, but her voice communicated her confusion.

“Relax,” the assistant glanced at her paperwork. “Anna. It is mostly painless.” Again, the sly smile returned to the assistant’s face as she called back, alerting the HR administrator that Anna was ready.

A moment later, the HR administrator and her new supervisor, Wes, walked around the corner. Seeing the confusion on Anna’s face, they both chuckled.

“Are you HRV-hazing our new hire?” the HR administrator asked the assistant, with a flat affect that soon turned into a smile.

“Just enjoying my upward trend and green status today.” She shot her boss a glance that communicated a friendly competitive spirit with a hint of holding her boss accountable.

“I scheduled that three-day weekend; you’d better keep that high number, because I’m coming back refreshed and back in the game,” the administrator said, as the two shared a chuckle.

Her new supervisor saw Anna’s confusion and interrupted the back and forth. “Don’t worry, Anna; our culture here is a little different. It won’t take you long to catch on.”

As they got comfortable in the HR administrator’s office, she handed Anna a package of paperwork. “Here is the boring stuff; hopefully, all the benefits and policies are self-
explanatory. If not, feel free to reach out. Just bring everything back signed on your first day.” The administrator reached into a cabinet door and pulled out a small box.

“Now for the fun part,” Wes said with a smile.

Anna took the box and saw the words Heart Rate Variability Reader. Although she had been in the helping field for decades, the term was new to her.

Seeing confusion return her face, the administrator chuckled. “Welcome to the future, Anna. Most HR professionals are stuck neck-deep in benefits management, disciplinary action, and other boring stuff. My main job here is to make sure you are healthy and supported in a way so that you thrive here for years to come and provide our clients with world-class services and treatment.”

“Your health is actually in both of our job descriptions,” Wes said with a welcoming smile. “It might seem odd at first, but everything we do is structured so our clients get the very best services. We know that your health and wellness will determine if we meet this goal.”

Anna did not know what to say, as this initial meeting was discussing her health and wellness more than her entire tenure at other jobs. “Thank you,” was all she could say.

Wes handed her a card with some login information. “I want to support you right from the start, as I know transitioning into a new job is highly stressful even under the best situations. As part of your initiation, please take this quick online training and survey. The training will help you take accurate HRV readings. Do not worry about your scores this week. Establishing an initial baseline will give you some personal data to reference in your orientation training.”

The First Reading

It was apparent that HRV was central to the culture of her new organization. Anna was excited to figure out what was in the box. As soon as she got home, she logged into the website on the card Wes gave her and opened the box.

In the box, she found a small, unimpressive device that had an ear clip. Following the instructions on the card, she created a profile on the site and an online training started playing. The training explained a little about HRV and how it measured mental, medical, social, and cognitive health. Anna was surprised that she had never heard of HRV, especially because there were decades of science demonstrating its efficacy.

The training went on to explain that the organization used HRV as a measure of clinical outcomes, the wellness of its staff, and the overall organizational health. Even though it seemed that HRV determined so much in the organization, the training went on to explain how no one is ever punished or disciplined due to HRV, and that the staff are in full control of whether or not they share their HRV information and who sees it.
The training then went on to explain how to download an app on her smartphone and connect the reader. It again stated that these first readings, while critical to take, were not shared with anyone and remained private until she decided to share. Anna was not sure if HRV or privacy was more important in her new organization.

With some nervousness, Anna put the sensor on her ear and took a reading, which took several minutes. When she got her HRV score, she started a second video, which helped her understand what the score meant, that her eventual goal was to use it to maintain or improve her overall wellness. It also provided her with some population norms to put her first score in a broader context.

While still a little confused about how this simple number measured so many important things, she was pleased to see her score fall into the average for women her age, even if it was on the low end of that average. Her first reading sparked her interest but left her with more questions than answers. She was excited to do her next measurement and see how the organization integrated this new biometric into its operations and culture.

**Professional and Personal Development Training**

By her first day of orientation training, Anna had established a five-day baseline. While her readings stayed within range of the population norms, she did notice them start to decline as she became more anxious about starting her new job. Could this little reader really measure her stress levels?

Orientation training dominated her first week. When she got the schedule, she was surprised to see that the first day was titled Self-Care & HRV. She had had a half dozen or so jobs since graduating college, and none of them included self-care in their orientation training, much less launching orientation training on the topic. Maybe this place was different.

