

**POLYVAGAL THEORY AND TRAUMA: PRESENTING SCHOOL
COUNSELLORS WITH A PHYSIOLOGICAL UNDERSTANDING OF
TRAUMA**

by

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**Polyvagal Theory and Trauma: Presenting School Counsellors with a
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Dedication

To the path that still holds me accountable every day.

To the spirits that guided me in this direction.

To my family, who never cease to unconditionally love and support me.

Abstract

Trauma is a pervasive issue in schools, affecting students' emotional well-being, social well-being, and academic achievement. School counsellors are increasingly called upon to address trauma in students, yet many may not have a strong understanding of the physiological mechanisms at play. To help address this issue, the Polyvagal Theory (PVT) provides a framework for understanding the autonomic nervous system's (ANS) response to stress and trauma. This paper presents an overview of PVT in the context of trauma, explores the literature of relevant physiological measures, and presents a guideline for becoming a polyvagal-informed helper. It also presents an introductory professional development workshop for school counsellors and educators.

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Polyvagal Theory and Trauma: Presenting School Counsellors with a Physiological Understanding of Trauma

Chapter 1: Introduction

Introduction

The experience of trauma is a common reality for many individuals in Canada, particularly for children and adolescents (Government of Canada, 2022). As such, school counsellors play a vital role in providing support to their students by helping them regulate and heal from the effects of trauma. The traditional psychological approaches used in counselling may not fully capture the physiological aspects of trauma and how they manifest in our students, and this is where PVT helps bridge the gap.

PVT is a theory that describes how our ANS responds to stress and trauma, providing insight into why individuals may exhibit certain behaviors in response to such experiences (Dana & Porges, 2018). This paper presents an overview of PVT and its connection to trauma with the hopes that this awareness can assist school counsellors (and all readers and prospective helpers) in better understanding the physiological underpinnings of trauma and improve their ability to provide support to their students and clients. By becoming polyvagal-informed, one can achieve a more holistic perspective of trauma and be better equipped to help their clients on their path to healing and recovery.

Background Information

PVT was developed by Dr. Stephen Porges in the 1990s as a way to better understand the role of the nervous system in regulating responses to stress and trauma (Porges, 1995). Building on previous research in neuroscience and psychology, Porges proposed that the ANS is not simply divided into two branches, the sympathetic and parasympathetic, but rather that it has a

more complex and nuanced response to stressors (Porges, 1998). According to his theory, the ANS is divided into three branches, with the newest and most evolved branch, the ventral vagal complex, playing a crucial role in social engagement and emotional regulation. The theory has significant implications for the understanding and treatment of trauma, as it suggests that a person's response to stressors is not solely a conscious or cognitive decision but is also influenced by the nervous system's automatic response.

Research in British Columbia has identified high rates of trauma among children and youth, notably with those who are involved in the child welfare system (Barker et al., 2014). According to Canadian statistics on adverse childhood experiences (ACEs), the prevalence of exposure to physical abuse is estimated to be 26%, while sexual abuse ranges between 7% and 15%, emotional abuse between 14% and 17%, intimate partner violence between 6% and 26%, and parental divorce or separation between 11% and 17.6% (Joshi et al., 2021). These statistics do not acknowledge Canada's unique history, and the Truth and Reconciliation Commission of Canada identified the widespread and systemic abuse experienced by Indigenous children in residential schools as a form of childhood trauma that has had intergenerational impacts on Indigenous peoples, with its effects still being prevalent today (Truth and Reconciliation Commission of Canada, 2015). All of these childhood traumas can have significant negative impacts on a students' ability to succeed in school, including relationship and social difficulties, lower academic achievement, poorer attendance, and increased behavioural issues (Miller, 2023).

Childhood trauma can be challenging to address in therapy due to the physiological, emotional, and cognitive impacts it has on our students. The body's physiological response to trauma, such as increased heart rate, sweating, and hypervigilance, can lead to ongoing feelings of anxiety and distress even when in safe conditions (Dana & Porges, 2018). Additionally,

traumatic experiences can impact emotional and cognitive functioning, such as difficulty with emotion regulation, self-esteem, and trust in others. By understanding the physiological impact of healthy social interactions and incorporating techniques such as breath work, movement, and mindfulness, PVT can help individuals regulate their nervous system and create a sense of safety, which can support healing from childhood trauma.

Statement of the Problem

For this section of the paper, I am going to speak in first person, as the inspiration behind this inquiry comes from my own experience. In 1637, French philosopher Rene Descartes put forth the quote "I think, therefore I am," and it has resonated throughout history because it highlights the power of our thoughts and their ability to impact our psyche (Descartes & Cress, 1998). This resonance has been solidified throughout my post-secondary career by research that continually proves the significance of cognitive-behavioural processes and their influence on our overall mental health and well-being.

These Cognitive Behavioural Therapy (CBT) approaches have deepened our understanding of maladaptive thoughts and behaviours and the empirical data that supports them is very encouraging for a prospective counsellor (Ruggiero et al., 2018). Although the interconnectedness of our thoughts, feelings, and behaviours has been reiterated time and time again, I have found that the majority of my education has focused on thoughts and behaviours, with a lesser degree of attention on the impacts or understanding of our feelings and physiological states. For this reason, when I was introduced to Stephen Porges' PVT and his notion that "I think, therefore I am" would be more appropriately phrased as "I feel myself, therefore I am" (Porges, 2022), I was intrigued.

Descartes' statement asserts that the ability to think is what defines our humanity and our existence, and although our thoughts play a critical role in our overall wellness, so does our physiology. PVT suggests that our sense of self is not just about our ability to think, but it is also grounded in our unconscious response to our environment through our body (Porges, 2022). Our nervous system plays a crucial role in our sense of self, and our ability to regulate it is a key factor in our mental and physical well-being. With my experience in post-secondary studies relating mostly to Descartes' statement, I feel an obligation to recognize, learn, and spread the knowledge and awareness of Porges' statement to any and all who wish to read.

Purpose of the Paper

The purpose of this paper is to provide school counsellors with a comprehensive understanding of PVT and how it relates to trauma on a physiological level. Although it is relatively new, PVT has important implications for understanding and treating traumatic experiences in therapeutic settings. By presenting the basic tenets of PVT and its relevance to trauma, this paper aims to provide a new lens through which to view its impact on our students. The paper will explore the role of the nervous system in trauma responses and the physiological measures that can be assessed in order to help us understand specific behaviours, expand on ways to regulate and balance these measures, and investigate ways in which PVT can inform therapeutic interventions for those who have experienced trauma. Through this paper, the reader will gain a deeper understanding of trauma and its effects on the body, mind, and subsequent behaviours, and they will be better equipped to support those they work with in a meaningful and effective way by becoming a polyvagal-informed helper.

Research Question

How can the physiological framework of PVT inform school counsellors and what therapeutic approaches and tools can be utilized when working with students who have experienced trauma?

Theoretical Framework

Stephen Porges PVT is based on the principle of evolution and proposes that specific neuroanatomical structures facilitate adaptive functions (Porges, 2021). A deep understanding of vertebrate evolution and neuroanatomy is essential for discussing the theory, and sophisticated metrics of measurement are necessary to test its hypotheses. The theory builds off, but also contrasts, arousal theory, which was prevalent in psychophysiology in the 1960s and emphasized arousal as a linear construct measured through peripheral autonomic measures such as sweating and heart rate. This emphasis neglected the parasympathetic influences, interactions between sympathetic and parasympathetic processes, and other factors that are crucial to understanding the ANSs adaptive and dynamic nature. From a polyvagal lens, the concept of homeostasis is more complex than arousal theory and previous autonomic models, and it relates to the feedback loops that occur between the organs and the brainstem in both directions.

Significance of the Study

In his seminal book, *The polyvagal theory: Neurophysiological foundations of emotions, attachment, communication, and self-regulation*, Porges outlines how our dynamic range of social behaviours are limited by our physiology (Porges, 2011). Specifically, how the ANS reacts in predictable ways depending on whether an environment is perceived as safe or dangerous. Research has highlighted the adaptability and vulnerability of our nervous systems, especially when we are developing, and identifies how a history of trauma or childhood maltreatment can potentially retune the ANS (Dale et al., 2022; Kolacz et al., 2020; Porges, 2022). The authors

emphasize how this retuning can create lower thresholds of safety and more sensitivity to cues of threat.

Porges argues that if practitioners can focus on these biologically based commonalities, it would allow for the creation of new interventions that could help children and youth whose attachment and social behaviours have been compromised (2011). As teachers, counsellors, and most importantly, human beings, we experience the gravity of our own physiological states and witness the strength with which an environment and personal feelings can affect students' behaviours, making this a significant subject to study.

Definition of Terms

Adverse Childhood Experiences (ACEs) & Trauma: Potentially traumatic events that occur in childhood, including abuse (physical, emotional, or sexual), neglect (physical or emotional), and household dysfunction (mental illness, substance misuse, domestic violence, divorce, or incarceration) (U.S. Department of Health & Human Services, 2022).

Autonomic Nervous System (ANS): Responsible for regulating and controlling internal organs in vertebrates without conscious effort or awareness from the organism. It is made up of two opposing sets of nerves, the sympathetic and parasympathetic nervous systems. (Britannica, T. Editors of Encyclopaedia, 2023).

Dorsal Vagal Pathway: The oldest of the three branches of the ANS that regulates the internal organs and is responsible for the body's conservation and immobilization responses in situations of extreme danger or threat, such as the "freeze" response (Dana & Porges, 2018; Porges, 2022; Porges, 2009).

Heart Rate Variability (HRV): Variability in the time intervals between consecutive heartbeats, reflecting the balance between the SNS and PNS and providing an overall measure of health (Kim et al., 2018).

Parasympathetic Nervous System (PNS): A division of the nervous system that plays a key role in regulating visceral organs, such as glands. It is one of two antagonistic sets of nerves within the ANS, the other being the SNS. The PNS is primarily composed of cranial nerves, particularly the vagus nerve, and lumbar spinal nerves. When these nerves are stimulated, they increase digestive secretions and reduce heart rate (Britannica, T. Editors of Encyclopaedia, 2023).

Respiratory Sinus Arrhythmia (RSA): The variation in heart rate that occurs in response to the natural fluctuations in breathing rate, where during inhalation, the heart rate increases slightly, and during exhalation, it decreases slightly (Yasuma & Hayano, 2004).

Sympathetic Nervous System (SNS): A division of the nervous system that is responsible for producing localized adjustments, such as sweating in response to increased temperature, and reflex adjustments in the cardiovascular system. When an individual experiences stress, the entire SNS is activated, leading to a widespread response known as the fight-or-flight response (Britannica, T. Editors of Encyclopaedia, 2023).

Ventral Vagal Pathway: The myelinated nerve pathways found in mammals that have inhibitory influences on organs above the diaphragm (ie. heart and lungs) and can interact with the striated muscles of the face and head, known as the face-heart connection, allowing for the regulation of physiological states and social engagement (Dana & Porges, 2018; Porges, 2022; Porges, 2009).

