

Sound Decisions: A Theoretically Informed Process Model of Somatic Experiencing for the Integration of Clinical Music Therapy

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Abstract

Adults living with unaddressed complex or developmental trauma frequently suffer from intrapersonal and interpersonal challenges resulting from the trauma they experienced early in life. The lasting impacts of unaddressed complex or developmental trauma commonly result in neurodevelopmental and cognitive deficits, nervous system dysregulation, emotional dysregulation, physical health challenges, and painful relational and attachment challenges. Somatic experiencing (SE) is a body-based model of therapy developed by Peter Levine. SE addresses stress and trauma-related symptoms by supporting autonomic nervous system regulation through the completion of previously thwarted protective responses. Research on the effectiveness of SE for complex and developmental trauma is emerging, and clinicians such as psychotherapists, body workers, and social workers have begun integrating SE into their work. There is scant theoretical music therapy literature to guide treatment processes. The purpose of this thesis is to provide a theoretically informed process model of somatic experiencing for the clinical music therapist and to articulate considerations for the integration of music therapy interventions and embedded elements of music to support the outcomes of co-regulation, regulation, and trauma renegotiation and integration for adults addressing complex or developmental trauma. A process model guides the translation of research into practice by describing and depicting practical steps or stages of the research-to-practice process for treatment planning and implementation. To create this process model, a review of trauma related and theoretical literature – the polyvagal theory and attachment theory - was conducted, steps of the research-to-practice process model were described and depicted, and clinical considerations were offered to support a clinical music therapist in treatment planning and implementation. Clinical and research implications are discussed.

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Table of Contents

Abstract.....	iii
Acknowledgments.....	iv
Table of Contents.....	vii
List of Figures.....	xiv
List of Tables.....	xv
Chapter 1: Introduction.....	1
Problem Statement.....	2
Somatic Experiencing.....	3
Polyvagal Theory.....	4
Attachment Theory.....	6
Music Therapy.....	7
Purpose Statement.....	8
Chapter 2: Review of Literature.....	9
Defining Trauma and Associated Disorders.....	9
Trauma.....	10
Post-Traumatic Stress Disorder (PTSD).....	12
Intrusive Memories.....	12
Avoidance Symptoms.....	13
Negative Alterations.....	13
Complex Post Traumatic Stress Disorder (C-PTSD).....	14
Developmental Trauma Disorder (DTD).....	15

Trauma Defined Through a Somatic Experiencing Lens	16
Impacts of Childhood Trauma	16
Neurodevelopmental and Cognitive Impacts.....	18
The Amygdala.....	18
The Hippocampus.....	18
The Medial Prefrontal Cortex.....	19
Nervous System Dysregulation.....	20
Emotional Impacts of Childhood Trauma.....	20
Physical Impacts of Childhood Trauma.....	21
Relational and Attachment Impacts of Childhood Trauma.....	22
Overview of Somatic Experiencing (SE).....	22
Stream of Life Model.....	24
Essential Somatic Experiencing Concepts.....	25
Developing Sense Perception Tracking.....	25
Sensation and Felt Sense.....	26
Image.....	28
Behavior.....	28
Affect.....	28
Meaning.....	28
Counter Vortex Resourcing.....	28
Titration.....	29

Pendulation.....	30
Trauma Renegotiation and Integration.....	30
Arrest Response.....	31
Startle Response.....	31
Defensive Orienting Response.....	31
Defensive Response.....	31
Completion of Threat Response.....	33
Exploratory Orienting.....	33
Control Centers of the Body.....	34
The Autonomic Nervous System.....	35
Vagus Nerve.....	35
Initial View of the Autonomic Nervous System.....	36
Polyvagal View of the Autonomic Nervous System.....	36
Healthy Autonomic Nervous System Response.....	37
Dysregulated Autonomic Nervous System Response.....	37
Foundations of the Polyvagal Theory.....	38
First Organizing Principle of the Polyvagal Theory – Hierarchy.....	39
Parasympathetic Nervous System - Dorsal Vagus.....	39
Sympathetic Nervous System.....	40
Parasympathetic Nervous System - Ventral Vagus.....	41
Second Organizing Principle of the Polyvagal Theory - Neuroception.....	41

Third Organizing Principle of the Polyvagal Theory - Social Engagement	42
Heart-Face Connection.	42
Vagal Brake.	43
The Importance of Co-Regulation for Self-Regulation.	44
Attachment Theory	45
Secure Attachment	45
Avoidant Attachment	46
Anxious Attachment	46
Disorganized Attachment.....	47
Music Therapy	47
Components of Bruscia’s Definition	48
Reflexive Process.....	48
Optimize Client's Health.....	48
Facets of Music Experience.....	49
Relationships Formed Through Them.....	49
Impetus for Change.....	49
Professional Practice Component of the Discipline.....	50
Music Therapy Methods	50
Improvisational.....	50
Re-creative.....	51
Compositional.....	51

Receptive.....	52
Problem Statement.....	52
Purpose Statement.....	52
Chapter 3: Methods.....	53
Epistemological Position	53
Implementation Science.....	54
Three Aims of Implementation Science	54
Five Categories of Theories, Models, and Frameworks	55
Process Models (Planned Action Models).....	55
Development of the Theoretically Informed Process Model.....	55
Chapter 4: Results.....	58
Impacts of Complex or Developmental Trauma.....	58
Polyvagal Theory.....	60
Attachment Theory and Attachment Styles	62
Intersection of the Polyvagal Theory and Attachment Styles.....	63
Somatic Experiencing.....	65
Intersection of Somatic Experiencing Model with Polyvagal Theory and Attachment Styles.....	69
Four Music Therapy Methods and the Embedded Elements of Music.....	70
The Embedded Elements of Music for Somatic Experiencing.....	71
Integrating Music Therapy Methods and the Embedded Elements of Music into the Somatic Experiencing Process	73

Music Therapy Methods to Support Tracking Sense Perception.....	74
Music Therapy Methods for Counter Vortex Resourcing	75
Music Therapy Methods for Titration and Pendulation.....	76
Music Therapy Methods for Trauma Renegotiation and Integration	78
The Embedded Elements of Music	80
Contextual Facilitation Considerations for Implementation of the Process Model	82
Assessment.....	82
Contextual Treatment Planning Considerations	83
Therapy Configuration.....	83
Autonomic Nervous System Pattern Considerations.....	84
Autonomic Nervous System Mapping.....	84
Co-Regulation and Attachment Patterns.....	86
Neuroception of Safety.	87
Neuroception of Sound.	87
Neuroception of Safety Within the Environment.	88
Neuroception of Safety Within the Therapeutic Relationship.....	89
Neuroception of Safety Through the Therapy Process.	91
Chapter 5: Discussion	95
Clinical Implications.....	96
Process Model Limitations	97
Future Research Based on this Process Model	100
Conclusion	102