The training kicked off with the CEO welcoming the staff before she put up a slide with a bunch of data. The data had columns for HRV scores and activities such as sleep, exercise, and time off. The CEO shot a glance at the trainer, who shrugged as if to communicate that he was not that impressed with what he saw on the screen. She responded with a sarcastic shrug of her own before beginning.

“Your health and wellness will determine the quality of services our clients receive. For the first several years of my tenure as CEO, we talked the talk about self-care, but many, including myself, did not walk the walk. I knew our clients saw our front-line staff as role models for health and wellness, and staff looked to the behavior of their leaders to model self-care.”

She paused for a second before continuing. “Hypocrisy is easy until you gather data that shows the story you tell yourself and others is just a bunch of B.S.”
A chuckle came from the new staff. Few had ever seen their CEO at previous jobs, much less got this sort of honesty on day one.

“We brought HRV in as a clinical tool and outcome measure for our mental-health and medical services. To help our staff learn the tools and get comfortable with the data, they started taking measures on themselves. I will never forget the day our quality director showed up at my door with our first HRV data report. The averages of both our medical and mental-health staff were well below population norms.”

“You mean, the people you paid to help others heal had lower physical, psychological, and cognitive health than the general population?” the trainer said in a half-joking voice.

“That is exactly what I’m saying. For some reason, I promoted one of those in the initial data set to the training director position,” the CEO joked back.

Another chuckle came from the audience. It was apparent this was not the first time these two had given this presentation, but you could tell that they genuinely enjoyed the task.

The CEO continued, “I was shocked. I asked our quality director to present the data to the leadership team. In my typical stress response, I wanted to fight the problem head-on. I was going to whip these burnt-out workers into shape.”

“The rest of my leadership team was just as shocked. Then the quality director educated us that these low levels of HRV scores put our staff and high risk of mental and medical illness, lowered morale and productivity, hindered their ability to engage our clients, and likely was costing the organization money in higher insurance costs, mistakes, absenteeism, and turnover.”

She paused again. “I was ready to rally the leadership to fix this unacceptable situation. Before I could open my mouth, our quality director silently started handing out HRV readers to our leadership team. I still remember his words.”

“Before you fix them, let’s get our own baseline. I would hate to waste our time on fixing something before we understand the scope of the problem.”

“We came back a week later and realized that our leadership team’s average was not just underperforming population norms, but was even lower than those of our medical and mental-health staff. The proof was in front of us. We had an epidemic of burnout in our organization, and the sickness started at the top.”

The training director smiled, “So what is that slide you have up?”

“This slide shows my HRV scores for the last two months. While we respect staff privacy, if you are in a leadership position, you share your scores each week. Just looking at this slide, you can see that last week I had a stressful couple of days because of an outside audit that was finishing up. However, you can also see the self-care strategies I implemented to combat the additional stress during this stretch. While my scores still dropped for a couple of days, they bounced back quickly.”
“That, my new friends, is what we call resiliency!” added the training director.

The CEO smiled. “And what we call honesty, transparency, and accountability. HRV forced us to address our hypocrisy. We spent months implementing HRV across the organization with staff. In the two years since the staff implementation, our outcomes have improved dramatically, turnover is at an all-time low, and our productivity is off the charts. We still have our good days and bad ones, but I am proud to say that all our teams are within or outperforming population norms.”

“Even the leadership team?” asked the training director.

“Yes, even the leadership team!” The CEO put up another slide showing the group average for the leadership team over the past two months compared to population norms.

The CEO set the tone for orientation training. The first day was all about the science of HRV, best practices in self-care, and the creation of individualized self-care plans for how to thrive at work and in their personal lives. The second day focused on the use of HRV as a clinical tool in different programs throughout the organization. Anna was amazed at how HRV data drove clinical decision making and the story it told about health, resiliency, and trauma and the post-traumatic growth of the people the organization served.

**First Day on the Job**

After a great week of orientation training, Anna was excited to get to work. She was fascinated that her HRV gradually improved during the week of training. She had learned about the importance of psychological safety in training. It amazed her that HRV seemed to quantify her experience of feeling a greater sense of safety as the orientation week progressed.