Outline of the Remainder of the Paper

Chapter 2 will provide a review of the current literature available on PVT, its connection to trauma, and its significance for counselling. It will be divided into three themes: A Brief

Overview of Polyvagal Theory, Polyvagal Theory & Trauma, and Investigating a Polyvagal Informed Approach to Counselling. Theme one will introduce PVTs core concepts and the history of its evolution. Theme two will explore trauma and provide a polyvagal understanding of its physiological effects. Theme three will connect these physiological effects to a therapeutic framework and provide a deeper awareness and understanding on how to become polyvagal-informed. Chapter 3 will summarize these findings, provide recommendations for school counsellors and propose a one-day Pro-D workshop introducing PVT to educators and counsellors alike.

Chapter 2: Literature Review

Introduction

This literature review explores the intersection of PVT and trauma with the intent of providing an awareness on how to integrate a polyvagal-informed approach to counselling in schools. The literature will be organized into three themes:

- Theme A: A Brief Overview of Polyvagal Theory
- Theme B: Polyvagal Theory & Trauma
- Theme C: Investigating A Polyvagal Informed Approach to Counselling

Review of Research Literature

[Theme A] A Brief Overview of Polyvagal Theory

Stephen Porges first published his presentation of PVT in 1995, and he has dedicated his life to empirically supporting his initial hypothesis ever since. Three decades later and he summarizes his findings in a simple, yet powerful statement: "[T]hat humans, as social mammals, are on an enduring lifelong quest to feel safe," (Porges, 2022, p. 2). The goal of this theme is to help provide an understanding of what this means on a physiological level by

summarizing PVT's core tenets in a way that is digestible for teachers and prospective counsellors. It will pull from the works of Porges and colleagues in the field and provide further clarification on terms/concepts that may be out of the ordinary for the average MEd or MA student.

The Evolution of Mammals

In their book, *Clinical Applications of the Polyvagal Theory: The Emergence of Polyvagal-Informed Therapies*, Dana & Porges outline mammalian history from a PVT perspective (2018). As mammals evolved, behavioural differences started presenting that were unlike our solitary, primitive ancestors. The lack of nurture that was common among reptiles was replaced with a caring nature for the young and cooperation became more common than solitude. In the context of community, these new behaviours were significant in supporting survival – however, they required a modified nervous system that could selectively down-regulate our primitive defensive reactions. Porges and Dana highlight three contingent points that are critical in understanding these evolutionary changes: "first, the relationship between autonomic state and defensive behaviours; second, the changes that occurred during vertebrate evolution in the neural regulation of the ANS; and third, the physiological state, which enables bodily responses and feelings of safety, optimizes social behaviour and concurrently optimizes health, growth, and restoration," (2018, p. 51).

Relationship Between Autonomic State and Defensive Behaviours. What is an autonomic state? The American Psychological Association explains how the ANS consists of two systems: the SNS and the PNS (2008), and it is these two systems that contribute to most vertebrate autonomic states. The SNS, commonly known as the "fight or flight" state, is responsible for mobilizing resources in emergencies such as increased heart rate, blood pressure,

and respiration. The PNS, commonly known for its "freeze" and "rest and digest" states, is responsible for preserving bodily resources by decreasing heart rate, blood pressure, and respiration, as well as restoring homeostasis to maintain healthy functioning. The fight-or-flight states allow for an organism to defend or flee when threatened, and require costly metabolic energy demands, while the freeze state reduces metabolic demands in an adaptive attempt to survive when resources are low or life-threatening danger is imminent (Porges & Dana, 2018). This immobilization, or parasympathetic freeze state, is controlled by an ancient complex observed in most vertebrates – the dorsal vagal complex (Porges, 2022).

Neural Regulation of the Autonomic Nervous System. PVT identifies three stages of evolution in the autonomic system of vertebrates (Dana & Porges, 2018; Porges, 2022; Porges, 2009). The first stage is the evolution and reliance on the *unmyelinated* vagus nerve of the dorsal vagal complex (PNS); the second stage is the development of the spinal SNS, which complemented the down regulations of the PNS with excitatory states; and the third stage, which is uniquely mammalian, is defined by the emergence of an additional *myelinated* vagal pathway: the ventral vagal. For primitive vertebrates that could live in low oxygen and low heart rate conditions, the neural regulation of the *unmyelinated* dorsal vagal pathway was a critical component for survival. This is not the case for mammals, who require much higher levels of oxygen, so this pathway was adapted for homeostasis when in safe conditions ("rest and digest") and as a primitive defence system during traumatic events ("freeze").

Myelin, a fatty substance that provides significant insulation to nerves, supports the transmission of electrical signals at much greater speeds and specificities (Dana & Porges, 2018). A foundation of PVT, and our introduction to the physiological underpinnings for feeling safe, the *myelinated* ventral vagal pathways found in mammals have *inhibitory* influences on organs

above the diaphragm (ie. heart and lungs) and can interact with the striated muscles of the face and head, known as the face-heart connection, allowing for the regulation of physiological states (Dana & Porges, 2018; Porges, 2022; Porges, 2009).

Physiological State. The cooperation that is so common among mammals differs from reptiles, and the newer ventral vagal pathway evolved to slow heart rate and respiration to support states of calm for social interactions that would have previously been interpreted as dangerous by our primitive ancestors (Dana & Porges, 2018; Porges, 2022; Porges, 2009). With the integration of the face-heart connection, this emergent system, known as the social engagement system (SES), allowed mammals to communicate through cues involving facial expressions, head gestures, and vocalizations. Depending on whether these were cues of safety or danger, this newer vagal circuit would functionally dampen or utilize the SNS responses to allow for the co-regulation of physiological states such as social play, safe intimacy, reproduction, caring for offspring and cooperation.

The Vagal Paradox

Having spent much of his early years researching human fetuses and newborn heart rate patterns, Porges felt confident when he first hypothesized vagal tone as being an indicator of health (Dana & Porges, 2018; Porges, 2009). This was at a time before he had distinguished the ventral vagal pathway from the dorsal vagal pathway, so he was met with resistance. He argued that high measures of respiratory sinus arrhythmia (RSA), or beat-to-beat HRV measured in synchronicity with respiration (Yasuma & Hayano, 2004), could be a positive indicator of health. However, he was challenged by researchers with the clinical phenomenon of bradycardia, which is the dangerously massive slowing down of heart rate (Dana & Porges, 2018; Porges, 2009). On the one hand, Porges' research had associated increased vagal tone with measures of resilience,

but on the other hand, research from neonatology proved that these same measures could prove fatal when presenting as bradycardia. This was coined the vagal paradox and was the inspiration behind PVT.

Research with RSA. From our understanding of the evolution of mammals, we can now answer this vagal paradox. Bradycardia and its resulting high levels of RSA are a response to the activation of the more primitive *dorsal vagal complex*, while similar, yet positive measures of RSA are responses of a healthy *ventral vagal complex* (Dana & Porges, 2018; Porges, 2009). Research into RSA continues to examine the importance of vagal tone, and in 2019 researchers conducted a meta-analysis that included 37 studies, involving 2,347 physically healthy adults, and the findings were mixed (Beauchaine et al.). Although the association between RSA and psychopathology was small, the researchers did point out considerable heterogeneities. One of these was RSA levels were significantly lower in samples with externalizing behaviours. These behaviours can encompass a wide variety of presentations which are generally antisocial, such as violating social norms and being harmful to oneself or others (ie. aggression, substance use etc.) (Kauten & Barry, 2020). This is a thought-provoking finding as exposure to trauma is also associated with a heightened risk of externalizing behaviours in adolescents (Carliner et al., 2017). Beauchaine et al concluded that the connection between RSA and psychopathology is complex, and that future research should be more standardized (Beauchaine et al., 2019).

In research with children and RSA, the results are more promising. In a study of 253 participants with a mean age of nine, Zhang et al found that lower resting RSA was a predictor of both externalizing and internalizing behaviours, particularly in boys under stressful social conditions (2017). They concluded that lower measures of RSA can be a potential biomarker for emotional dysregulation. An interesting finding in both Beauchaine et al and Zhang et al's studies

is that females showed greater RSA reactivity and resilience, prompting the researchers to suggest further investigation into gender differences (2019; 2017). In a study that aimed to identify RSA as a resilience factor for socioeconomic status, inflammation, and somatic health in children, the authors discovered some fascinating results: "lower [socioeconomic status] was associated with poorer global health, and higher levels of inflammation were associated with poorer global health, but these associations were not significant among children with high resting RSA," (Alen et al., 2022). These studies highlight the potential for RSA being a resilience factor, and the implications are inspiring for counsellors working with youth.

The Social Engagement System (SES), Dissolution and the Vagal Brake

The importance of the SES cannot be stressed enough, for it provides a biological understanding of behaviours responsible for many of our current theories. Without it, we would not be human, and the work of the likes of Vygotsky, Bronfenbrenner, Bandura, Bowlby, Maslow, Baumeister & Leary, and many others would be non-existent. It is the physiological framework for our unique social practices, and PVT is responsible for our current understanding of it.

At birth, the SES, driven by the ventral vagal complex, enables the co-regulation of autonomic states between infant and mother through reciprocated cues of safety and establishes a foundation for social bonds (Dana & Porges, 2018; Porges, 2022; Porges, 2009). When fully developed and in healthy condition, two important features are expressed: 1) the ventral vagal pathways slow heart rate, inhibit the SNS, dampen the stress response and reduce inflammation, thus regulating bodily states in a manner that supports growth and restoration, and 2) the face-heart connection conveys physiological state through facial expressions and vocalizations, and is

responsible for regulating uniquely mammalian middle-ear muscles which optimize listening frequencies for protective social communication.

In PVT there is a hierarchy of response to challenges called *dissolution*, and at the top of that hierarchy is the SES (Dana & Porges, 2018; Porges, 2022; Porges, 2009). If the SES fails to provide safety the older circuits are engaged, with the SNS responding next, followed by the primitive dorsal vagal complex. To help understand how functional or impaired these responses are within the SES, Porges' identified the *vagal brake*. This brake has an inhibitory influence on heart rate via the ventral vagal complex and its purpose is to either dampen our SNS or free it up for productive energy use.

In a meta-analysis examining the connection between the ANS and childhood maltreatment, researchers suggest that there is an association between blunted sympathetic activity and childhood maltreatment (Young-Southward et al., 2020). From a polyvagal perspective, one could hypothesize this connection as an impaired SES and vagal brake from a history of maltreatment and consequent over-activation of the SNS, which could result in the present SNS that is blunted in stressful situations. What is critical in our understanding of a healthy SES, and what will help make sense of Porges' statement "I feel myself, therefore I am," is the *bidirectional relationship* of the pathways responsible for reacting to environmental cues.

Neuroception

Have you ever walked into a room and unconsciously felt safe or uncomfortable? Porges would propose the underlying mechanism responsible for these feelings is *neuroception*, or your brain and body's bidirectional, neural evaluation of risk and safety (Dana & Porges, 2018; Porges, 2022; Porges, 2009). The face-heart connection of the ventral vagal complex makes us sensitive to the intentionality behind movements and sounds from others, especially in social

contexts. This process, distinct from perception, is your nervous system processing sensory information in your environment, both living and inanimate, and your body's physiological state reacting to those signals. In this top-down and bottom-up process, our autonomic reactions are often unconscious and we may not be aware of the stimuli that trigger neuroception, but we are aware of our body's visceral feelings and the physiological state with which they support.