References..... 105

List of Figures

Figure 1: Impacts of Complex or Developmental Trauma.....	59
Figure 2: The Polyvagal Theory.....	61
Figure 3: Attachment Styles.....	63
Figure 4: Intersection of Polyvagal Theory and Attachment Styles.....	65
Figure 5: Somatic Experiencing Model of Therapy Concepts.....	68
Figure 6: The Intersection of Somatic Experiencing with Polyvagal Theory and Attachment Styles.....	70
Figure 7: Four Music Therapy Methods and the Embedded Therapeutic Function of the Elements of Music.....	73
Figure 8: The Integration of Music Therapy Methods and Embedded Therapeutic Function of Music Elements into the Somatic Experiencing Model of Therapy for Adults Addressing the Impacts of Complex or Developmental Trauma.....	81

List of Tables

Table 1: Contextual Considerations for the Integration of Music Therapy into the SE Process.93

Chapter 1: Introduction

I completed my bachelor's degree in music therapy at Phillips University in 1999 and have enjoyed a career that has shifted as my professional and personal interests evolved. In the early part of my career, I provided clinical music therapy services for children with special needs and autism spectrum disorders. Next, I worked with adults in an acute medical intensive care setting. Parallel to my early days working as a music therapist, I struggled with interpersonal challenges that caused me to seek out a myriad of mind-body therapies through which I could explore and address the painful relational patterns I was experiencing. Over time, I decided to train in some of the therapies that I personally found most helpful so that I could utilize those tools in the clinical work that I offer. In 2007, I opened a private practice offering hypnotherapy and cellular release therapy services for adults addressing life changes, painful relational patterns, trauma, and abuse. Cellular release therapy is a hypnotherapy-based protocol designed specifically for those addressing trauma and the effects of trauma (Drucker, 2008). In 2012, I began exploring mindfulness, embodiment, and somatic approaches for trauma healing. In my exploration, I found that mindfulness-based embodiment practices allowed me to experience a greater sense of grounded connection with my body and inner experience. I also found that they offered access to a deep level of compassion and acceptance, essential ingredients in a healing process. Because I found embodiment practices so useful, I trained in somatic experiencing and gestalt therapy so that I could also add these tools to the services I offer in my private practice.

Most recently, the work I have offered in my private practice has utilized tools from a myriad of approaches that include somatic experiencing (SE) - a body-based therapeutic model used to support trauma and stress disorder recovery (Somatic Experiencing International, 2021), gestalt therapy, hypnotherapy, and cellular release therapy. The SE model of therapy is grounded

in the polyvagal theory, a theory of the autonomic nervous system. The polyvagal theory was developed by psychiatrist and researcher Stephen Porges; the theory outlines how the autonomic nervous system (ANS) functions to support survival, safety, and social engagement (Porges, 1995). I have found that approaching trauma recovery from a somatic experiencing approach that is grounded in the polyvagal theory allows individuals to compassionately connect to the wisdom of the body and nervous system, which allows for healing to happen in a more gentle and integrated way.

A few years ago, I went through an intense grief process in which I found myself longing for the resource of music that I utilized when I was a child. As I began engaging with music to support myself through the grief process, this opened the door for me to wonder how I could integrate clinical music therapy interventions to support SE-based trauma renegotiation for the clients that I am honored to serve in my private practice.

Problem Statement

Adults with a history of childhood trauma often have a compromised ability to regulate their autonomic nervous system (ANS) state and struggle in interpersonal relationships. Experiencing childhood trauma such as violence or witnessing violence, abuse, or unreliable caregiving such as abandonment or neglect can shape the autonomic nervous system response during the formative years of life and cause ANS disruption and dysregulation (Dale et al., 2009). Adults with unaddressed childhood trauma commonly report symptoms such as anxiety, depression, insomnia, extreme emotional states such as anger or rage, addiction, social isolation, and engagement in risky social behaviors (Roesler & McKenzie, 1994). Those who come to therapy in adulthood typically do so because they are struggling with persistent and overwhelming symptoms that impact their mental, emotional, and physical health and well-

being, as well as their personal intimate and social relationships (Beilharz et al., 2020). These individuals come to therapy seeking tools to soothe themselves, engage in the world from a more regulated state, and learn how to sustain healthier and more fulfilling relationships.

Somatic Experiencing

Somatic experiencing (SE) is a body-oriented therapeutic model developed by Peter Levine in the 1970s. Levine saw that while animals in the wild regularly face threatening and dangerous experiences, they do not develop post-traumatic symptoms the way humans do (Levine & Frederick, 1997). In his investigations into why this is so, he began to see that animals in the wild who have faced and survived dangerous encounters have natural ways of discharging autonomic nervous system fight, flight, and freeze energy. Once the danger has passed, they shake, tremble, or run away, which allows them to return to a normal and settled ANS state (Levine & Frederick, 1997). An example commonly seen is the example of a dog who perceives a threat and afterward "shakes" it off. Humans, however, when faced with stressors or danger, typically override the body's natural tendency to shake, tremble, cry, or otherwise naturally discharge adrenaline-fueled nervous system energy, disrupting the natural completion cycle of the autonomic nervous system. Ongoing autonomic nervous system cycle disruption can cause ANS dysregulation, in which the nervous system becomes "stuck" in defensive patterns of response (Levine & Frederick, 1997). In the face of extreme or prolonged danger, this continuous ANS disruption can contribute to post-traumatic stress symptoms such as anxiety, depression, insomnia, difficulties with memory, and digestive issues (Levine & Frederick, 1997). SE offers a way to honor the body's wisdom in completing incomplete ANS activation cycles, gently and in a titrated way, so that accumulated activation energy can discharge without overwhelming the system.

Somatic experiencing is used by professionals who are trained in the SE model and who work with clients presenting with stress, trauma, and PTSD symptoms. Professionals who may include SE in their work are therapists, social workers, nurses, first responders, and bodyworkers such as yoga instructors and massage therapists (Somatic Experiencing International, 2021). The SE training takes place over three years and requires individuals to already be working in a helping profession; it also requires attending all trainings and a set number of personal sessions and case consultations to fulfill certification requirements (Somatic Experiencing International, 2021).

I learned about SE from reading one of Peter Levine's books, *Waking the Tiger: Healing Trauma: The Innate Capacity to Transform Overwhelming Experiences* (Levine & Frederick, 1997). After reading Levine's book and participating in an introductory SE workshop, I decided that SE was to be the next addition to the tools I utilize in my practice to support individuals recovering from painful experiences.

Polyvagal Theory

The polyvagal theory, proposed by Stephen Porges in the 1990s, explains how the autonomic nervous system functions to support human survival and social engagement (Porges, 1995). The polyvagal theory provides a physiological basis for how and why the somatic experiencing model supports autonomic nervous system regulation. Central to the polyvagal theory are three organizing principles. The first principle is that the autonomic nervous system functions in a very predictable and hierarchical way in response to safety and danger cues. The second principle is that the ANS utilizes neuroception, a term Porges coined to describe the subconscious way the ANS scans for safety and danger cues (Porges, 2009). The third organizing principle is that the ANS longs to co-regulate and connect with other nervous systems (Porges,

2003). The polyvagal theory describes a hierarchy of predictable adaptive responses to cues of safety and danger. If danger cues are present, the newest parasympathetic ventral vagus is used to scan for help. If social engagement (facial expression, vocalization, and listening) fails to provide safety, the older branches are recruited sequentially. If danger seems imminent and a safe other is unavailable, the sympathetic branch will produce a fight or flight response. If, in the face of imminent danger the fight or flight response is perceived to be unsafe or unsuccessful, the parasympathetic dorsal vagus will respond, and the individual will move into a state of immobility or collapse. If both the ANS dorsal vagal and sympathetic branches respond simultaneously, it will produce the highly activated state of freeze (Levine, 2010).