Even though she wanted to get to work, the only thing on her schedule was a meeting with Wes. That morning, her HRV score was a little lower than her baseline, so she made sure to eat a healthy breakfast, add another couple blocks to her morning dog walk, and spend five minutes practicing some of the mindfulness breathing she learned in orientation. Curious, she took another reading and was happy and a little surprised to see her score jump 15% from her previous score.

Wes and her new team welcomed her with a big sign, a round of introductions, and a welcome basket. Instead of the usual donuts, this gathering had healthy smoothies, fruit, and an assortment of tea. An HRV-healthy snack, she thought to herself.

After a friendly welcome, she met with Wes in his office. In a way, she could not explain until that moment this feeling she had every time she walked into the organization; it just felt good to her. Wes’s office felt like a home den rather than a stale work environment. The lighting was warm, the walls were painted a calming light blue, the chairs were comfortable, and while there was not much on the walls, he had brought in some nature scenes from his travels and pictures of work team events.
As she sat in a comfortable chair, she felt herself relax. While the office was exceptionally welcoming, the rest of the organization gave off a similar vibe. The overhead lighting was softer, the paint warm, and natural light utilized as much as possible.

Wes gave her a second to just sit before beginning. “If you do not mind, I would love to start with a reading. Of course, it is up to you if you share.”

“I would love to see my score. I feel an equal measure of nervousness and excitement right now. I’m curious how that will show up on my reading.” Anna pulled out her reader from her bag, a little nervous to sit in silence with her boss for a couple of minutes.

Anna’s score was slightly below her baseline. She wondered how Wes would react.

“As you heard in orientation, we do not require anyone to share their data. Well, that isn’t totally true; everyone in a leadership position is required, so you can always hold me accountable.” Wes turned his computer screen around to show Anna his last two months’ of scores. Like the CEO, he was outperforming population norms.

He continued. “Staff get a few more options. First, as you learned last week, as part of employment, we require staff to take daily morning readings. However, you have the option of depersonalizing your scores. We use them to calculate the health of our team and organization, but your data is just to help you manage your self-care and wellness.”

Anna appreciated the option for privacy.

“The other option is to identify your data. This option allows me to see your 7-day, 30-day, and all-time averages. Your data stays between you and me unless you choose to share it with your teammates. We find that this option helps supervisors better support staff, lowers healthcare costs, reduces turnover, and improves individual performance. Because of these findings, we offer $100 off your insurance contributions each month.”

Anna was surprised that she could save $1,200 a year by sharing a biometric that she did not even know existed a couple of weeks ago. But a sense of worry came over her.

“If I go with the second option, will my HRV get included in my performance review?”

“Great question, Anna. Absolutely not. Nothing will get a leader in this organization fired quicker than a punitive use of HRV. However, since my job is to support you in maintaining and even improving your health, wellness, and productivity, I am evaluated on my team’s health as measured through HRV.”

“Wow, so if I don’t take care of myself, it impacts you?” Anna asked bluntly.

“Yes, although it is deeper than just an HRV score. Over the last several years, the organization’s outcome data demonstrates a connection between HRV and productivity, quality, outcomes, risk management, HR costs including health-insurance costs, absenteeism and turnover, team performance, and client satisfaction. My performance gets measured by all these factors. HRV is such a powerful predictor that it becomes our best daily tool to measure leadership effectiveness.”
“If I go with the second option, can I change my mind at some point?” Anna asked.

“Yes, we ask for a six-month commitment if you choose to share. This commitment is more for administrative reasons. Changing people’s insurance contributions and the technological changes to our HRV databases get a little crazy if people change their choice weekly.”

“I’ll share my data,” Anna said with confidence.

Wes handed her a tablet with a disclosure agreement that outlined the six-month commitment, the organization’s promise not to use the data for performance review purposes, and the healthcare contribution savings. She signed and handed it back to Wes.

“As I mentioned, I only get 7-day averages, so this question is optional for you to answer. I’m wondering how your scores compare to your baseline as you went through orientation, and how your first day is impacting your HRV?”

“My baseline was in the range for my population norm demographics, but a little on the lower end. I know that in the orientation, they told us not to worry about population norms, and the goal is to measure against your own baseline. However, I am a pretty competitive person.”

“Join the club,” Wes said, pointing to his scores on the monitor.

Anna continued, “I found it fascinating that the more comfortable I felt in orientation, the better my scores were throughout the week.”