Although PVT is relatively new and the concept of neuroception requires more empirical data, researchers in a newborn intensive care unit are using this knowledge to improve their care and compassion for the families that they work with (Sanders & Hall, 2017). They witness neuroception at play with the co-regulation of mothers and their babies, and difficult parents/families are better understood by having an awareness of the processes of neuroception that can result in either SNS arousal or dorsal vagal collapse (PNS "freeze"). This is just the beginning of our understanding of neuroception, and researchers have now created a *Neuroception of Psychological Safety Scale* (NPSS), concluding that the "NPSS will help shape new approaches to evaluating trauma treatments, relational issues and mental health concerns," (Morton et al., 2022).

Autonomic State as an Intervening Variable

The emphasis on the bidirectional nature of communication between the brain and the body leads to PVT proposing that our physiological states play a fundamental role in our thoughts and behaviours (Dana & Porges, 2018; Porges, 2022; Porges, 2009). Changes in our facial expressions, voice, breathing, and posture, along with our unconscious neuroceptive responses, can change physiology through the ventral vagal pathways, so depending on an individual's current state, the same cue from an environment could be calculated as either neutral, safe, or dangerous.

For example, researchers during the COVID-19 pandemic found that indicators of negative autonomic states influenced the overall impact of the event on individuals' mental health outcomes (Kolacz et al., 2020). Acknowledging that the autonomic state can be an intervening variable would provide an alternative understanding to the assumption that behaviours are intentional and that they can be regulated through rewards and punishments (Dana & Porges, 2018; Porges, 2022; Porges, 2009). Applied to counselling, this knowledge is critical when working with youth who have experienced trauma and who live in dysregulated states, and it will be explored further in Theme #2: The Connection Between Polyvagal Theory and Trauma.

[Theme B] Polyvagal Theory & Trauma

Stephen Porges describes how the purpose of the nervous system is to evaluate risk and match the body's neurophysiological state with that of the environment's actual risk (2009). When an environment is appraised as safe, calm visceral states can emerge. When an environment is appraised as dangerous, the body's defensive fight, flight, or freeze mechanisms are initiated. Being in a safe state is a prerequisite for optimal social behaviour, access to creativity and access to productivity, so when there is a mismatch in interpretation and a safe environment is evaluated as dangerous, these beneficial behaviours are inhibited (Porges, 2015). When the body is in such a defensive state, behaviours can present as chronic anxiety, irritability, depression, dissociation, withdrawal, loss of purpose, and social isolation. Having an understanding of these concepts, one can extrapolate that if a child has been exposed to traumatic events it may be more difficult for them to engage in a positive, productive manner. With their body's response to danger being conditioned in abnormally unsafe environments they may have altered their nervous systems, which could lead to a heightened sensitivity or blunted reactivity

to perceived threats. With this in mind, it is warranted to further examine the connection between PVT and trauma to gain a deeper understanding and compassion for such outcomes.

A Closer Look at Trauma

Before diving into the research and physiology of this connection, there needs to be an overview of what trauma is. According to the National Institute of Mental Health (2021), trauma refers to a deeply distressing or disturbing experience that exceeds a person's ability to cope or integrate the emotions and memories associated with it. This experience, which may begin very early on in life, can cause long-lasting psychological, physiological and emotional distress, such as feelings of anxiety, depression, isolation, anger, or guilt. Childhood traumas, often referred to as ACEs in literature (adverse childhood experiences), are not limited to, but can include physical abuse, sexual abuse, emotional abuse, neglect, witnessing violence, and separation or loss, and can happen in isolated incidents or through ongoing chronic exposures (National Child Traumatic Stress Network, n.d.).

What all ACEs have in common are their associated feelings of stress, and Dr. Bruce Perry, an American neuropsychiatrist, researcher, author and founding member of The Child Trauma Academy, can help explain the significance of these. He describes how stress can be any situation or condition that causes our physiological and neurophysiological systems to deviate from their typical activity, and that traumatic events are an extreme form of stress that can disrupt the body's homeostasis (Perry, 2007). Perry highlights how it's important to note that stress during development is not always negative, the development of healthy stress response systems actually requires exposure to moderate, manageable levels of stress. Providing children with opportunities for controlled exposure to stress through safe exploration and discovery is crucial for healthy development, and children who have a consistent, available, and safe

caregiver as a "home base" can become resilient against future, more severe stressors. Events that disrupt the body's homeostasis are stressful, but in a normal development the child will recover. However, if the stress or ACE is severe, prolonged, unpredictable, or chronic, the compensatory mechanisms may become over-activated or fatigued, hindering their ability to restore homeostasis and resulting in a plethora of health issues.

One doesn't have to dig very hard to find the literature that connects such trauma to adverse health outcomes, as there are many studies that identify strong associations between childhood trauma and negative mental health outcomes in adulthood (Chapman et al., 2007; Schneider et al., 2020; Wu et al., 2010). Chapman et al. (2007) highlight that ACEs, such as abuse and neglect, are significant risk factors for outcomes including depression, anxiety, and substance abuse. Wu et al. (2010) found that individuals with a history of childhood trauma who also struggle with substance abuse and mental health disorders face poorer health outcomes compared to those without a history of childhood trauma, and Schneider et al. (2020) demonstrated that childhood traumas such as physical abuse, sexual abuse, emotional abuse, and neglect, all resulted in higher rates of mental health problems as adults. All three studies highlight the importance of addressing childhood trauma and its impact on mental health in adulthood, however, an interesting note from Schneider et al. (2020) was that the participants who experienced ACEs but had strong social support networks were less likely to report poor mental health. Although not mentioned in their article, from a polyvagal lens this finding highlights the influence of co-regulation and the social engagement system (SES).

The Polyvagal Perspective

To fully grasp the effects of trauma and its connection to PVT we need to have a better understanding of a few core concepts. Specifically, dissolution and the three autonomic states, neuroception and the vagal brake.

Dissolution and the Three Autonomic States. According to PVT, the ANS has three pathways that respond to stimuli in the body and the environment. These pathways are activated in a specific sequence called dissolution, with the newest pathway being the ventral vagal (PNS), followed by the SNS, and finally the dorsal vagal (PNS) (Porges, 2009; Porges, 2022). The dorsal vagal pathway responds to challenges by inducing immobilization, the SNS pathway triggers mobilization, and the ventral vagal pathway supports the SES, co-regulation and connection.

The ventral vagus, sometimes referred to as the "smart" or "social" vagus, plays a crucial role in promoting health, growth, and restoration. When active, it directs our focus toward connecting with others and seeking opportunities for co-regulation through the SES (Dana & Porges, 2018). The capacity to soothe and be soothed, to communicate and listen, and to move seamlessly between connections is located in this newest part of the ANS. With its myelinated pathways and the face-heart connection, the ventral vagus is able to respond rapidly and effectively, and when we are in a ventral vagal state, we have access to a range of emotions such as calmness, happiness, engagement, attentiveness, interest, excitement, passion, alertness, relaxation, appreciation, and joy.

The SNS, sometimes referred to as our "fight or flight" response, is activated when a feeling of unease is triggered by a neuroception of danger (Dana & Porges, 2018). In this state, the environment is scanned for potential danger and our heart rate increases, with breathing becoming shallow and rapid, leading to the mobilized response it is so well known for. When

stressful events or trauma don't allow for the body to be in a ventral vagal state and our SNS is over-activated, daily living issues such as anxiety, panic attacks, anger, difficulty in focusing or completing tasks, and relationship distress are all felt. Over time, these states can result in negative health consequences including heart disease, elevated blood pressure, sleep difficulties, weight gain, memory issues, headaches, chronic neck, shoulder, and back pain, digestive problems, and a weakened immune system.

When we are unable to take action and all other pathways have failed, the "primitive vagus" of the dorsal vagal pathway in the parasympathetic branch takes over, causing shutdown, collapse, and dissociation, better known as our "freeze" response (Dana & Porges, 2018; Porges, 2009; Porges, 2022). Our body goes into conservation mode, and one may enter a state of hopelessness, abandonment, and emptiness, describing their experience as foggy, and being mentally and physically exhausted (Dana & Porges, 2018). This state can lead to symptoms such as dissociation, memory problems, depression, isolation, and a lack of energy for daily activities, and some of the health consequences associated with it include chronic fatigue, fibromyalgia, stomach problems, low blood pressure, type 2 diabetes, and weight gain.

Neuroception & Trauma. Neuroception is that gut feeling, the intuition of your ANS while it subconsciously evaluates potential risks and cues of safety in your environment (Dana & Porges, 2018; Porges, 2009; Porges, 2022). In response to a perceived threat, it shifts the body's state to either sympathetic mobilization or dorsal vagal immobilization. However, in the presence of safety, the sympathetic and dorsal vagal systems are suppressed, allowing the ventral vagal system to be in control and activate the SES. For individuals who have experienced trauma and are more sensitive to cues of danger, the process of neuroception can lead to misalignment, meaning that they may not be able to effectively deactivate their defence mechanisms in safe

environments or activate them when necessary in hazardous environments. In a podcast on trauma and healing, Deb Dana summarizes this conflict with an impactful statement: "Co-regulation is complicated for those with trauma because [they] have this longing for connection that is in competition for the drive to survive" (Koven, 2020).

The Vagal Brake & Trauma. The vagal brake is a crucial aspect of PVT. The ventral vagus plays a significant role in regulating heart rate and without this control, it could become excessively elevated (Dana & Porges, 2018). The vagal brake is comparable to the brakes on a bicycle – when you release the brakes, your speed increases, and when you apply the brakes, your speed decreases. The vagal brake operates similarly, releasing to provide rapid energy (SNS) and engaging to bring peace and calm (PNS). If we think of this in the context of ACEs, intense or frequent occurrences of trauma and stress may cause the vagal brake to become dysregulated. Losing control of the vagal brake will result in the overactivation of the SNS and dorsal vagal system which can then lead to many of the negative health consequences mentioned above. Trauma survivors who are prone to dysregulation of survival responses often lacked the childhood experiences that help to effectively use the vagal brake, and as a result, even minor stressors can overwhelm their ability to regulate it.

Polyvagal Theory & Trauma Research

Incorporating the concepts of dissolution, neuroception, and the vagal brake, one can make better sense of the full effect of trauma. A neuroception that is sensitive to cues of danger, combined with a dysfunctional vagal brake, will hypothetically lead to a quick descent through the three autonomic states of dissolution. To further examine this, this section will synthesize the research that focuses on variables of sympathetic and parasympathetic control. In many of his articles and books, Stephen Porges refers to RSA as a measure of parasympathetic vagal tone and

the influence of the SNS on the sympathetic-adrenal-medullary (SAM) and hypothalamic–pituitary–adrenal (HPA) axes as measures of sympathetic control (Dana & Porges, 2018; Porges, 2001; Porges, 2022), so these will be explored along with HRV, which RSA is a more specific form of.