For many adults dealing with the aftereffects of ongoing childhood trauma, the natural completion of the body's protective responses has been thwarted and ANS activation cycles have remained incomplete. Childhood co-regulation was dangerous or inconsistent and the ANS learned patterns of interacting with others from a physiologically defensive state of fight, flight, collapse, or freeze. These individuals have learned to engage in the world and with others from a state of survival rather than one of engagement with security and ease (Dana, 2018). Because the activation cycles remain incomplete, the system has not had the opportunity to discharge activated ANS energy and settle into regulation. Dysregulated ANS defensive state relational patterns of interaction can cause painful difficulties in intimate and social engagement (Dana, 2018). SE draws upon the polyvagal theory to provide a map of how the ANS learns new ways of regulating by allowing the completion of activated self-protective responses so that the nervous system can navigate both activated and non-activated states organically and with ease, allowing for self-regulation and co-regulation (Payne et al., 2015).

While I had been trained in somatic experiencing (SE) and during that training was introduced to the polyvagal theory, it was not until I was in a graduate-level music therapy class taught by Dr. Hanson-Abromeit at the University of Kansas, in which the polyvagal theory was being discussed, that I began to realize how critical this theory may be for music therapists who aim to support clients in experiencing relief from trauma symptoms. Understanding nervous system states, how the nervous system becomes dysregulated, and how to support ANS regulation to support trauma integration and renegotiation, as outlined by the SE model, may offer a new way to think about how clinical music therapy interventions can be utilized in support of ANS safety, regulation, co-regulation, and trauma recovery.

Attachment Theory

Attachment theory was first developed by the British psychologist John Bowlby, as he was studying the psychological connectedness between individuals (Bowlby, 1969). Mary Ainsworth, a psychologist, later expanded on Bowlby's research. Ainsworth studied young children twelve to eighteen months of age and their responses to being left alone and then reunited with their mothers (Ainsworth & Bell, 1972). Since Bowlby introduced attachment theory, Ainsworth and other researchers in the field have contributed to current understandings about it. The major theme of attachment theory is how reasonably available, responsive, and engaged primary caregivers let infants know that they are dependable, which allows the infant to know that they are safe and form secure attachments to their caregivers. For infants whose primary caregivers are unavailable for reasonably responsive and engaged dependability, the infant may not have such a sense of security which can cause anxiety, avoidance, or a combination of both for the infant with the primary caregivers. Attachment theory explains how attachment and bonding patterns set up in infancy and childhood play out through the life span.

Currently, four attachment styles are commonly recognized that include secure, avoidant, anxious, and disorganized. While attachment styles are typically consistent throughout the life span, it is possible to experience a more secure attachment pattern when significant others offer a more secure attachment experience for those with anxious, avoidant, or disorganized attachment patterns (Heller, 2019).

Music Therapy

The importance of music throughout human history is well-documented. From the soft humming of a mother's lullaby for her fussy infant, to great orchestral works, music offers a pathway for communication, expression, celebration, and connection. In the third edition of his book, *Defining Music Therapy* (2013), professor and author Kenneth Bruscia offers a working definition of the term,

Music therapy is a reflexive process wherein the therapist helps the client to optimize the client's health, using various facets of music experience and the relationships formed through them as the impetus for change. As defined here, music therapy is the professional practice component of the discipline, which informs and is informed by theory and research (p.36).

Music provides a unique therapeutic medium that offers an opportunity to be creative with sound while relationally engaged to allow clients a voice and help them integrate, express, and externalize their inner processes. Clinical music therapists offer their services in community, mental health, medical, educational, residential, and private settings. Utilizing music as the medium to support the optimization of clients' health, clinical music therapists commonly help individuals in addressing stress management, emotional awareness and expression, reducing or

alleviating pain, improving communication, supporting physical rehabilitation, and improving social skills goals (American Music Therapy Association, 2005).

Purpose Statement

The purpose of this thesis is to provide a theoretically informed process model of somatic experiencing for the clinical music therapist and to articulate considerations for the integration of music therapy interventions and embedded elements of music to support the outcomes of co-regulation, regulation, and trauma renegotiation and integration for adults addressing complex or developmental trauma.

Chapter 2: Review of Literature

Individuals who enter therapy as adults to address complex childhood relational or developmental trauma symptoms commonly report self-regulation and interpersonal relationship challenges. Included in this review of literature are a discussion of what trauma is and the diagnostic labels used for this population that can consist of post-traumatic stress disorder (PTSD), complex post-traumatic stress disorder (CPTSD), and developmental trauma disorder (DTD). The review of literature will also include the theoretical foundation of the proposed process model including the polyvagal theory, attachment theory, and somatic experiencing model of therapy. Also offered is a definition of music therapy, discussion of the four music therapy methods described by Bruscia (2013), and a brief synopsis of the elements of music embedded in them.

Defining Trauma and Associated Disorders

Multiple definitions of trauma have been generated over decades of work done in the field (Substance Abuse and Mental Health Service Administration, 2014). Definitions of trauma vary based on who is defining the term and the purpose of the definition. For this paper, included below are an industry-standard definition of trauma as outlined by the Substance Abuse and Mental Health Services Association (SAMHSA), a description of post-traumatic stress disorder (PTSD) as outlined by the Diagnostic Statistical Manual (fifth edition), a brief discussion of proposed additional PTSD designations for individuals exposed to ongoing trauma as children, and a definition of trauma that is relevant for a somatic experiencing approach grounded in the polyvagal theory.

Trauma

The Substance Abuse and Mental Health Service Administration (SAMHSA) offers a definition of trauma crafted by an expert panel of trauma survivors, researchers, practitioners, and policymakers. Their definition of trauma is relevant for public health agencies and services systems, people receiving services, and their communities (SAMHSA, 2014). SAMHSA defines trauma in this way, "individual trauma results from an event, series of events, or set of circumstances that is experienced by an individual as physically or emotionally harmful or life-threatening and that has lasting adverse effects on the individual's functioning and mental, physical, social, emotional, or spiritual well-being" (SAMHSA, 2014, p.6). Central to SAMHSA's definition of trauma are the events that cause or potentially cause harm, the experience of the individual in response to the event, and the lasting effects of the event on the individual.