“Wonderful,” Wes almost jumped out of his chair. “Over the last year, leadership did a great deal of work to build an orientation training series that increases HRV over the course of the week. We are in the third month of our new format, and while you are a sample of one, it is great to hear your results.”

Wes’s statement blew Anna’s mind. “You evaluate training effectiveness by our HRV scores. Is there anything you don’t use HRV to assess?”

Wes laughed. “The longer we work with HRV, the more it gets integrated into everything we do. We are in the business of improving psychological, physical, and social health. You will see soon how we integrate it into the clinical care our program delivers. From an administrative and leadership perspective, why would we do anything if it does not improve the HRV of staff or clients?”

“Makes sense,” Anna said.

Wes continued, “We replace donuts with healthy food, performance improves. The health of our staff improves, we decrease turnover and absenteeism, clinical outcomes improve, and so do our finances. We build a gym so staff can work out at lunch or before or after their shift and we see afternoon productivity and client satisfaction skyrocket.”
Anna was curious. “Any negative consequences in all of this HRV focus?”

Wes’s face changed to a frustrated look. “Accounting.”

“But you said your finances improved.”

Wes smiled. “Oh, our financial health is better than ever. It is the accounting department, that is the problem. Initially, they hated the idea of HRV. We even had some turnover in that department, which had a reputation for burnout. Honestly, no one liked working with them. After learning he could quantify cognitive health, our head of finance got obsessed with HRV, and I mean obsessed. They structure everything around what they can prove increases their team’s HRV. We conduct an unofficial competition to see which team gets the highest HRV average. Accounting won ten out of twelve months last year.”

Anna could tell this irritated Wes’s competitive side.

“Those of us in client services argue that they do not get exposed to our clients’ trauma and mental and medical struggles. They counter with audits and the distress caused by keeping the programs funded and ensuring we all get paid. Never repeat what I say next: while they are incredibly annoying about their HRV, they are so much easier to work with now. The relationship between accounting and everyone went from conflict to collaboration. As this changed, so did the financial health of our programs and organizations, as we worked together to streamline processes, find inefficiencies in program budgets, and find ways to fund healthy initiatives like our free healthy cafeteria food.”

Anna and Wes discussed her morning HRV score and how she implemented a few self-care strategies to improve it before coming to work. Wes was thrilled that she was executing her plan before her first shift. He was also happy to see how her score remained close to her baseline after the introduction and team welcome.

They spent another hour reviewing her self-care plan. Wes helped her identify times through her workday to schedule breaks and integrate some strategies at work. He suggested that she take a few measurements throughout the day to track how well these strategies worked.

As they set a time to meet later that week to follow up, there was a knock on the door. Courtney, who Anna had met earlier that morning, opened the door. “Looks like he has you hooked up already.”

Anna realized to her embarrassment that the ear sensor was still on her ear. She removed it quickly.

“How’s she doing?” Courtney said with a smile that helped relieve Anna’s embarrassment.

Wes looked a little ashamed. “She is outperforming me today. Pretty impressive for her first day.”
“Looks like someone needs to hit the gym at lunch, maybe a little mindfulness too?” Courtney then turned to Anna. “It is fun to hold your boss accountable! Plus, if we keep his HRV high, he is soooo much easier to get along with.”

Wes smiled. “Maybe this was a mistake, but Courtney is going to serve as your mentor for the next couple of weeks. Not only is she amazing with clients, but her last couple of months of HRV scores are off the charts.”

“Off the charts, he is exaggerating. I started pretty low when we started the HRV measure a few years back. It’s been a long road to go from burnout to mentor.”

Anna was puzzled. “Do you use HRV to choose mentors?”

Courtney enjoyed beating Wes to the answer. “Absolutely. Research demonstrates clearly that those with good HRV scores possess a greater capacity for social engagement and providing emotional support. As staff, we know our HRV is important to our work with clients.”

“And the staff.” Wes chimed in.

“Yes. Anna, we want you to become a great part of our team for years to come. While our decreased turnover makes mentorship a less frequent activity, we strive to make sure new staff get paired with mentors who have the health to help them learn the demands of the job while supporting them psychologically.” Courtney said with a sense of pride in her voice.