The SNS Response. When the ANS detects cues of danger through neuroception there is a specific chain of events that occurs. The SNS takes control over the ventral vagal PNS and activates the SAM and HPA axes (Dana & Porges, 2018; Porges, 2001). These two axes are closely linked systems and they interact with each other to produce a coordinated response to stress (American Psychological Association, 2023). The SAM system provides a quick burst of adrenaline, bringing a short-term, rapid response that is quickly regulated. If this is not enough to resolve the distress the HPA axis takes over and releases cortisol, which is commonly referred to as the stress hormone (Godoy et al., 2018). This release of cortisol is slower, taking several minutes to take effect, but it provides a more sustained response to stress. Through the interplay of the SAM and HPA axes, the SNS can activate individual actions such as pupil dilation and sweating, increase reactions like breathing and heart rate, or mobilize a full-body response in the "fight or flight" state. This coordinated response helps the body to cope with stressful situations when one has a functional vagal brake.

Frequent moments of sympathetic activation were common among those with a history of trauma and ACEs, and these events caused their SNS to remain in a state of high alert (Dana & Porges, 2018). When cortisol is released by the HPA axis it makes it difficult to relax, as it is utilizing the body's resources for a fight or flight state, and when it is blunted, the body's response to trauma is dysregulated (Godoy et al., 2018). This ongoing chronic distress can interfere with a person's ability to form and maintain healthy relationships through their SES as

their vagal brake also becomes dysregulated, which can lead to a lack of social support (Dana & Porges, 2018). In the absence of such support and connection, the ANS is quick to perceive danger through neuroception and shifts into a protective state. This perpetuation can create a feedback loop of habitual defensive responses that utilize the mobilization of the SNS and/or the immobilization of the dorsal vagal system.

Trauma, Depression & Cortisol Levels. To say the extent of research on the HPA Axis and its relation to trauma is vast would be an understatement (Hosseini-Kamkar et al., 2021), so with this in mind, this section will focus on ACEs and cortisol levels in the context of depressive and suicidal symptoms. Childhood trauma has been shown to cause changes in the HPA axis and result in persistent sensitization of the stress response system in the context of major depression (Heim et al., 2000; Heim et al., 2008). However, the impacts of childhood trauma on cortisol reactivity have been inconsistent. Heim et al. (2000) found that women who had experienced childhood abuse with or without major depression exhibited increased cortisol levels in response to a laboratory stressor, while Carpenter et al. (2007) found that men who had experienced trauma without depression had decreased cortisol levels in response to a laboratory stressor. Researchers were later able to replicate this result and found that women who had experienced childhood physical abuse with depression had a blunted, or decreased, cortisol response compared to women without such abuse (Carpenter et al., 2011).

One thing that is common among all of these studies is that trauma influences the dysregulation of the HPA axis and cortisol, however, an interesting note from Heim et al. (2000) was that the impact of increased cortisol was notably pronounced in females who were concurrently experiencing symptoms of anxiety. From a polyvagal perspective, one could hypothesize that this increase in cortisol from anxiety is because the individuals are more prone

to a sympathetic response to stress, while the individuals who experience depression and decreased cortisol reactivity are more prone to shifting into the most primitive response of dorsal vagal shutdown (DVS). The research behind trauma, suicide risk and cortisol levels is definitely thought-provoking when it comes to this proposal.

Trauma, Suicide Risk & Cortisol Levels. Suicide risk and childhood abuse is a global issue. Researchers in the U.S., Turkey, and Brazil have found significant associations between suicide risk and all types of childhood maltreatment, with all three studies concluding that emotional neglect and abuse had the greatest impact on suicidal behaviours (Barbosa et al., 2014; Saraçlı et al., 2015; Sarchiapone et al., 2007). With this knowledge in hand, and with the support of a systematic review finding 11 studies that uniquely associated childhood emotional abuse with depression (Li et al., 2020), it would make sense to suggest the connection of a DVS due to ACEs contributing to depression, subsequent decreases in cortisol activity, and potential suicidal behaviours.

A study in Sweden demonstrated that suicidal behaviour was associated with low levels of cortisol activity (Lindqvist et al., 2008) and when comparing those who had attempted suicide to those who had not, researchers in the U.S. discovered evidence of lower baseline cortisol levels in those who had (Keilp et al., 2016). Similarly, Melham et al. (2017) found decreased hair cortisol levels in suicide attempters compared to suicide ideations and controls. When examining the connection between childhood trauma, cortisol levels, and suicide, O'Connor et al. (2018) identified ACEs as significant predictors of decreased cortisol reactivity, with higher levels of ACEs being associated with lower baseline cortisol in participants who had a previous history of suicidal behaviour.

Although many studies point to the association between decreased cortisol levels and suicide risk, recent meta-analyses have found mixed results, with associations being found with both decreased and increased levels of cortisol (Hernández-Díaz et al., 2020; O'Connor et al., 2016). All of the aforementioned authors were aware of the mixed results in previous studies, and they agree that there is a need for further research in identifying the role of the HPA axis and cortisol levels in suicide risk (Keilp et al., 2016; Lindqvist et al., 2008; Melham et al., 2017; O'Connor et al., 2018). Making sense of it from a polyvagal perspective, the over-activation of both the second and third stages of dissolution due to a dysfunctional vagal brake seems to play a role in suicide behaviour, as both increased and decreased levels of cortisol are associated with higher risk. O'Connor et al. summarize the findings quite well, concluding that "the challenge for researchers is to elucidate the precise causal mechanisms linking trauma, cortisol and suicide risk and to investigate whether the effects of childhood trauma on cortisol levels are amendable to psychological intervention," (O'Connor et al., 2018, p.15)

Parasympathetic Tone in Relation to RSA & HRV. While the research regarding trauma and the HPA axis in relation to PVT is still far from being concrete, the connection between parasympathetic vagal tone and overall health outcomes has been better established. RSA and HRV are measures of parasympathetic vagal tone because they reflect the influence of the PNS, specifically the vagus nerve, on the heart (Dana & Porges, 2018). The PNS, through the utilization of the vagal brake, is responsible for slowing down heart rate and increasing HRV, and this effect can be seen in the RSA and HRV measures.

RSA refers to the variation in heart rate that occurs in response to the natural fluctuations in breathing rate, where during inhalation, the heart rate increases slightly, and during exhalation, it decreases slightly (Yasuma & Hayano, 2004). This variation in heart rate is due to the

influence of the vagal brake on the heart, and a robust RSA with larger variations in heart rate is indicative of a strong and healthy PNS, while a weak RSA with smaller variations in heart rate may indicate a compromised PNS (Bernston et al., 1993). HRV refers to the variability in the time intervals between consecutive heartbeats, which reflects the balance between the SNS and PNS (Kim et al., 2018). A high HRV with larger variations in the time intervals between heartbeats indicates a healthy and flexible ANS, one that is able to adapt to changing physiological and emotional demands and is associated with good health outcomes, while a low HRV with smaller variations in the time intervals between heartbeats suggests a rigid and inflexible ANS, one that is associated with a higher risk of health problems such as chronic stress, anxiety, depression, and cardiovascular disease (Kim et al., 2018; Koch et al., 2019; Thayer and Sternberg, 2006).

Trauma & RSA. Although RSA was covered in *Theme 1: A Brief Overview of Polyvagal Theory* as both a resilience factor and predictor of negative health outcomes, we will briefly explore its further connections with trauma. A study by Sack et al. (2004) found that individuals with PTSD had lower RSA compared to healthy individuals and those with other psychiatric disorders, and this was associated with prolonged psychophysiological arousal, which may contribute to the development and maintenance of PTSD symptoms. Campbell and Wisco (2021) conducted a literature review and found that studies have consistently shown lower RSA reactivity in individuals with anxiety and PTSD compared to healthy individuals. However, the review also noted inconsistent findings regarding the direction of the relationship between RSA and PTSD, with some studies finding that low RSA precedes the development of PTSD and others finding that PTSD leads to lower RSA reactivity.

Two studies investigated the relationship between RSA and trauma in children but with different focuses. Gray et al. (2017) investigated the role in the development of psychopathology and discovered sex differences in the contribution of RSA and trauma. They found that both boys and girls with low RSA reactivity and high trauma exposure had increased levels of psychopathology, but that the effect was stronger for girls. Mikolajewski and Scheeringa (2018) looked at the prospective relationship between pre-disaster RSA and post-disaster PTSD symptoms in children and found that lower pre-disaster RSA reactivity was associated with higher levels of post-disaster PTSD symptoms in children. Both of these studies are significant as they highlight the importance of RSA as an indicator of mental health susceptibility and resilience in regard to trauma.

In the context of PVTs SES and co-regulation as protective factors, Scheeringa et al. (2004) had an interesting finding. Both traumatized children with PTSD and traumatized children without PTSD showed reduced RSA in response to a traumatic stimulus when compared to the non-traumatized group. However, there was a significant impact of the interaction between parental positive discipline and PTSD symptoms on RSA. The most affected children exhibited lower RSA and heightened PTSD symptoms when their caregivers utilized less positive discipline during the traumatic stimulus. This is a key finding because even with the parenting being less positive – not negative, abusive, or neglectful – it had an impact on the children's parasympathetic vagal tone.

Trauma & HRV. Several studies have investigated the relationship between childhood trauma, HRV, and various health outcomes. In Australia, researchers found that childhood trauma was associated with lower psychosocial functioning and physical health in a non-clinical community sample of young adults, with participants demonstrating low HRV measures

(Beilharz et al., 2019). In the U.S., Stone et al. (2018) found that a history of childhood emotional abuse was associated with lower HRV in women with depression, and authors in Germany found that individuals with PTSD or BPD who experienced early life maltreatment had lower HRV compared to those without a history of maltreatment (Meyer et al., 2016). When looking at the overall picture of PTSD, regardless of ACEs, a meta-analysis by Schneider and Schwerdtfeger (2020) found that participants had lower HRV compared to controls, indicating a potential autonomic dysfunction in individuals with PTSD. All of these findings suggest a link between life stress and HRV, which may have implications for the development and treatment of psychological disorders.

There were a couple of studies found that have exciting insights for the next theme in this paper. Research suggests that social interaction and high HRV may play roles in moderating the relationship between childhood trauma and psychosocial outcomes in adulthood. Schwerdtfeger and Friedrich-Mai (2009) found that the relationship between depressive mood and HRV was moderated by social interactions, meaning that the relationship between the two variables changed depending on the context of social interactions. Specifically, the study found that depressive mood was associated with lower HRV during periods of social isolation, but not during periods of social interaction. Duprey et al. (2018) found that childhood maltreatment, particularly emotional abuse, is linked to lower self-esteem, which in turn is linked to increased suicidal ideation in emerging adults. However, they also found that HRV acts as a moderator in this relationship, meaning that individuals with higher HRV were less affected by the negative effects of childhood maltreatment on self-esteem and suicidal ideation. These studies highlight the importance of considering the SES, co-regulation and HRV in understanding the impact of childhood trauma on psychosocial outcomes in adulthood.

Reflection & Direction

Trauma is a diverse and vast topic and having a basic understanding of it through the theoretical lens of PVT can provide a foundation of understanding for counsellors and those in the helping professions. This theme provided a small introduction to what ACEs are and how the body responds to them from the polyvagal perspective of the ventral vagal pathway, sympathetic pathway and dorsal vagal pathway, it explored the research and physiological measures that connect and support these states, and now it is time to examine the approaches to therapy that align with PVT and how they have been successful in addressing some of the variables outlined in this theme, specifically HRV.