Events that cause or potentially cause harm includes extreme threats of physical or psychological impact including violence, severe life-threatening neglect that jeopardizes healthy development, and natural disasters. These can occur as single events or repeatedly over time (SAMHSA, 2014). How an individual experiences these harmful or potentially harmful events is essential in determining whether the incident or circumstance is considered traumatic. What one perceives as threatening or potentially threatening differs from person to person. Perception of an event is determined by several factors, including personality, culture, developmental stage, and access to a community of support (or lack thereof) (SAMHSA, 2014).

A power differential inherently propagates trauma between an authority figure or force and an individual that causes the individual to be or feel powerless in the face of threat. Examples of this power differential are an adult caregiver and small child or a force of nature

such as a tornado and those it affects. Some of the common devastating effects that this power differential exploits can include feelings of hopelessness, powerlessness, guilt, shame, humiliation, and betrayal. Experiences of physical or sexual abuse are frequently accompanied by questions of, "why me?" which can lead to humiliation, self-blame, shame, and feeling inadequate or dirty (SAMHSA, 2014). Natural disasters can leave survivors blaming themselves and feeling guilty for surviving when others did not (SAMHSA, 2014).

Children who experience abuse and domestic violence by trusted caregivers frequently experience feelings of betrayal and distrust. Many times, threats of speaking up or reaching out for help can lead to silencing and leave children feeling alone and unsupported in their pain (SAMHSA, 2014). Being unable to speak up, confide in another, or ask for help can cause a deep distrust between others and oneself, potentially damaging the child's developing sense of identity, ability to trust their feelings and inner knowing, and their ability to form secure, reliable attachments.

The final component of SAMHSA's definition of trauma is the lasting effects of the traumatic event on the individual. The duration of the impact from traumatic events can either be short or long-term and may occur immediately following the event or have a delayed onset (SAMHSA, 2014). In some cases, individuals may not link their symptoms with the originating event itself (SAMHSA, 2014). Some of the adverse effects an individual may experience include an inability to cope with the ordinary demands of daily living, poor memory or problems with cognitive processing, and difficulties with emotional and behavioral regulation, personal expression, and trusting oneself and others. Long-term effects can also cause constant states of hypervigilance or arousal, avoidance, and numbing. These long-term, after-trauma effects can wear individuals down and strain their mental, emotional, and physical health and well-being.

Survivors of trauma also highlight that these effects impact their spiritual beliefs and capacity to make meaning of the events, further impacting their sense of identity and ability to trust others and themselves (SAMHSA, 2014).

Post-Traumatic Stress Disorder (PTSD)

The post-traumatic stress disorder (PTSD) diagnostic label was introduced to the clinical community in 1980 in the Diagnostic Statistical Manual – III (DSM-III) (Friedman, 2016). Since then, the PTSD diagnostic criteria have been revised and updated several times. Currently, for an individual older than six years of age to receive a clinical PTSD diagnosis as outlined in the DSM-V, it is required that they directly experience or are exposed to a traumatic event such as violence or assault, sexual assault, a severe accident, act of terror or war, combat, rape, natural disaster; witness a traumatic event such as domestic violence; indirectly learn about a violent or accidental event that a close family member or friend has experienced; or be exposed to repeated aversive traumatic details of events (such as first responders) (American Psychiatric Association, 2013). To be diagnosed with PTSD, an individual must have one or more of the following symptoms associated with the event after the event occurred - intrusive memories; avoidance of stimuli associated with the trauma; and negative alterations in cognition and mood (APA, 2013). These symptoms must be persistent and cause significant distress lasting for at least one-month post-trauma (APA, 2013).

Intrusive Memories. Intrusive memories are nightmares, flashbacks, or mental images of the past trauma, experienced as if the event is happening in the present moment (American Counseling Association, 2011). Intrusive memories typically present through brief and vivid sensory fragments such as visual images, tastes, smells, sounds, or bodily sensations (Ehlers et al., 2002). As the intrusive memory occurs, the autonomic nervous system is activated and may

produce increased respiration, heart rate or blood pressure, dilated pupils, or pale skin color. Intrusive memories are distressing as they are unpredictable and activate the autonomic fight, flight, collapse, or freeze responses (American Counseling Association, 2011).

Avoidance Symptoms. Avoidance symptoms allow individuals to withdraw from experiences that may trigger potentially painful memories or feelings (American Counseling Association, 2011). Avoidance symptoms can include both internal and external avoidance behaviors. Internal avoidance behaviors include avoiding distressing thoughts, feelings, or memories closely associated with the traumatic event. External avoidance behaviors include avoiding people, places, situations, conversations, activities, objects, smells, or sounds that may potentially trigger painful memories or feelings (Asmundson et al., 2004).

Negative Alterations. Negative alterations can occur in both cognition and mood. Negative alterations in cognition include an inability to remember the traumatic event or important details of the event, negative thoughts, blame, and self-blame about the event. Negative alterations in cognition can lead to distorted beliefs about oneself and others (American Counseling Association, 2011). Negative alterations in mood include ongoing fears, horror, anger, guilt, shame, and lessened interest in activities that previously had been enjoyable. Individuals with negative alterations in mood may also experience a sense of detachment from others and lack satisfaction in situations or activities that previously were satisfying (American Counseling Association, 2011). Alterations in arousal and reactivity symptoms can render individuals feeling as though they are always on high alert, waiting for something terrible to happen. The symptoms can include jumpiness, an exaggerated startle response, and hypervigilance. As a result of these symptoms, an individual may have difficulty sleeping, have

difficulty concentrating, exhibit aggressive behavior, or engage in reckless or self-destructive behavior (American Counseling Association, 2011).

Complex Post Traumatic Stress Disorder (C-PTSD)

It has long been suggested that the diagnosis of PTSD is not adequate for those who have experienced ongoing emotional or psychological trauma during childhood and that additional diagnostic categories be created (Abrams, 2021). Judith Herman, in her seminal book, *Trauma and Recovery* (1992), first introduced the term "complex post-traumatic stress disorder" (C-PTSD) to connote a spectrum of complex symptoms that survivors of prolonged and repeated trauma experience. Since Herman first introduced the term "complex post-traumatic stress disorder," many clinicians and researchers have advocated for additional traumatic-stress disorder diagnostic categories to be included in the Diagnostic Statistical Manual (DSM) (Abrams, 2021). While requests to include additional traumatic stress-related disorder diagnostic categories to the DSM have not yet been approved, the need for designating complex traumatic stress disorder as separate from PTSD has gained traction in clinical settings (Abrams, 2021). As PTSD is currently outlined in the DSM-V (American Psychological Association, 2013), 636,120 symptom combinations can be configured to lead to a PTSD diagnosis. This poses potential complications in research, clinical assessment, and treatment planning (Cloitre, 2012).

In 2020, the World Health Organization (WHO) published the International Classification of Diseases -11 (ICD-11), which introduced post-traumatic stress disorder (PTSD) and complex post-traumatic stress disorder (C-PTSD) as two distinct trauma disorders (World Health Organization, 2020). This distinction simplifies the diagnostic structure for PTSD and C-PTSD and offers transparency for treatment planning. (Cloitre, 2020). According to the ICD-11, complex post-traumatic disorder (C-PTSD) requires all diagnostic requirements for PTSD to be

met, with the addition of challenges in affect regulation, diminished beliefs about oneself such as viewing the self as defeated, powerless, or worthless, accompanied by feeling shame, guilt, or failure about the traumatic event, and challenges maintaining relationships and feeling close to others. The C-PTSD symptoms cause significant impairments in personal, family, educational, occupational, and additional essential areas of function (WHO, 2020).