As Anna and Courtney left Wes’s office, Anna felt incredibly supported, and her nervousness transformed into curiosity. If the organization integrated HRV so profoundly into its operations and culture, how would it inform clinical care?

A Digital Introduction

Courtney walked Anna to her new office. At first glance, it looked like a typical office space, with a desk, a computer, a bookshelf, and some chairs. Everything was up against the walls, providing an open space in the middle of the room.

“Welcome to your office. Nothing too special but let me go over some of the basics. We work hard to create a safe place for our clients and a comfortable one for our staff. Everything from the paint and carpet color to the soft lighting comes out of a collaboration between our mental-health staff and a psychologist who specializes in trauma-informed architecture. There are a couple of different paint options if you don’t love this color.”

After a moment in her new office, Anna felt a sense of relaxation. “I like this space.”

Courtney smiled. “I love to hear that. We encourage all staff to make this their own space with some guidance. We found that too much stimulus is overwhelming for some of our clients. As we say, make it friendly and minimalist.”
Anna nodded, as she knew that too many wall hangings, messy desks, and clutter could distract her and her clients. “Got it. I’m assuming the furniture arrangement is also intentional.”

“Yes, it is. Most of our clients come to us with a history of trauma and negative experiences in other helping organizations. The open space is to prevent them from feeling trapped. It gives them the freedom to choose a chair that feels comfortable to them, and the open space makes it easy for them to see their HRV scores on your computer monitor.” Courtney said, gesturing to the monitor.

“Speaking of, let’s log you in.” Courtney handed her a user name and password from HR.

Anna sat down at her desk, turned on her computer, and logged in. The first screen that came up was a dashboard with her HRV scores and averages, the averages of her team, and organizational averages. The dashboard also had information on population norms for each average.

“Surprise, more HRV. Do you mind if I show you a few things? I do want to protect your privacy.”

“Go for it,” Anna said, a little nervous about Courtney’s reactions to her scores.

“Obviously, your scores are always front and center along with our team and organizational averages. Please avoid comparing your scores to anyone else’s or to the team and organizational averages.”

“Everybody seems extremely competitive about their scores,” Anna said.

“True. Once you get settled and comfortable with our team, talk all the trash you want. No matter how competitive we get and how much we focus on HRV, everyone’s primary focus is their own scores. We all know that the higher the organizational average, the better services we provide our clients. Your goal is to focus on your baseline and maintaining or improving over time.” Courtney paused to make sure Anna got this vital point.

Anna nodded, showing she understood before Courtney continued.

“You will notice both on your app and the dashboard, scores are labeled green if you are above or within 85% of your all-time baselines, yellow if you are between 70% and 84% of your all-time baseline, and below 70% you are in the red. Your goal is to stay in the green, ensure you are implementing your self-care strategies at work if you are in yellow, and ask for help if you are in red for more than a day or two.”

“That seems simple. One question.” Anna paused to make sure she framed her questions right. “What do you mean when you say, ‘Ask for help?’”

“Great question,” Courtney continued. “A single red score is not a cause for panic. I am usually in red when my kid is sick, when I struggle to sleep, or when I am recovering from a difficult day. A yellow or red score is an alert to step up your self-care. If red continues
for several days, something greater is going on, and that is when we see people’s productivity and quality start dropping.”

“Wes, our team, and I, as your mentor, will not judge you for asking for help, as we see it as an indication that you care about your clients. Often a drop to red for several days means your body is fighting off illness. If you feel sick, don’t come in. Over the years, we have collected data on how one person with early symptoms of illness and several days in the red can spread the flu throughout the organization, leading to decreases in quality, more staff missing work, missed appointments and drops in billable hours, and, most importantly, sick clients. One flu season early on in our HRV adoption, we tracked how one sick staff member ended up getting twenty additional staff sick, and we could even track many of our family members getting sick as well.”

“Wow, obviously I don’t want to be that person,” Anna said sincerely.

“Neither do I. Or at least, not again,” Courtney said with notable embarrassment.

“I’m sorry; I didn’t realize,” Anna said, trying to take her foot out of her mouth.

“Do not worry about it,” Courtney said with a smile. “Many of us thought that it was better for our clients and co-workers if we worked through an illness. I got the tremendous honor of changing that forever. I’ve never worked at a place that supports the use of PTO more than this organization. Whether you are in the red because of sickness or stress, HRV proves that time off is one of the best ways to get a person back in green and at full productivity. Plus, time off prevents the virus or distress from impacting quality and our team dynamics.”