[Theme C] Investigating A Polyvagal Informed Approach to Counselling

Stephen Porges first introduced the concept of PVT in 1994 and over the next decade it gained recognition among a new generation of leading trauma therapists who saw in the theory a clear explanation for the effectiveness of their body-based approaches (Polyvagal Institute, 2023). This insight helped these therapists, as well as the practitioners who came after them, to better understand the connection between our sense of safety and our behavior by highlighting the biology and significance of the ANS. Names that one may recognize today, such as world renowned researchers and doctors Bessel van der Kolk, Dan Siegel, Gabor Maté, and Peter Levine, are all advisors on Porges' team for the Polyvagal Institute (PVI), and all offer individual and unique certificate training programs for helping professionals. As valuable as these programs would be for school counsellors, the substantial amount of time and finances that are required may not make them as feasible to dig into in this theme. This is where the written work of Deb Dana, a clinician, author, and a founding member of the PVI alongside Porges', bridges this gap of accessibility for those in helping positions.

In this section, we will briefly explore and define a therapeutic polyvagal framework outlined by Dana, connect the overarching practices and themes that unite it, and further highlights the significance of them with research related to HRV. The purpose will be to introduce and reaffirm concepts that the reader may already be familiar with, with the intention to become more adept at being a polyvagal informed helper. These concepts will include mindfulness and breath work, compassion, movement and exercise, social interaction, sound, nature and art, and writing and gratitude.

The BASIC Framework

In her book *Polyvagal exercises for safety and connection: 50 client-centered practices*, Dana creates the BASIC framework to educate and assist both therapists and clients on how to reorganize and harness the power of the ANS for not only survival but also for promoting healing (Dana & Porges, 2020). An important factor in this process, and one that many in the helping professions are aware of, is the relationship between the therapist and client. The counselling session serves as a predictable time for clients to experience co-regulation and a connection to a calming vagal state that provides them with a safe environment to explore both SNS mobilization and PNS shutdown. Furthermore, the process of ANS reorganization that begins in therapy can be reinforced through awareness and practice outside of the session.

The BASIC framework, which stands for *Befriend, Attend, Shape, Integrate, and Connect*, assists clients in building this proficiency with autonomic regulation, resulting in greater adaptability and resilience to stressors. Some of the concepts may seem out of reach for elementary students as they are tailored toward an adult demographic, however, an awareness of them from the counsellor may allow them to adapt certain practices and exercises to promote these mind-body connections in the little ones they are working with.

Befriend. Temporary feelings of disconnection from one's body are widespread and frequently encountered by clients who have undergone traumatic experiences (Dana & Porges, 2020). The more conscious a person is of their bodily sensations, the greater their control over their life. Befriending involves developing the ability to pay attention to and approach one's autonomic state and experiences with curiosity and self-compassion.

Attend. Attending means being able to acknowledge and follow your body's nervous system states and practicing this creates the capacity to identify autonomic states, monitor transitions between them, and cultivate the habit of recognizing major changes and subtle fluctuations (Dana & Porges, 2020). For clients, being aware of their current nervous system state and its progression is the first step towards regaining control and regulating it.

Shape. Trauma interferes with the ability to control and smoothly transition between nervous system states (Dana & Porges, 2020). The ANS is molded by past experiences and functions to ensure survival by reacting to current signals of safety and danger based on those experiences. However, just like the brain can learn new ways of functioning, the body's nervous system can too. Shifting from automatic survival reactions by shaping a more connected state involves being mindful and engaging in activities that improve the ability to stay relaxed and in control.

Integrate. From the lens of PVT and the nervous system, resilience means the ability to come back to a calm state after feeling stressed or shutting down (Dana & Porges, 2020). Changes in nervous system responses to daily challenges are normal and expected. For some people, these changes are minor, and they can still return to a calm state even when there are big changes, but for others, the response is severe, and they have a difficult time re-entering a ventral

vagal state. Integration involves paying attention to new nervous system patterns and working with them to create resilient ways to respond to stressors.

Connect. The body's nervous system affects how we connect with others (Dana & Porges, 2020). How your clients feel about themselves, build relationships, and navigate the world is shaped by their nervous system. They feel comfortable with people whose nervous system patterns match their own or remind them of their childhood, so by doing activities that help regulate their nervous system your clients' patterns begin to change and they may find that they are attracted to people who align with their new patterns. Examining relationships from this new perspective helps distinguish what drains and what strengthens their nervous system.

Overarching Practices of the BASIC Framework

Within each step of the BASIC framework Dana provides several client-centred practices to help educate and guide them on their autonomic reorganizing journey. With the timeline and sporadic nature of school counselling, it's not realistic to work through this process with students. However, there are overarching practices that can be utilized to help strengthen the ventral vagal influence on the ANS of all our students. These practices include mindfulness and breath work, compassion, movement and exercise, social interaction, sound, nature and art, and writing and gratitude. The beautiful thing about all of these is that science can now back them with research involving HRV, a factor that we discussed in detail as a measure of parasympathetic vagal tone in Themes 1 & 2. We will synthesize the literature connecting each of these practices with HRV and in our final Chapter we will look at recommendations for applying them in school counselling.

Mindfulness, Breath & HRV. Particularly prevalent in the first three stages of *Befriending, Attending* and *Shaping*, mindfulness is implemented as a way to *befriend* the

nervous system through education and awareness of one's current body states, *attend* the nervous system by identifying the nuances between the ebbs and flows of the ventral, sympathetic, and dorsal energies, and help *shape* the nervous system by focusing intentionally on techniques that enhance the ability to remain grounded in the ventral vagal network (Dana & Porges, 2020). An extension of mindfulness, breath work is introduced in the *shaping* stage as it can be intentionally controlled and provides a direct method for affecting one's autonomic state. By using breath work in between sessions, clients are developing their ability to regulate themselves, and when used with a therapist in session, it becomes a shared co-regulation activity.

Mankus et al. (2013) investigated the relationship between mindfulness and HRV in individuals with high and low levels of generalized anxiety symptoms. The study found that individuals with higher levels of mindfulness had greater HRV than those with lower levels of mindfulness. Similarly, Christodoulou et al. (2020) reviewed the utility of HRV in mindfulness research, finding that mindfulness interventions were associated with increased HRV in a range of populations, including healthy adults, individuals with anxiety and depression, and those with physical health conditions. Both studies suggest that mindfulness may enhance ANS functioning and improve stress and emotion regulation, which aligns with the research as mindfulness interventions have been shown to decrease depression and anxiety and alleviate trauma-related symptoms, while also enhancing coping abilities, improving mood, and increasing quality of life in both trauma-exposed adults and youth (Ortiz & Sibinga, 2017).

A major component of mindfulness practice, both Zaccaro et al. (2018) and Laborde et al. (2022) provide evidence in their systematic reviews that slow breathing techniques can increase HRV. Zaccaro et al. (2018) suggest that slow breathing can activate the PNS, which can lead to increased HRV and improved emotional regulation, while Laborde et al. (2022) found that slow

breathing can increase HRV and decrease heart rate, indicating improved autonomic balance. Both studies suggest that slow breathing techniques may be useful in promoting relaxation, reducing stress, and improving overall health and well-being (Laborde et al., 2022; Zaccaro et al., 2018).

Compassion & HRV. Compassion for oneself and others is foundational within the BASIC framework, and it is most prominent in the *Befriending*, *Shaping*, and *Connecting* stages (Dana & Porges, 2020). When individuals engage in self-criticism, it can trigger primal defense mechanisms that shift them from a state of safety to one of protection. This survival mode can hinder their ability to think clearly, making them more prone to reactive behavior instead of thoughtful reflection. When individuals practice self-compassion, they can find a secure way to investigate and understand their autonomic response patterns. This approach provides a supportive and non-judgmental attitude that encourages clients to explore and learn about themselves without feeling threatened or overwhelmed. By cultivating a perspective of compassion and regulating their own nervous system, one can perceive when someone else's system is dysregulated, and respond with kindness and regulation. This capacity for both compassion and self-compassion is something that develops gradually over time and recognizing that they arise from an autonomic state can provide your clients with a foundation for *befriending* their nervous systems, allowing them to objectively and lovingly *shape* their systems, and teaching them how to recognize the same processes in others and *connect* through a more robust ventral vagal state and SES.

The research investigating the relationship between compassion and HRV is still building, however, a meta-analysis including 15 articles found that compassion was positively associated with HRV, particularly the high-frequency component of HRV, which reflects

parasympathetic activity (Di Bello et al., 2020). The analysis also found that compassion training was associated with increased HRV in both healthy populations and individuals with various health conditions, including depression. A more recent study by Gerdes et al. (2022) investigated the psychophysiological responses to a brief self-compassion exercise in armed forces veterans and they found that the participants who completed the exercise showed increased HRV. These studies are encouraging because they back up the emphasis of compassion within the BASIC framework, suggesting that compassion and self-compassion training may improve autonomic regulation, in turn helping to buffer the effects of stress on the body and improve overall health and well-being. This has been highlighted in research not involving HRV, as Friis et al. (2015) also found that practicing self-compassion can result in greater adaptability in responding to stressful experiences.

Movement, Exercise & HRV. Incorporated into all stages of the BASIC framework, the purposeful engagement with movement provides an avenue to connect with and regulate the dorsal vagal and sympathetic states, reducing their intensity and duration, while promoting the development of ventral vagal states (Dana & Porges, 2020). Within the individual each autonomic state is associated with varying levels of energy that can be harnessed and utilized to shape one's experience. The expression of these movements can take place along a spectrum that ranges from simple to complex, encompassing both small micro-movements and full body motions. Within the context of counselling and practices that we can encourage for our clients and students, these movements can be activities such as swaying of the body, stretching, yoga, and exercise. There is therapeutic value in being able to consciously focus on and fully experience bodily sensations while moving (Lucas et al., 2018) and the ANS can be activated not

only through the physical act of movement, but also by mentally visualizing movement, as evidenced by studies conducted by Collet et al. (2013) and Demougeot et al. (2009).

Although the literature with simple movements and HRV is limited, one can extrapolate to the mind-body practice of yoga. Two review articles examined this relationship, and both agree that practicing yoga and mind-body exercises are associated with increased HRV (Tyagi & Cohen, 2016; Zou et al., 2018). Tyagi and Cohen (2016) suggest that yoga can increase HRV through various mechanisms, including reducing stress, promoting relaxation, and enhancing respiratory and cardiovascular function, and similarly, Zou et al. (2018) reported that mind-body exercises, including yoga, are effective in improving HRV parameters and reducing perceived stress in randomized controlled trials, including those with mental health conditions. Regarding more active exercise, which is most prevalent in the *shaping* stage, a review article by Souza et al. (2021) found that there is a positive relationship between HRV and exercise. The article suggests that regular exercise can enhance parasympathetic activity and decrease sympathetic activity, leading to an increased HRV.