Developmental Trauma Disorder (DTD)

Another diagnostic category proposed for individuals with childhood trauma is developmental trauma disorder (DTD (van der Kolk, 2009). Spinazolla, van der Kolk, and Ford (2021) have conducted ongoing research in which they found distinct etiological diagnostic pathways for individuals with ongoing childhood trauma that impacts development. Their research found that PTSD is associated with physical violence and traumatic loss. In contrast, the proposed DTD diagnostic category fits as a probable diagnosis for children who have experienced attachment disruption due to emotionally abusive and physically violent homes (Spizanolla et al., 2021). Spizanolla and colleagues argue that the DTD diagnostic category is appropriate for those exposed to childhood interpersonal victimization with the primary caregiver(s) and the resultant DTD symptomology includes emotion and/or somatic dysregulation; attentional or behavioral dysregulation; and relational or self-dysregulation (Spizanolla et al., 2021). Children who experience chronic emotional and relational trauma commonly display symptoms of pervasive emotional dysregulation, disrupted or failed attachment, difficulty staying focused, and a deficient sense of coherent personal identity (van der Kolk, 2009). It is proposed that the addition of DTD as a trauma disorder diagnostic category would focus research, assessment, and treatment for this vulnerable population.

Trauma Defined Through a Somatic Experiencing Lens

Peter Levine, the developer of the somatic experiencing therapy model, defines trauma as a response that originates in the nervous system, not in the event itself (Foundation for Human Enrichment, 2007). According to Levine, trauma symptoms and the resultant trauma-related disorders arise when self-protective fight, flight, collapse or freeze energy is activated during a stressful, dangerous, or potentially dangerous event, or series of events, and the activation cycle is not completed. Because the activation cycle is incomplete, the activated energy has not been discharged from the nervous system and body. The activated, self-protective energy remains stuck and trapped in the autonomic nervous system where it can "wreak havoc on our bodies and minds" (Foundation for Human Enrichment, 2007, p. B1.4). This autonomic nervous system dysregulation can lead to numerous ongoing physical, mental, emotional, and attachment symptoms (Foundation for Human Enrichment, 2007). Levine's definition of trauma differs somewhat from the definitions of trauma stated earlier in this paper. The SE definition of trauma does not have requirements about the event(s) that cause nervous system dysregulation, only that the nervous system is dysregulated in an ongoing way as a result. A dysregulated nervous system is denoted by activation that produces an ongoing fight, flight, collapse (or collapse combined with dissociation), or freeze state (Nijenhuis et al., 1998).

Impacts of Childhood Trauma

The impact of trauma on children has been documented extensively in the research literature. The effect of trauma on children is dependent on a variety of factors such as the type of traumatic event that had occurred, with whom, when in the child's development it occurred, whether it was a single traumatic event, a series of traumatic events, or ongoing traumatic events, the child's personality, temperament, and whether support was available for the child during or

after the event(s). Each of these factors plays a significant role in determining how the trauma impacts the child. An in-depth discourse on specific personal, developmental, and relational impacts of childhood trauma is beyond the scope of this thesis. For this thesis, I will address this topic in a general manner.

From 1995 to 1997, Kaiser Permanente conducted the Adverse Childhood Experiences Study (ACEs), one of the most extensive investigations into the impact of childhood abuse and neglect on an individual's subsequent health and well-being later in life (Early Childhood Learning & Knowledge Center, 2021). The study investigated specific adverse childhood experiences such as child physical, sexual, and emotional abuse; emotional and physical neglect; having a mentally ill, depressed, or suicidal person in the home; family members with drug or alcohol addiction; witnessing domestic violence against the mother; loss of a parent due to death or divorce; and incarceration of any family member for a crime. The researchers found that having adverse childhood experiences, especially multiple ACEs, has a subsequent severe and profound impact on mental and physical health (Early Childhood Learning & Knowledge Center, 2021). The ACEs study revealed that childhood trauma or abuse causes a stress response that releases cortisol into the body. Toxic stress occurs with prolonged exposure to dangerously high cortisol levels, such as when a child has four or more adverse childhood experiences, which negatively impact the brain's learning capacity and ability (Early Childhood Learning & Knowledge Center, 2021). Because of this, children who are victims of trauma often struggle or underperform compared to their peers and are at an increased risk for academic failure. Children who have experienced four or more ACEs are at ten to twelve times greater risk for intravenous drug use and attempted suicide, two to three times greater risk for developing heart disease and cancer, and are thirty-two times more likely to have learning or behavioral problems. Four or

more ACEs also correlate with having eight out of the ten leading causes of death in the US (Early Childhood Learning & Knowledge Center, 2021).

Neurodevelopmental and Cognitive Impacts. Research indicates that childhood maltreatment and trauma negatively impact neurodevelopment and cognitive function (Cowell et al, 2015). In a study conducted by Cowell et al., children who were maltreated in infancy (versus children who were not maltreated) showed neurobiological impairments indicated by poorer inhibitory control and working memory performance. Results of their study suggest that maltreatment in infancy disrupts normative neurocognitive structure and function and plays a role in developmental outcomes that include challenges with fostering self-control, relationship stability, and academic competence (Cowell et al., 2015). There are three specific brain areas impacted by childhood trauma that results in PTSD that include the amygdala, hippocampus, and medial prefrontal cortex (Shin et al., 2006).

The Amygdala. The amygdala is in the limbic portion of the brain and is the first limbic structure to develop post-birth. The primary function of the amygdala is to regulate emotions. It plays a crucial role in assessing and responding to environmental cues of threat and is responsible for the fight or flight response (Guy-Evans, 2021). The amygdala also is involved in the acquisition and expression of conditioned and unconditioned fear and linking emotional meaning and memory, reward-processing, and decision making (Davis, 1997; Guy-Evans, 2021). When an individual experiences trauma, the amygdala can become hyperactive and override the frontal lobes, "hijacking" control of the stress response.

The Hippocampus. The hippocampus is another component of the brain that appears to be impacted by childhood trauma that may eventually result in PTSD. The hippocampus is also a part of the limbic system, and it lies beneath the cerebral cortex in the medial temporal lobes.

The human brain contains two hippocampi – one on each side of the brain, located a few inches above the ears. The hippocampus plays a critical role in learning, emotional response, and memory formation and storage (Bonne et al., 2001). Research suggests that stress, especially ongoing stress, may damage the hippocampus, possibly making the hippocampus smaller in size which makes the individual more vulnerable to the fear response. Research also indicates that stress and trauma impact how the hippocampus forms and stores memories. Individuals with PTSD may experience memory-related difficulties that make recalling details of the trauma difficult, or some memories may be vivid and frequently present (Bonne et al., 2001).