“We also communicate this strategy to our clients. They would rather get a call to reschedule than get the flu. If they are sick or just do not feel up to figuring out transportation, we have all the technology to do a virtual visit. You will find out soon that our culture rewards those who use their time off.” A slight mischievous grin came across Courtney’s face, and she clicked a second tab. “To prove my point, our leadership tab.”

A screen appeared with a list of leaders with their scores alongside the averages for the teams they supervised. Next to their HRV scores was a line for paid time off and some other outcome data. Like HRV, time-off numbers got color-coded, ranked by green, yellow, and red. Those with less accrued time off were green with a couple of yellows mixed in. Anna was not used to this type of transparency.

“As a new employee, you start with a week of paid time off, with the expectation that you will use it within three months. We all hold each other accountable. While we all seem nice, everything here is hyperfocused on getting the best services to our clients.”

All Anna could do was nod in agreement.

“Okay, enough lecturing about time off and self-care; let’s look at your caseload.” Courtney clicked another tab, and thirty names populated the screen, ranked by changes
in HRV scores, with red names at the top. Next to each name was an HRV score for their last two readings, their 7-day average, their 30-day average, and their all-time average.

“Welcome to your caseload. We will support transitioning all these clients to you over the next couple of weeks. Most of our clients are pretty consistent about taking daily HRV readings. The client dashboard alerts you to which clients are struggling. As you get to know them, you will get a sense of what action to take based on their HRV scores. Jonathon, here, is one of my clients that I’m transferring to you, so let’s take a look at him.”

Courtney clicked his name, and his electronic record came up with a summary of HRV scores at the top of the page. Anna could see that his scores had dropped in recent days. Immediately below the scores were Courtney’s notes on how she reached out after the second red day and learned that Jonathon had a fight with his partner, and they were probably breaking up. The note also stated that she scheduled a visit with him for tomorrow to help support him through the process.

“So, you integrate HRV into your electronic records?” Anna asked, impressed at what she was seeing.

“Some would say we integrated our electronic records into our HRV dashboard! I’m going to give you a few hours to get comfortable with the system and get to know your new clients. We have a team meeting this afternoon, and I will come get you. Please call me if you have any questions in the meantime. While I do not expect you to get through reviewing all of your clients, I will ask you which self-care strategies you applied over lunch and before I see you next.” Courtney’s smile communicated both support and seriousness.

Anna spent several hours engrossed in her new clients’ electronic records. Unlike record keeping in most organizations, these told a much richer story about her clients and their progress in treatment. Most clients seemed to have fully bought into the use of HRV, with many taking four or more readings a day.

The app asked them specific questions about their mood, sleep quality, meals, and activities. It allowed them to chat with their professionals, providing more insight into their HRV readings. Anna noticed that these chats included an option where they could request a response. While most did not, the ones that did alerted staff to potential or actual crises, allowing them to provide timely support. It seemed to her that the focus on HRV and the technology drastically sped up the treatment process.

Following Courtney’s direction, Anna got a healthy salad from the cafeteria. While she wanted to impress Courtney, there were no unhealthy options. It made sense; why would an organization invest in food that decreases HRV? She also worked in a quick walk around the outside of the facility to soak up some sunshine and get a little exercise.
A Different Kind of Meeting

Back at her desk, Anna continued to learn about her new clients. She was pleasantly surprised that the healthy meal and exercise gave her the mental energy to get through most of her clients. After an hour, she heard a knock on the door. It was Courtney.

“Ready for your first team meeting?” Courtney asked.

“Sure,” was her reply, not knowing what to expect.

Courtney prepared her for the meeting. “This next thing will probably not shock you; we take a reading before our meeting, so grab your reader. Just a heads up for the future; always show up on time. It is pretty embarrassing to show up late, and then everyone waits for you to take your readings. Those late readings never help your averages.”

The team gathered around a big table. Wes looked at his watch. “Alright, everyone, it is 3 pm; plug in.”

Everyone opened their app and sat in silence for several minutes with their eyes closed while taking a reading. Anna further appreciated how much Wes valued HRV. She also recognized that the short time it took to get a reading allowed everyone to get settled down and be present at the meeting.