Social Interaction & HRV. The experience of the ventral vagal state, or SES, involves a profound sense of connection to the world and oneself, an ability to engage with others, and a willingness to embrace change and explore new possibilities (Dana & Porges, 2020). This state encompasses a range of emotions, including solitude and social connection, excitement and relaxation, happiness and sadness, as well as frustration and flow. Despite the diversity of these experiences, they are held together by a fundamental sense of safety, which is why the practice of visualizing, reflecting, and engaging in social interaction are fundamental aspects of the BASIC framework. Throughout our lifetime, the need for social interaction and co-regulation persists, even as we develop the ability to self-regulate. This is because the capacity for self-

regulation is built on continuous experiences of co-regulation, and the research investigating the effect of these social interactions on HRV, and a lack of, is quite intriguing.

The authors of a 2019 review article argue that HRV can be a useful biomarker of social engagement, emotional regulation, and resilience, as the evidence that they highlight suggests that social support and positive social interactions can increase HRV (Petrocchi & Cheli, 2019). However, the findings from a meta-analysis with 1,544 children didn't indicate that social engagement tasks significantly affect baseline HRV (Shahrestani et al., 2014). Interestingly though, when Shahrestani et al. (2014) conducted a task involving both disengagement and subsequent re-engagement, HRV decreased during the disengagement phase but returned to its original levels during the reunion phase (i.e., engagement). This shows the regulating powers of social interaction, and results from authors investigating the power of conversation in individuals with perceived social isolation strengthens this argument. Feng et al. (2021) showed that a conversational task led to increased HRV, suggesting an improvement in ANS regulation. What was inspiring was that this effect was more significant among individuals with higher levels of perceived social isolation. Their study suggests that engaging in social interactions can have positive effects on physiological health, especially among those who are susceptible to social isolation.

Sound, Nature, Art & HRV. Throughout the entirety of the BASIC framework there are exercises that incorporate the use of sounds, nature and art, because each of these fundamental human experiences has the capacity to regulate the ANS into a ventral vagal state (Dana & Porges, 2020). Sounds include music and vocal prosody (the melodious quality of the voice that is perceived through elements like rhythm, volume, and tone), nature includes both outdoor immersion and indoor creativity and care, and art includes both the act of viewing and

appreciating along with making one's own. Although the research exploring these experiences in relation to HRV is limited, there are still some interesting findings that can help one become a polyvagal informed counsellor.

In a systematic review and meta-analysis investigating the relationship between outdoor exposure and various health outcomes, researchers found an association between time spent in green spaces and higher HRV, suggesting that nature can have a positive effect on physiological health by reducing stress and promoting relaxation (Twohig-Bennett & Jones, 2018).

Interestingly, Song and Miyazaki (2018) explored the relationship between viewing forest imagery and HRV and found that the forest imagery group had significantly higher HRV, specifically higher high-frequency power, which is associated with PNS activity, compared to the control group. As there were no studies that could be found with the significance of *viewing* and *appreciating* art, one could hypothesize from Song and Miyazaki's study that the physiological response in terms of HRV would be similar. In terms of creating one's own art, however, there is research exploring the benefits of art on HRV. Both Abbing et al. (2019) and Choi et al. (2023) looked at the anxiety reducing and calming effects of art, and both found significant improvements in HRV as opposed to control groups.

Everywhere you go, music surrounds you and has an impact on your physical and emotional states. Dana & Porges (2018) posit that not only does it trigger a ventral vagal response, but it also has a paradoxical effect, which enables you to safely connect with and even derive pleasure from your sympathetic and dorsal vagal states. Review articles from 2015 and 2020 verify this statement, with both finding that music can increase HRV and decrease HRV depending on contexts such as the type of music, the duration and frequency of exposure, and the characteristics of the study population (Koelsch & Jäncke, 2015; Mojtabavi et al., 2020). They

conclude that music therapy may be a promising non-pharmacological intervention to promote autonomic balance and improve overall health, but further research is needed to establish its optimal use and effectiveness in different settings. In a similar vein vocal prosody plays a role in our interpretation of emotions, with Eckland et al. (2019) finding that regarding RSA reactivity, only vocal prosody played a mediating role in the association with observers' perceptions of negative affect and positive affect. They discuss the possibility that the behavioral cues observed were not sufficiently sensitive to capture the nuances in emotional valence and expression, whereas vocal prosody, as an objective and more sensitive behavioral index, was better able to do so.

Writing, Gratitude & HRV. For hundreds of years people have utilized writing to comprehend and find meaning in their lives as it imparts a unique level of awareness to our thoughts and emotions (Dana & Porges, 2020). During the course of therapy, individuals may not fully notice their autonomic experiences, and one effective method for increasing awareness of such experiences is through writing. A common practice of writing, cultivating a habit of gratitude can enable individuals to appreciate the small and often overlooked moments of goodness in everyday life by increasing their experiences in a ventral vagal state, changing their personal narratives, and creating stronger connections with others. For these reasonings, writing and gratitude exercises are foundations of all stages in the BASIC framework.

Bourassa et al. (2017) and Seeley et al. (2017) both investigated the effects of expressive writing on HRV in different populations. Bourassa et al. (2017) found that narrative expressive writing following a marital separation was associated with decreased heart rate and increased HRV, while Seeley et al. (2017) examined the role of emotional approach in an emotional processing writing intervention, finding that individuals who utilized emotional approach

techniques in their writing had higher levels of HRV compared to those who did not. The two studies suggest that expressive writing interventions may be beneficial for improving HRV and ANS function in different populations (Bourassa et al., 2017; Seeley et al., 2017). Although limited, the relationship between gratitude and HRV has also been explored in different populations, with a written component being present in both studies (Rash et al., 2011; Redwine et al., 2016). Rash et al. (2011) found that a gratitude intervention was associated with increased HRV in young adults, while Redwine et al. conducted a pilot randomized study with patients with stage B heart failure and found that a gratitude journaling intervention led to increased HRV and decreased inflammation. The two studies suggest that gratitude interventions may have potential benefits for physical health, particularly for those with lower baseline levels of HRV (Rash et al., 2011; Redwine et al., 2016).

Summary

As a reader of this paper and someone expressing interest in the helping professions, you may have been familiar with many of the concepts that we explored and that were outlined within the BASIC framework. As PVT is physiological in nature, whether intrinsically, through personal practice and experience, or through research, this means that you and your body are already aware of the benefits of these practices. The purpose of this theme was to reaffirm these understandings and provide a deeper knowledge and understanding through education so that you, as a helper, can become more polyvagal informed. The extent of the research and the practices available for supporting clients are vast and may feel overwhelming after reading this chapter, however, we come back to the most important aspect of therapy and one that many in the helping professions are naturally great at – connection.

As mentioned in the overview of the BASIC framework and highlighted throughout our exploration of PVT, the importance of the therapeutic relationship can't be stressed enough. Even if as a helper you feel like you may not have the right tools or strategies to help your student or client, if you feel like you have provided a safe place and have established a trusting relationship, there is immense potential for change. Tschacher and Meier (2020) investigated this potential by studying the physiological synchrony in psychotherapy sessions between therapist-client pairs and they found a *significant synchrony* in HRV. Furthermore, the degree of physiological synchrony was found to predict session outcome, with greater synchrony associated with better therapeutic outcomes. With this in mind, even if you are a beginning helper and may not have the extensive toolkit of your supervisors or colleagues, you are already polyvagal informed if you can provide the conditions for safety, trust, and connection. With this as a foundation, the recommendations that we will explore in our next chapter will only supplement your capacity for helping.

Chapter 3: Summary, Recommendations and Conclusions

Summary

In Canada, a significant number of individuals, especially children and adolescents, have experienced trauma (Government of Canada, 2022). Therefore, school counselors play a crucial role in supporting their students to regulate and recover from trauma's effects. However, conventional psychological approaches used in counseling may not completely address the physiological aspects of trauma and how they present in students, and this is where PVT comes in as a framework to bridge this gap.

This capstone asked the question: 'How can the physiological framework of PVT inform school counsellors and what therapeutic approaches and tools can be utilized when working with

students who have experienced trauma?’ and provided a platform to explore the role of the nervous system in trauma responses. By reviewing the physiological measures that can be assessed through a polyvagal lens, a new way to view the impacts and outcomes of trauma was highlighted. Furthermore, this paper discussed how PVT can inform therapeutic interventions for those who have experienced trauma, and how becoming a polyvagal-informed helper can better equip readers to support those they work with in a meaningful and effective way.

In Chapter 2, the literature review on PVT explored the main tenets of the theory, its relationship with trauma, and its therapeutic value and relevance through three themes:

- Theme A: A Brief Overview of Polyvagal Theory
- Theme B: Polyvagal Theory & Trauma
- Theme C: Investigating A Polyvagal Informed Approach to Counselling

A Brief Overview of Polyvagal Theory

PVT posits that humans, as social mammals, are on an enduring quest to feel safe, and that this safety is rooted in our physiological state (Dana & Porges, 2018; Porges, 2009; Porges, 2022). It provides an explanation of the evolution of mammals from a physiological perspective, identifying three stages of evolution in the autonomic system of vertebrates that are critical in understanding the neural regulation of the ANS. These stages, from oldest to newest, are: (a) the dorsal vagal system; (b) the sympathetic nervous system; and (c) the ventral vagal system. Through an awareness of the mechanisms of these three stages, the importance of physiological state, which enables bodily responses and feelings of safety, optimizes social behaviour, health, growth, and restoration, was highlighted.

Polyvagal Theory & Trauma

PVT suggests that the ANS's purpose is to evaluate risk and match the body's neurophysiological state with that of the environment's actual risk (Dana & Porges, 2009; Porges, 2018; Porges, 2022). When an environment is safe, calm visceral states can emerge, but when an environment is dangerous, the body's defensive fight, flight, or freeze mechanisms are initiated. Childhood trauma, or ACEs, can cause long-lasting psychological, physiological, and emotional distress, because traumatic events have the potential of disrupting the body's homeostasis, hindering the ability to restore safe states and resulting in health issues (Perry, 2007). There are many studies that corroborate this and identify strong associations between childhood trauma and negative mental health outcomes in adulthood (Chapman et al., 2007; Schneider et al., 2020; Wu et al., 2010).

The ventral vagus, which supports the SES, co-regulation, and connection, plays a crucial role in promoting health, growth, and restoration (Dana & Porges, 2018; Porges, 2009; Porges, 2022). However, trauma can impact the ventral vagus, leading to a blunted reactivity or heightened sensitivity to perceived threats (Carpenter et al., 2007; Carpenter et al., 2011; Heim et al., 2000; Heim et al., 2008). Understanding the connection between PVT and trauma is crucial to gain a deeper understanding and compassion for individuals experiencing trauma, and biomarkers such as HRV and RSA are used as variables to measure ventral vagal tone (Bernston et al., 1993; Kim et al., 2018; Koch et al., 2019; Thayer and Sternberg, 2006).

Investigating A Polyvagal Informed Approach to Counselling

PVT has gained recognition among trauma specialists such as Bessel van der Kolk, Dan Siegel, Gabor Maté, Peter Levine, and Deb Dana, who have all found it helpful in understanding the connection between a sense of safety and behavior and who offer unique certificate training programs for helping professionals (Polyvagal Institute, 2023). Dana's therapeutic BASIC

framework, rooted in PVT, highlights key interventions for counselling that focus on regulating the ANS for those who have experienced trauma (Dana & Porges, 2020). Some of these include mindfulness, breath work, compassion, movement and exercise, social interaction, sound, nature and art, and writing and gratitude, and all of them have been supported through literature investigating their positive effects on HRV.