The Medial Prefrontal Cortex. The medial prefrontal cortex is the third component of the brain that appears to be impacted by trauma. The medial prefrontal cortex is the frontal lobes of the human brain; it helps control the activity of the amygdala (Bremner, 2006). The medial prefrontal cortex is the last brain structure to develop; it is not until late in adolescence or early adulthood that it is fully developed. The medial prefrontal cortex is particularly sensitive to the emotional, psychological, and social environment in which one grows up. It is the center of higher cognitive function and is known as the "personality center" of the brain. It is involved in reasoning, decision making, problem-solving, personality expression, and social cognition (Bremner, 2006). The medial prefrontal cortex also supports motivation, spatial memory, focus, and self-initiated movement. The medial prefrontal cortex inhibits amygdala function to regulate emotions (Bremner, 2006). Research has shown that when animals are subjected to stress early in life, there is a decrease in the branching of neurons in the medial prefrontal cortex (Bremner, 2006). When individuals have experienced trauma, the prefrontal cortex may struggle to regulate fear and other emotions.

Nervous System Dysregulation. Individuals who have experienced prolonged or severe trauma can suffer from ongoing autonomic nervous system dysregulation (Levine, 1997). Exposure to prolonged threat or trauma stimulates a defensive autonomic nervous system response. It can result in a chronic fight or flight state of sympathetic hyperarousal, a chronic dorsal-vagal-mediated state of collapse, immobility or submission, or the highly activated state of freeze that involves both the sympathetic fight and flight response matched with the parasympathetic dorsal-vagal-mediated response (van der Kolk, 2009). It is common for individuals who have experienced early, ongoing childhood trauma to be easily overwhelmed. When chronic overwhelm is coupled with a hyper-critical inner dialogue, it makes both self and co-regulation incredibly difficult. Because the ANS becomes stuck in a defensive response pattern, it can be difficult for individuals to modulate their ANS response. These individuals may respond to the world from a defensive state and have difficulty experiencing safety cues that promote a parasympathetic ventral-vagal state of homeostasis. According to Pat Ogden, developer of sensorimotor psychotherapy, individuals with a dysregulated nervous system are challenged in modulating heightened (activated ANS) states and often report difficulty tolerating emotional and physiological arousal without becoming overwhelmed. They also suffer from problems in recovering from experiences of intense activation (anxiety) or depression (Ogden et al., 2006).

Emotional Impacts of Childhood Trauma. Exposure to interpersonal childhood trauma is associated with a wide range of emotional impairments across the lifespan (Dvir et al., 2014). Children who grow up with childhood adversity are more likely to be emotionally reactive to stress and less capable of emotion regulation (Hart & Rubia, 2012). The emotional impacts of childhood trauma are complex and include chronic affect dysregulation, interpersonal distrust,

dissociation, emotional numbing, self-injury, identity confusion, poor self-esteem, and impulsivity (Malarbi et al., 2017). Children who experience chronic interpersonal trauma may develop dissociative responses to protect themselves from becoming overwhelmed (van Der Hart et al., 2006).

Children who experience chronic interpersonal trauma may be out of touch with their feelings and have difficulty giving language to their inner experience. In his 2009 article, *Developmental Trauma Disorder*, Bessel van der Kolk states that when prolonged abuse comes from within the family unit, children from such environments are typically prevented from sharing their experiences and what they have witnessed. They will organize their thoughts and behavior around keeping secrets, likely resulting in feelings of powerlessness, helplessness, or defiance (van der Kolk, 2009). Being alone to deal with their experiences also leaves these children with deficits in self-definition and emotional regulation, which can contribute to challenges with impulse control, aggression against self and others, distrust in the reliability and predictability of others, and problems with intimacy that result in social isolation. Children who experience chronic interpersonal trauma may also experience altered states of consciousness, dissociation, and depersonalization (van der Kolk, 2009). Also, as stated above, children who have experienced four or more ACEs are at ten to twelve times greater risk for intravenous drug use and attempted suicide.

Physical Impacts of Childhood Trauma. Exposure to early interpersonal childhood trauma produces a stress response in the body. If the adverse experience is prolonged or compounded by multiple adverse experiences or stressors, the toxic stress load can create a multitude of physical reactions that impact the health of the child in both childhood and beyond. Toxic stress can impair brain development and cause hormone and immune systems changes that

increase inflammation in the brain and body. Toxic stress can increase the likelihood of later health problems that include heart disease, diabetes, substance abuse, depression, and cancer (Schonkoff, 2016). According to the Kaiser Permanente ACEs study, children who have experienced four or more ACEs are at two to three times greater risk for developing heart disease, cancer, and having eight out of the ten leading causes of death in the US (Early Childhood Learning & Knowledge Center, 2021).

Relational and Attachment Impacts of Childhood Trauma. Adults whose early formative relational experiences disrupted and overwhelmed their capacity to feel safe, secure, cared for, and consistently connected with others commonly struggle with forming and maintaining mutually respectful and honoring interpersonal relationships and secure attachments (van der Kolk, 1994). While mediating protective factors such as individual characteristics and outside social supports can buffer the impact of complex or developmental trauma on the quality of relationships one has as an adult, researchers have repeatedly reported that there is a direct correlation between childhood trauma or abuse and adult relationship dissatisfaction (Walker et al., 2009). When children grow up in homes with abuse, neglect, or violence, their brain and nervous system are shaped by these experiences, and they subsequently can struggle with trusting who and what is safe or dangerous. This struggle can lead to social isolation or engaging with partners whose behavior and attachment style mimics the ones experienced in childhood (van der Kolk, 1994).

Overview of Somatic Experiencing (SE)

Somatic experiencing (SE) is a body-based therapy model that gently supports the physical and emotional release of stress and traumatic shock by completing self-protective motor responses (Somatic Experiencing International, 2021). Peter Levine, a psychologist, began

developing the SE model in the 1970s (Levine, 1997). Levine formed the SE model by combining the wisdom and practices of physiology, psychology, ethology, biology, neuroscience, indigenous healing practices, and medical biophysics (Somatic Experiencing International, 2021). In his research, Levine found that wild animals who have experienced life threats do not display symptoms of post-traumatic stress the way humans do. After wild animals survive a life-threatening situation, they have an instinctual way to discharge the highly activated energy through shaking, trembling, or stotting ("jumping high into the air by lifting all four feet off the ground simultaneously" (Merriam Webster, n.d.)) (Levine, 1997).

In contrast, humans who display post-traumatic symptoms may not have had a way to discharge accumulated highly activated nervous system energy (Levine et al., 2018). When the body does not complete the self-defensive cycle, the individual can remain stuck in looping patterns of ANS dysregulation. Often, these individuals are fearful of the internal sensations that signal the body is attempting to complete the discharge cycle, which keeps them indefinitely trapped in a state of autonomic dysregulation (Levine et al., 2018). Levine desired to find a way to support individuals in gently releasing this highly charged and stuck activated energy and this led to the development of somatic experiencing (Levine et al., 2018). Professionals and clinicians in many settings offer SE for treating trauma and other stress disorders (Somatic Experiencing International, 2021).