After a few minutes of silence, Wes spoke. “Alright, everyone, I want to start by thanking you all for your support this week. The grant we finished required some long hours, and I know my scores took a dip. You all stepped up, and I think this is proof of the power of your support.” Wes turned his phone on to show a green-colored reading.

The team clapped and cheered.

“Okay, I know how much you all love stressed-out Wes. Again, thank you. More importantly, we have a new teammate.” Wes turned to Anna.

Everyone cheered again, and Courtney officially welcomed Anna, as she had already met everyone earlier that morning.

“We start our meeting by going around the room and just checking in on how everyone is doing. It also gives us a chance to ask our teammates for support if our HRV is not doing so well.” Wes nodded to Courtney to start the check-in.

“I’m doing okay this week. Most of you know, I’m excited and honored to mentor Anna. While it is good stress, I have seen my scores drop a little for a couple of days in the yellow. My scores today seem to indicate that the stress is turning into excitement and I’m back in the green.”

A quick congratulations came from the group.

Similar reports came from each member of the team. Most reported doing well. One staff reported several days of all-yellow scores with a red one this morning. “I’m starting to feel
exhausted and apologize if I’ve been short with anyone this week. It does not seem my typical strategies are working. Wes and I found a way to turn this weekend into a four-day break, and I have a week’s vacation on the schedule for next month. I hope to come back next week in green, but please alert me if my stress is impacting my communication or other aspects of my role on our team.”

Anna was shocked by this level of insight and honesty. Several team members provided support, including some suggestions to help him reach his upcoming time off, and another asked what he was going to do with his time off to recover fully. He provided a plan for a day of sitting on his deck, listening to fictional audiobooks and relaxing, followed by a couple of nights of camping with his family. Unlike her other workplaces, his vulnerability concerning his burnout was a strength and something to celebrate.

When it got to Anna, she felt comfortable enough to share. “Hi everyone; I’m so excited to join your team. Honestly, I feel like I am on a different planet, and it is a little overwhelming.”

“Welcome to Planet Wes!” one of her new teammates joked, followed by collective laughter.

“Yeah, I felt like I focused on my own health and self-care more this last week than the rest of my career combined. My HRV has been up and down since establishing my baseline. I cannot wait to learn from you all, and please teach me anything you can to help get me up to speed,” Anna said with full humility.

“Thanks Anna.” Wes took the meeting back over. “I love your curiosity and openness to our culture. Now let us look at our team scores for the last week.”

Anna was somewhat surprised that Wes had delegated the team report to Curt. Everyone brought out their phones as Curt reviewed their collective data. The app allowed them to view the daily averages of the team and consider how their 7-day averages compared to their 30-day and all-time averages.

“Thanks, Curt.” Wes took the meeting back over. “Any insight into why our scores are slightly below our typical average?”

“Transitions,” Courtney said. “We are excited to add Anna to our team, and most of us are transitioning clients to her caseload. While this action will relieve stress in the long term, in the meantime, there is extra administrative and emotional labor needed to transition everyone in a way that sets them and Anna up for success.”

Wes nodded. “So, an overall positive is this is something with a short-term cost when it comes to our own allostatic load. Great insight. I know we created a plan for the transition. I wonder if anyone sees any changes we need to make based on our HRV decline?”

A staff member next to Anna spoke up. “I’m finding it more time-consuming than I thought to support our clients’ emotional needs through the transition. I am seeing a significant
drop in the clients’ 7-day averages. I know I only have a few people going to Anna, but I think if we got an additional week, it would relieve some of the stress.”

Wes looked around the room and saw everyone’s heads nodding. “It seems like everyone agrees. Transitions are difficult. However, I do not see any reason not to adjust the schedule. I imagine some clients will find it easier than others to transition. Unless anyone has a counterargument, I support allowing flexibility, as it would support both staff and client HRV.”

Everyone agreed, and the discussion moved to more administrative issues. Anna was impressed by how focusing on the HRV of both staff and clients informed the decision-making process.

As she drove home, Anna felt a mix of excitement and tiredness. What a day. Even though she had decades of experience, it felt more like the first day of her career than starting at a new organization. While her job title was the same as her last job, she felt like she had leaped twenty years into the future.

She could not wait for tomorrow, but first, she needed to take an HRV reading and practice some of her self-care strategies.
Conclusion

What now?