While the research and extent of practices may seem overwhelming, the most important aspect of therapy is the therapeutic relationship and establishing a safe and trusting environment (Geller & Porges 2014; Porges, 2021). Studies have shown that physiological synchrony between therapist and client is associated with better therapeutic outcomes (Tschacher & Meier, 2020). Therefore, even if a helper is just starting out and doesn't have an extensive toolkit, they are already polyvagal informed if they can establish safety, trust, and connection.

Critique of Polyvagal Theory

Criticisms of PVT are few and far between, and when it came to finding them, they were addressed by none other than Stephen Porges. On his website, the Polyvagal Institute (polyvagal institute.org), he identifies and counters three studies of which criticize his theory (Porges, 2021, August). All of these articles are directly related to the phylogeny, or history, of the autonomic nervous system, and they aim to disprove PVT by demonstrating that RSA and vagal control of the heart *can be found* in non-mammalian animals, specifically fish, and that this information also provides evidence that contradicts PVT's proposal that the dorsal vagal complex is older than the ventral vagal (Campbell et al., 2005; Grossman et al., 2007; Monteiro et al., 2018).

Porges agrees that cardiac vagal neurons can be found within our primitive ancestors, and he points out that a select few share the source of the mammalian ventral vagal complex, the

nucleus ambiguus, but he argues that as far as current literature suggests, the cardioinhibitory effect of such neuroanatomy is uniquely mammalian (Porges, 2021, August). He concludes his rebuttal with "Basically, the criticisms are not criticisms of the Polyvagal Theory. The criticisms are not about testing the documented constructs embedded in the theory: dissolution, vagal brake, neuroception, or social engagement system... Hopefully, future criticisms will, by focusing on the stated principles of the theory, lead to refinements in the theory," (Porges, 2021, p. 57).

Recommendations

Recommendations for School Counsellors

Based on the findings in this capstone and the literature review, there is one key recommendation for school counsellors: educate themselves on PVT. It is important for school counselors to have an understanding of PVT because it provides a deeper knowledge of the physiological responses that underlie behavior and emotions. By having this awareness, school counselors can better identify signs of stress and trauma in their students. For example, a student who exhibits behavioral problems or appears to be disengaged from learning may actually be in a state of physiological dysregulation, which could be a response to stress or trauma. By recognizing these signs, school counselors can develop more effective strategies for supporting their students, such as providing a safe and calm environment or introducing calming techniques like deep breathing or mindfulness exercises.

Additionally, school counselors who are polyvagal-informed can provide valuable psychoeducation to their students. This can help students reframe what might seem like negative responses to stress as protective, survival responses that the body just needs some help regulating. By explaining the role of the ANS and how it responds to stress, school counselors

can help them understand their own responses and take steps to regulating them. This can help students feel more empowered and in control of their emotions, potentially removing much of the damaging shame that hinders their healing capacity, and it can also contribute to a more positive and supportive school environment.

Professional Development for School Counsellors

Based on the literature review and the above recommendation, a professional development workshop is proposed for school counsellors in BC. An outline of the workshop is provided below, followed by session details that include the content to be covered and delivered:

<i>Workshop – PVT and Practices for School Counselors:</i>			
<i>Understanding the Nervous System to Better Support Students</i>			
<i>Time</i>	<i>Session #</i>	<i>Topic</i>	<i>Sub-topics</i>
<i>8:45 - 10:15</i>	<i>1</i>	<i>Understanding PVT and the Autonomic Hierarchy</i>	<ul style="list-style-type: none"> • <i>An Introduction to PVT</i> • <i>Dorsal Vagal Pathway</i> • <i>Sympathetic Nervous System</i> • <i>Parasympathetic Nervous System</i> • <i>The Autonomic Ladder</i>
<i>10:30- 11:30</i>	<i>2</i>	<i>Neuroception and Trauma</i>	<ul style="list-style-type: none"> • <i>Detection Without Awareness</i> • <i>Detection With Awareness</i>
<i>11:45 - 12:45</i>	<i>3</i>	<i>Coregulation and the Therapeutic Relationship</i>	<ul style="list-style-type: none"> • <i>Connection and Safety</i> • <i>A Look at HRV</i> • <i>Synchronicity</i>

1:30 - 2:30		<i>Activities for Improving Parasympathetic Tone</i>	<ul style="list-style-type: none"> • <i>Influences on HRV</i> • <i>Mindfulness, Breath, Nature, Social Interaction, Movement, Art, Music, Compassion & Gratitude</i>
2:45 - 3:15		<i>Recommendations for Further Learning and Wrap-Up</i>	<ul style="list-style-type: none"> • <i>Books and Podcasts</i> • <i>Continuing Education and Certifications</i> • <i>Questions & Reflection</i>

Session 1 – Understanding Polyvagal Theory and the Autonomic Hierarchy. In this lesson, participants will gain an understanding of the basic principles of Polyvagal Theory (PVT) and be able to differentiate between the three levels of the autonomic hierarchy. They will learn about the characteristics and functions of the dorsal vagal pathway, the SNS and the ventral vagal pathway. Additionally, they will have the opportunity to engage in an autonomic ladder activity, which will allow them to apply their knowledge of the autonomic hierarchy and further reinforce their understanding of PVT.

8:45-9:45: An Introduction to PVT. The facilitator will present a slideshow introducing PVT that will cover the following concepts.

- **The Evolution of Mammals:** As mammals evolved, they began to display distinct behavioral differences from their solitary and primitive ancestors (Dana & Porges, 2018; Porges, 2009; Porges, 2022). The reptilian characteristic of lacking nurture for offspring was replaced with a nurturing behavior towards young, and cooperation among individuals became more prevalent than isolation. While these changes were vital for survival within a community, they necessitated a modification in the nervous system to

selectively down-regulate primitive defensive reactions. Hence, these new behaviors required an adaptive nervous system to support them.

- **Autonomic States:** The autonomic nervous system (ANS) is composed of two systems, the sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS), which are responsible for most vertebrate autonomic states (American Psychological Association, 2008). The SNS triggers the "fight or flight" response during emergencies, mobilizing bodily resources such as increasing heart rate, blood pressure, and respiration. On the other hand, the PNS induces the "freeze" and "rest and digest" states, which conserve bodily resources by reducing heart rate, blood pressure, and respiration, and restoring homeostasis to maintain healthy functioning.
- **The Autonomic Hierarchy:** The evolution of the autonomic nervous system occurred in three stages (Dana & Porges, 2018; Porges, 2009; Porges, 2022):
 1. The earliest stage is the dorsal vagal system, which involves immobilization strategies.
 2. The second stage is the sympathetic system, which adds fight and flight to the autonomic responses.
 3. The most recent stage is the ventral vagal system, which allows for safety through connection and social engagement.

In therapy, it is crucial to identify which stage of the autonomic hierarchy your client's nervous system is in. If they are in a dysregulated dorsal vagal or sympathetic state, their body and brain are held in a survival response, making processing and change difficult. On the other hand, when the ventral vagal state is active, the body and brain can work together, and change is more achievable.

- The Social Engagement System: At birth, the ventral vagal complex drives the social engagement system, allowing the infant and mother to co-regulate their autonomic states through cues of safety and laying the foundation for social bonds (Dana & Porges, 2018; Porges, 2009; Porges, 2022). When fully developed, the ventral vagal pathways slow down the heart rate, inhibit the SNS, reduce stress response, and regulate bodily states for growth and restoration. The face-heart connection transmits physiological states through facial expressions and vocalizations, regulating mammalian middle-ear muscles to optimize listening frequencies for social communication.
- Reshaping Through Trauma: PVT explains that our range of social behaviors are limited by our physiology, particularly by the ANS which reacts predictably based on our perceived sense of safety or danger in our environment (Porges, 2011). Studies have demonstrated how our nervous system can adapt and become vulnerable during development and have identified how a history of childhood maltreatment or trauma may potentially reconfigure the ANS (Dale et al., 2022; Kolacz et al., 2020; Porges, 2022). This reconfiguration can result in lower thresholds of safety and greater sensitivity to signals of threat.

These questions will be integrated throughout the presentation to encourage engagement and participation and all of them would include a reflection on how their students might answer:

1. Can you think of a time when you felt calm and connected, in a ventral vagal state?
 - a. Were you alone or with other people?
2. What are some things that often make you feel overwhelmed?
3. Is there a particularly difficult situation that is too much for you to handle?
4. How do you react when you feel the need to take action?

- a. Do you tend to fight or flee in those situations?
5. Have you ever felt completely disconnected?
6. What might a dorsal vagal shutdown look like?
7. What causes you to feel disconnected?

The following video would be viewed as a part of the slideshow:

- ‘Trauma and the Nervous System: A Polyvagal Perspective’ (The Trauma Foundation, 2021).

9:45-10:15: *The Autonomic Ladder Activity.* Participants will create a personalized autonomic ladder that illustrates their hierarchy and associated feelings with their ventral vagal safety, SNS, and dorsal vagal threat states (Dana & Porges, 2020). They can include words, colours, images, emojis, animals, nature, music – anything that they identify as being related to each state. The session would conclude with a group reflection exploring the activity’s application within the school context. Some questions to consider would be:

1. Is there value in this activity for yourself?
2. Could there be value for your students?
3. Can you think of a student that you may be able to integrate this with?

Session 2 – Neuroception and Trauma. In this lesson, participants will learn about the concept of neuroception and its role in detecting danger and safety, particularly in the context of trauma. They will explore how trauma can impact neuroception and lead to dysregulation and how this might affect their students and clients in the school context. They will also add to their autonomic ladders, identifying potential cues of safety, danger, and threat to their three states.

10:30-11:15: *Detection With and Without Awareness.* The facilitator will present a slideshow introducing neuroception that will cover the following concepts.

- **Neuroception Definition:** The ANSs ability to detect without awareness and interface with the environment, both inside and outside the body (Dana & Porges, 2018; Porges, 2009; Porges, 2022). The ventral vagal complex, which is connected to both the face and the heart, makes us sensitive to the intentions behind movements and sounds made by others, particularly in social situations. This is a process separate from perception, where the nervous system processes information from the environment and the body's physiological state reacts to those signals. These autonomic reactions are often unconscious, but we are aware of our body's visceral feelings and physiological state that support them.
- **Neuroception and Trauma:** The body's response to perceived threat shifts it to either sympathetic mobilization or dorsal vagal immobilization (Dana & Porges, 2018; Porges, 2009; Porges, 2022). The presence of safety suppresses the sympathetic and dorsal vagal systems, enabling the ventral vagal system to activate the SES. Those who have experienced trauma and are sensitive to cues of danger may have difficulty deactivating their defense mechanisms in safe environments or activating them in hazardous environments due to misalignment caused by the process of neuroception.
- **Detecting With Awareness:** Neuroception can provide valuable information when brought to conscious awareness (Dana & Porges, 2020). To reshape the ANS, it is necessary to bring awareness to the implicit experience and add context through discernment. In therapy, tuning into these implicit autonomic conversations is crucial for building trust and creating therapeutic presence. Bringing perception to neuroception can identify moments of distress and opportunities for ventral vagal responses. Keeping track of our neuroception is a way to bring explicit awareness to how the ANS is shaping one's

life, and it is essential for building trust and creating therapeutic presence in the therapy process.