While there is a high level of interest in the clinical application of SE for the treatment of PTSD and stress-related syndromes, research investigating the effectiveness of SE is still in the early stages of development (Kuhfuß et al., 2021). Kuhfuß and colleagues (2021) conducted the first literature review on the effectiveness of SE and the method-specific key factors of importance of SE. Their scoping review approach investigations included 16 articles published

between 2007 and 2018 that fulfilled their inclusion criteria. According to the authors, ten quantitative studies investigated the effectiveness of SE, and six qualitative studies investigated the method-specific key factors of SE. Based on the available studies that met the inclusion criteria for their literature review, Kuhfuß and colleagues found that initial results provide promising evidence that SE is an effective treatment for PTSD and comorbid symptoms. Initial results also suggest that outside of PTSD, SE has a positive effect on general well-being and may be effective for affective and somatic symptoms (Kuhfuß et al., 2021). Method-specific factors of SE that both clients and practitioners emphasize as important are resource activation and the use of touch (a specific technique taught only in advanced SE training). Because research investigating the effectiveness of SE is still in the early phases, the authors suggest a standardized therapeutic manual for SE be developed to support additional research.

Stream of Life Model

Metaphors can be powerful tools for making meaning of complex and multifaceted ideas and concepts. In SE, the "stream of life" metaphor is offered as a way of viewing trauma within a greater context of an individual's life. In the "stream of life metaphor", the stream waters represent one's conscious thoughts, feelings, and behaviors and that which one is conscious of and has some sense of personal control over. The stream's banks represent one's boundaries, which protect against excessive stimuli. Stones and boulders in the stream represent personality quirks or difficult developmental situations.

Shock trauma arises when the boundaries of the stream are breached. A breach of boundary occurs when an event happens too fast or in a way that is too much for the ANS to manage or integrate. This breach activates a rush of arousal energy beyond one's capacity to manage or control. The breach of the boundary and subsequent ANS overwhelm creates an

undercurrent or vortex of energy termed the trauma vortex. In this metaphor, when a trauma vortex forms, a counter vortex also simultaneously forms, representing resources that support healing. With time, attention, and care, the counter vortex can strengthen and expand, helping to depotentiate the highly charged trauma vortex. Healing and integrating the trauma response requires strengthening and attending to the counter vortex (Foundation for Human Enrichment, 2007).

When trauma can seem overwhelmingly all consuming, the "stream of life" metaphor offers a visual reminder that there is more to life than the traumatic experience(s); there is the past, present, and future, and there are inherent internal resources and external resources that one can draw upon to support their healing capacities. The metaphor serves as a reminder that the flow of life exists beyond trauma and is available to support trauma recovery.

Essential Somatic Experiencing Concepts

The core aim of somatic experiencing is to support the resolution of incomplete defensive responses to restore ANS regulation. Supporting ANS regulation through the SE process does not mean that the practitioner “does something” to the client. Instead, the practitioner supports the client in experiencing external and internal resources that build their capacity to track sense perception for access to greater ease and resilience in support of trauma renegotiation and integration. There are five essential concepts for the somatic experiencing process that include (a) developing sense perception, (b) counter vortex resourcing, (c) pendulation, (d) titration, and (e) trauma renegotiation and integration.

Developing Sense Perception Tracking. According to Levine, sense perception channels are the way in which the body reveals information to the conscious mind. Levine describes five sense perception channels through which the body conveys information that

include sensation (felt sense), image, behavioral, affect (emotion), and meaning channels.

Utilizing the five channels of perception contributes to a “gestalt” (the whole, or completion) of one’s experience and can provide important information about bodily memory as related to both trauma and resources. Levine states that everyone has channels that are more developed and used than others. As one goes through the somatic experiencing process and notices and attends to the sense perception channels, this supports counter vortex resourcing, titration, pendulation, and the self-protective completion and integration processes of the cycle (Foundation for Human Enrichment, 2007).

Sensation and Felt Sense. Felt sense is a phrase coined by the Austrian psychotherapist and philosopher Eugene Gendlin, who developed a model of therapy he called "focusing" (Gendlin, 1982). Gendlin describes the felt sense as sense perception that includes many interwoven strands, such as when one looks at a fabric. An example Gendlin (1982) offers of the felt sense is when one is involved in a conversation and is listening to others speak; the felt sense is the longing to chime in that appears before words are formed. Levine saw that developing the capacity to be with sense perception, and especially the felt sense, was essential for those addressing stress and trauma symptoms. Through learning to attend to the felt sense, individuals can support bodily awareness, decouple trauma renegotiation from fear, and support completion of activated defense states. The felt sense perception terms that contribute to the SE model are interoception, proprioception, and exteroception (Foundation for Human Enrichment, 2007).

Interoception is a term that “refers to the process by which the nervous system senses, interprets, and integrates signals originating from the body’s internal landscape across conscious and unconscious levels” (Khalsa, et al., 2018, p. 501). Interoception provides feedback about the inner experience facilitated by sensory neurons that bring information from muscles, organs, and

connective tissue to the brain. Felt sense may include sensing hunger, thirst, sleepiness, alertness, body temperature, tension, pain, constriction, restlessness, or other visceral sensations. SE involves interoception to direct an individual's attention to their inner experience to support a grounded sense of embodiment and as a way of gently decoupling fear from activated defensive ANS arousal (Payne et al., 2015). Interoception of sensations that signal security, such as ease, safety, peace, and pleasure, can also help generate new, corrective experiences that support a developing sense of personal awareness, identity, and control (Payne et al., 2015). According to Levine, when individuals have a dysregulated ANS, it is helpful for them to learn to interrupt the looping signals of extreme distress. Using interoception and the afferent feedback circuits can support the organs in experiencing a greater sense of security, safety, ease, and pleasure. As the organs feel safer, the brain relays the command to regulate digestive, sensory, and social functions (Ogden et al., 2006).

Proprioception refers to sensory feedback about the body's movement, action, and location. Proprioception is facilitated by neurons that bring sensory information from the muscles, joints, and tendons of the body and inner ear to the brain. This feedback of body positioning includes awareness of sitting upright, leaning to the side, or maintaining balance while walking or standing (WebMD, 2021).

Exteroception refers to the conscious and subconscious way the body senses the external environment. Exteroception can occur both consciously and subconsciously and is facilitated by sensory neurons that travel from the body's periphery (eyes, ears, nose, tongue, skin) to the brain. Exteroception includes sight, sound, smell, taste, and the sensations generated over the skin and through touch (Ogden et al., 2006).

Image. The image channel presents information as visual images that arise from one's inner awareness.

Behavior. The behavior channel reveals information through how the body behaves both consciously and unconsciously. Physical behavioral responses and movements that arise in session may include gestures, rocking, facial and bodily expressions, postural shifts, ANS responses such as yawning or sweating, and archetypal gestures such as the way one holds their hands or a physical stance.

Affect. The affect channel are the emotions that arise such as sadness, anger, rage, grief, and shame.