When I started learning about HRV, I could not stop thinking about its potential to improve the mental, medical, social, and cognitive health and wellness of those struggling in our communities. I began an obsessive search for knowledge on HRV, reading everything I could find. While I learned a great deal, the lack of technology stood in the way of my bringing HRV to the organizations and systems that help people struggling with trauma. I found myself in the position of waiting until someone else developed the app I needed or creating one on my own.

I am not sure what you would say about a guy who learns something new, gets very excited, a couple of months later starts a technology company, and then possesses the audacity to write a book on the topic. Your clinical diagnosis might vary depending on your professional expertise. However, my diagnosis of myself is that I am merely lucky.

I am lucky because of my connection to so many amazing people around the world who cheer on my crazy ideas. I married an amazing woman who supports me when I say things like, “I think I want to start a technology company” or “Put this thing on your ear so I can take a reading.” Sarah and I took a personal risk to develop Optimal HRV. Not only did she listen to my passionate rants about HRV, she also said “go for it” when I asked her about investing our money into starting up a technology company to support my dream. I would not be the person I am today without her love and support every step of the way.

Somehow I ended up in a place in life where I get to dream and people support me, help me grow intellectually, and say yes when I ask them to put something on their ear and take a reading! Finally, I want to thank all my friends and the people who listened to my vision, provided their support and feedback, and tested the initial versions of the Optional HRV app. My advice to anyone trying to bring innovation to the world is to surround
yourself with amazing people who will spend hours sitting with you as you work to turn an idea into something tangible and useful to the world. The success of Optimal HRV is in significant part due to the support and love of the fantastic people in my life.

I now count you as one of those amazing people who will pick up a book on something called heart rate variability and read it to the end. The scary thing about writing a book on an innovative topic is that you realize everything you don’t know. The exciting thing about writing a book on an innovative subject is that you get to participate in the discussion of how we will use the innovation to change the world.

I sincerely look forward to having that discussion with you!
About the Author

Matthew S. Bennett is a relentless advocate for trauma-informed care and other interventions that help people and communities heal. His passion manifests in his books Connecting Paradigms, Talking about Trauma & Change, and Trauma-Sensitive Early Education, as well as his Trauma-Informed Lens Podcast. Matt combines his masters' degrees in psychology and business administration with his practical experience as a therapist and leader to develop research-based solutions and trainings to improve the health of individuals, staff, organizations, and systems.

As soon as Matt learned about heart rate variability (HRV), he saw its life-changing potential. For him, HRV became the next logical step in his work with the trauma-informed care paradigm, self-care, and trauma-informed leadership. After spending months trying to figure out how to help integrate existing HRV technology into services, his frustration led him to create the Optimal HRV app specifically for those trying to help others live their best lives.

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To learn more about Optimal HRV visit us at www.optimalhrv.com
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**What is HRV?**

Tens of thousands of research studies support HRV as a biometric indicator of health and wellness. HRV measures the functioning of the autonomic nervous system, which manages over 80% of the body’s processes. HRV indicates the body’s ability to handle and recover from stress. The higher the HRV score, the more able and ready the body and mind are to manage and recover from stress.

**A Revolution in Care**

Optimal HRV captures data and displays short-term trends to answer the questions, “How is this person or group doing today?” and “How are they doing this week?” The app and dashboard also display long-term data to measure the positive effects of treatments, services, and interventions. Beyond providing professionals innovative ways to track outcomes, Optimal HRV also provides those receiving services insights into how their own behaviors and mental health affects their wellness.

**It Can Save Lives**

Significant drops in HRV indicate 9 out of the 10 leading causes of death. HRV provides an early warning to a range of medical conditions. In addition to alerting professionals to possible medical issues, HRV also predicts an increased likelihood of adverse behaviors such as suicide and relapse. Optimal HRV’s web-dashboard allows professionals to identify potential issues and proactively provide support and treatment before more significant problems develop.

Optimal HRV is a mobile app and web-based dashboard designed to capture and display HRV scores for individuals and groups. As a measure of mental, medical, social, and cognitive functioning, HRV allows organizations to quantify the effects of their services on the overall health and wellness of those they serve. HRV will also revolutionize self-care and organizational wellness by providing leaders daily measures on the health of staff.

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