- **Applicability in Therapy:** Researchers in a newborn intensive care unit are using the knowledge of polyvagal theory and neuroception to improve their care and compassion for families (Sanders & Hall, 2017). They witness neuroception at play with the co-regulation of mothers and their babies and are better able to understand difficult parents/families by having an awareness of the processes of neuroception. Researchers have also created a Neuroception of Psychological Safety Scale (NPSS), which will help shape new approaches to evaluating trauma treatments, relational issues, and mental health concerns (Morton et al., 2022). This marks just the beginning of our understanding of neuroception.

These questions will be integrated throughout the presentation to encourage engagement and participation and all of them would include a reflection on how their students might answer:

1. Reflect on your personal neuroceptive cues of safety and unsafety:
 - a. What are the cues from inside your body?
 - b. The environment?
 - c. Between you and others?
2. Consider your experience of autonomic reactions:
 - a. Which are only you aware of?
 - b. Which do you show to others?
3. Take a moment to notice your current neuroception, observing sight and sound:
 - a. Are there sufficient cues of safety to allow for a state of readiness?
 - b. Are there any cues of danger keeping you in a state of survival?

- c. Try to discern and reflect on whether you are actually in danger or are safe.

The following video would be viewed as a conclusion, starting at 5:15s, as it is a great transition into the next session:

- ‘Neuroception: The missing piece in our children's Mental Health Crisis | Claire Wilson | TEDxTelford’ (Wilson, 2019).

11:15-11:30: The Autonomic Ladder Activity Ctd. Participants will expand their autonomic ladders by recognizing potential cues that signal safety, danger, and threat in each of their three states. This helps to bring the subconscious experience of neuroception to conscious awareness, which can aid in understanding autonomic activation (Dana & Porges, 2020). Neuroception operates beneath our conscious awareness, but developing the ability to bring it to our attention is a crucial skill.

Session 3 – Coregulation and the Therapeutic Relationship. In this lesson, participants will learn about the importance of connection and safety in therapeutic settings, as well as the role of heart rate variability as a measure of parasympathetic vagal tone. They will gain a better understanding of the crucial role of coregulation in the therapeutic relationship, and practical tools for fostering a safe and connected therapeutic environment.

11:45-12:25: Therapeutic Presence. The facilitator will hand out Geller and Porges study *Therapeutic Presence: Neurophysiological Mechanisms Mediating Feeling Safe in Therapeutic Relationships* (2014) and have the participants read the following sections:

1. What is Therapeutic Presence?
2. Therapeutic Presence and the Neuroception of Safety
3. The Face and Voice
4. Final Remarks

Table groups will discuss their findings and we will come together as a class, reflecting on the article and how we can implement the authors knowledge into their daily practice and lifestyles. These questions will also be integrated throughout the discussions to encourage engagement and participation and all of them would include a reflection on how their students might answer:

1. Consider the people in your life and reflect on which relationships tend to co-regulate and which ones lead to mutual dysregulation.
 - a. With whom do you co-regulate?
 - b. With whom do you dysregulate?
2. Who are the individuals in your social support system?
3. At what times do you experience feelings of loneliness?
4. When do you experience the advantages of solitude and feel a sense of enjoyment in being alone?

12:25-12:45: HRV and Synchronicity. The facilitator will present a slideshow that will cover the following concepts.

- The Significance of HRV: Measures the variation in time intervals between consecutive heartbeats and reflects the balance between the SNS and PNS (Kim et al., 2018; Koch et al., 2019; Thayer and Sternberg, 2006). A higher HRV with larger variations in these intervals indicates a healthy and adaptable ANS, while a lower HRV with smaller variations suggests a rigid and inflexible ANS, which can increase the risk of health problems like chronic stress, anxiety, depression, and cardiovascular disease.
- Synchronicity in Therapy: Researchers Tschacher and Meier (2020) found that even if helpers feel unequipped to help their clients, creating a safe space and establishing trust

can lead to positive changes. The researchers studied psychotherapy sessions and found that there was significant physiological synchrony in HRV between therapist-client pairs, which predicted session outcomes, with greater synchrony associated with better outcomes.

Session 4 – Activities for Improving Parasympathetic Tone. In this lesson, participants will learn about a variety of activities that can be implemented or recommended in counselling for improving parasympathetic, or ventral vagal, tone. They will explore the influences on HRV such as mindfulness, breath, nature, social interaction, movement, art, music, compassion, and gratitude. These strategies can be used not only in counseling sessions, but also in our personal lives to promote self-regulation and co-regulation, and ultimately enhance therapeutic outcomes.

1:30-2:30: Influences on HRV. The facilitator will present a slideshow that will cover the following concepts and studies to support them.

- **Mindfulness and Breath:** Mindfulness practice can improve ANS functioning and increase HRV, which in turn can enhance stress and emotion regulation (Christodoulou et al., 2020; Mankus et al., 2013). Slow breathing techniques have also been found to increase HRV and promote relaxation, stress reduction, and overall well-being (Laborde et al., 2022; Zaccaro et al., 2018). These findings highlight the potential benefits of incorporating mindfulness and slow breathing techniques into therapeutic interventions for individuals with anxiety, depression, trauma-related symptoms, and other health conditions.
- **Movement and Exercise:** Two review articles found that practicing yoga and mind-body exercises are associated with increased HR, and they suggest that these activities can reduce stress, promote relaxation, and enhance respiratory and cardiovascular function

(Tyagi & Cohen, 2016; Zou et al., 2018). A separate review article found a positive relationship between HRV and exercise, with regular exercise enhancing parasympathetic activity and decreasing sympathetic activity, leading to increased HRV (Souza et al., 2021).

- **Nature:** A meta-analysis showed a link between spending time in green spaces and higher HRV, which is associated with stress reduction and relaxation (Twohig-Bennett & Jones, 2018). Additionally, Song and Miyazaki (2018) found that viewing forest imagery was linked to higher HRV, particularly higher high-frequency power linked to PNS activity. The findings suggest that exposure to nature or even nature imagery may have positive effects on physiological health.
- **Art:** Abbing et al. (2019) and Choi et al. (2023) observed that art has anxiety-reducing and calming effects, and both studies reported significant increases in HRV when compared to control groups. These findings suggest that engaging in artistic activities may have a calming and relaxing effect on the body.
- **Music:** Dana and Porges (2018) suggest that music not only triggers a ventral vagal response but can also have a paradoxical effect by allowing individuals to safely connect with and derive pleasure from their sympathetic and dorsal vagal states. Two review articles by Koelsch and Jäncke (2015) and Mojtabavi et al. (2020) found that music can increase or decrease HRV depending on various factors such as the type of music and study population, and they suggest that music therapy may be a promising non-pharmacological intervention to promote autonomic balance and improve overall health.
- **Writing and Gratitude:** Bourassa et al. (2017) and Seeley et al. (2017) found that expressive writing interventions were associated with improved HRV and ANS function

in different populations. Additionally, Rash et al. (2011) and Redwine et al. (2016) explored the relationship between gratitude and HRV, finding that gratitude interventions may have potential benefits for overall health, particularly for those with lower baseline levels of HRV. These studies suggest that interventions involving expressive writing and gratitude may be useful for improving physiological health.

- **Social Interaction:** HRV can be used as a biomarker for social engagement, emotional regulation, and resilience as social support and positive interactions can increase HRV (Petrocchi & Cheli, 2019). While a meta-analysis with children did not find a significant effect of social engagement tasks on baseline HRV, results suggest that social interactions can regulate HRV, as shown by decreased HRV during disengagement and increased HRV during re-engagement (Shahrestani et al., 2014).

These questions will be integrated throughout each concept to encourage engagement and collaboration:

1. Does this concept resonate with you?
 - a. Would it resonate with one of your students?
2. Are you already incorporating this concept in your practice?
 - a. If yes, how so?
 - b. If no, how can we?
3. Are you incorporating this concept in your life?
 - a. If yes, what is its effect?
 - b. If no, how can we integrate it into our lives?

Session 5 – Recommendations for Further Learning and Wrap-Up. In this lesson, the workshop will conclude by exploring opportunities for further learning and reflecting on the day together.

2:45-3:15: Resources and Conclusion. The facilitator will present a slideshow that will link to and recommend the following resources.

- Podcasts:
 1. Koven, M. (Host). (2020, April). *The Healing Trauma & C-PTSD Podcast: Trauma and The Polyvagal Theory with Deb Dana* [Audio podcast]. Spotify.
 2. Kurlander, K. (2021, June). *The Higher Practice Podcast for Optimal Mental Health: Polyvagal Theory, Trauma and Neuroscience of the Mind - Dr. Stephen Porges* [Audio podcast]. Spotify.
- Books:
 1. Dana, D., & Porges, S. W. (2018). *The polyvagal theory in therapy: Engaging the rhythm of regulation*. W.W. Norton et Company.
 2. Dana, D., & Porges, S. W. (2020). *Polyvagal exercises for safety and connection: 50 client-centered practices*. W.W. Norton & Company.
 3. Porges SW (2021). *Polyvagal Safety: Attachment, Communication and Self-Regulation*. New York: WW Norton.
- Continuing Education and Certificates:
 1. The Polyvagal Institute (<https://www.polyvagalinstitute.org/>) (Polyvagal Institute, 2023)
 - a. Link to courses: <https://www.polyvagalinstitute.org/courses-1>

2. Deb Dana's Rhythm of Regulation (<https://www.rhythmofregulation.com/>) (Rhythm and Regulation, 2023)

a. Link to trainings: <https://www.rhythmofregulation.com/training>

The facilitator will conclude the workshop in a circle, where each participant will have the opportunity to share their biggest takeaway from the day and a self-care practice that they will treat themselves to in the evening.

Conclusions

In conclusion, the prevalence of trauma among children and youth in Canada has highlighted the need for effective support systems (Barker et al., 2014; Government of Canada, 2022; Joshi et al., 2021; Truth and Reconciliation Commission of Canada, 2015). Traditional psychological approaches used in counselling may not fully capture the physiological aspects of trauma, and PVT has been introduced to bridge this gap. The theory proposes that the ANS is divided into three branches and that a person's response to stressors is influenced by the nervous system's automatic response (Dana & Porges, 2018; Porges, 2009; Porges, 2022). Research shows that childhood trauma can have significant negative impacts on a student's ability to succeed in school (Miller, 2023), and addressing trauma in therapy can be challenging.

However, PVT can help individuals regulate their nervous system and create a sense of safety to support healing from childhood trauma. As a prospective counsellor and helper, it is crucial to recognize this interconnectedness of our thoughts, feelings, and physiology, to gain a more holistic perspective of trauma. Having such awareness and understanding the physiological underpinnings of trauma through PVT can improve our ability to provide support to students and clients on their path to healing and recovery.

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