Meaning. The meaning channel is the way in which the mind makes meaning of the other sense perceptions in relation to the context of the inner work being done, one's history, beliefs, ideas, interpretations, and judgements (Foundation for Human Enrichment, 2007).

Counter Vortex Resourcing. A resource is an anchor – either internal or external – that helps the client feel less activated and more at ease. Counter vortex resourcing is a process that occurs to connect one with their capacity for organization and connection; it provides the ANS with an experience of safety, ease, and even pleasure in the present moment that supports ventral vagal regulation. Counter vortex resourcing also supports the individual in building their capacity for navigating more intense sense perception (Foundation for Human Enrichment, 2007). Inner resources are processes that one can do on their own to create or produce an inner state of calm or ease. Inner resources can include experiences such as deep breathing, grounding exercises, humming, chanting, or singing exercises. Outer resources are processes that one does with others or in community that produce a state of calm, ease, pleasure, or even joy. These can include experiences such as being with friends or family members who are safe and affirming,

attending a yoga class, being in a support group, or singing or making music with a group.

Engaging in music making can be a wonderful way to offer playful engagement within the safety and structure of the music intervention with the initial aim to support co-regulation and regulation.

As an individual tracks their sense perception while accessing inner or outer resources, this can support ANS regulation. If the counter vortex resourcing occurs with another or other individuals, this supports ANS safety with co-regulation. Counter vortex resourcing begins to move the ANS out of a defensive response into one of safety and ease. It allows an individual to experience enjoyment, success, and personal control as they engage in resources that allow for an experience of their vital life force energy (Foundation for Human Enrichment, 2007).

Titration. The concept of titration is borrowed from chemistry. Merriam-Webster offers an online definition of titration as a "method or process of determining the concentration of a dissolved substance in terms of the smallest amount of reagent of known concentration required to bring about a given effect in reaction with a known volume of the test solution" (n.d). In the SE process, the concept of titration includes introducing the smallest amount of ANS defense response activation to a settled nervous system to support the body in slowly moving through the complete defense activation cycle, without ANS flooding or overwhelm. Once an individual has developed a sense perception and is able to rest in a place of settled orientation, they are guided to experience a minimal amount of ANS activation. Utilizing interoceptive awareness, they slowly allow the activation to move through the complete defensive cycle, one small portion at a time. This enables the ANS activation to gently move through the whole defensive cycle from the arrest response to the completion and exploratory orienting phase. Completing the response in this slow and titrated way teaches the nervous system how to move through the complete cycle

without becoming overwhelmed, or getting stuck (Levine, 2018). Through this process, the ANS learns a new way of responding to ANS activation.

Pendulation. Pendulation is a method used to support individuals in navigating the felt sense emotions and sensations that arise through the somatic experiencing process, and in their daily lives. As an individual begins to develop their felt sense perception, pendulation can occur when an individual notices a particular physical sensation in one place in the body and also a sensation that is somewhat opposite of the first sensation in another area of the body. For example, if an individual notices tightness or constriction in a particular area, they are invited to find a place within in their awareness that may be something like the opposite of the first reported sensation. Pendulation involves expanding awareness from one sensation to another; therefore pendulating (moving awareness) gently from one to the other. This expanding awareness allows the body to recognize that while one experience of contraction or discomfort occurs, more comfortable sensations are also happening. Pendulation enables the body to tap into its innate rhythm of contraction and expansion to support ANS regulation. As awareness shifts from one sensation to the other, sensations commonly change due to this shift in awareness. The process of slowly pendulating awareness from one sensation to another restores the ventral vagal response to support autonomic balance and regulation (Levine, 2018).

Trauma Renegotiation and Integration. The SE model requires understanding how the body perceives and responds to danger and threat to navigate the completion of incomplete survival responses. Initially, the threat response cycle is triggered when novelty in the environment is detected, involving a hierarchy of self-protective responses (Foundation for Human Enrichment, 2007). As an individual perceives a threat, movement into defensive action may only take milliseconds. Healthy defensive responses include a range of possible strategies

that match the threat and come into play as needed. In a complete cycle, the threat response moves through a predictable series of steps that include the arrest response, startle response, defensive orienting response (DOR), specific defense (fight, flight, or freeze), completion, and exploratory orienting response (EOR) The following information describes the threat response cycle that includes the arrest response, startle response, defensive orienting response (DOR), defensive response, completion of threat response, and exploratory orienting (EOR). The information below has been summarized from the somatic experiencing training manual (Foundation for Human Enrichment, 2007).

Arrest Response. The arrest response refers to when an individual senses novelty in the environment. In response to the novelty, the individual may stop and notice the source of the stimulus and evaluate the level of threat it potentially poses (Foundation for Human Enrichment, 2007).

Startle Response. The startle response may co-occur with the arrest response. Unique to the startle response is a higher level of sympathetic activation that mobilizes chemical and physical resources required to respond to the possible threat (Foundation for Human Enrichment, 2007).

Defensive Orienting Response. The defensive orienting response (DOR) occurs when the body assesses that the potential of a threat is high and there is a need for additional, focused information about the source of threat. At this point in the threat response cycle, as sympathetic activation levels rise, an individual may become overwhelmed with the environmental information they are sensing (Foundation for Human Enrichment, 2007).

Defensive Response. If active defense is required, the body will move into one of three specific defense behaviors – fight, flight, or freeze (Levine, 2010). A defensive fight response is

initiated when a situation calls for aggression, and it seems both necessary and possible to overcome the threat directly. The flight response is initiated when the magnitude of threat is such that fighting appears unlikely to be successful or when confrontation is unavailable. A last-ditch attempt at a fight response may be initiated if the flight is unsuccessful. The freeze response will be initiated if the fight or flight response has been unsuccessful. The freeze response is not a conscious choice; it is a state of tremendous overwhelm and activation that simultaneously engages both the sympathetic and dorsal parasympathetic nervous systems. A dissociative response may also occur if the overwhelm is at a high level (Foundation for Human Enrichment, 2007).

When individuals address lingering symptoms of past trauma in therapy, it is likely that the threat response cycle has previously been thwarted somehow. For those with complex or developmental trauma, the threat response has probably been thwarted over time in various ways, contributing to a myriad of complex regulation and co-regulation challenges. The SE model supports the completion of previously thwarted threat response(s) to support ANS regulation and flexibility, thus decreasing presenting trauma responses.

Levine emphasizes that it is important to note that individuals are often terrified of their bodily responses (particularly the highly activated freeze response) and emotional flooding (Levine, 2010). It is essential for clinicians whose work supports trauma recovery to uncouple the fear of high activation from the actual freeze response. To complete the defensive response cycle, fear and terror must be addressed in small increments so that individuals do not drop back into the immobility of the freeze response. In general, the more profound the freeze response, or the longer the dissociation, the more likely that terror is present in the system (Levine, 2010).

When trauma occurs early in life, the connections between lower and higher brain functions are not yet formed. This tends to result in volatility in movement into the freeze response as an adult (Foundation for Human Enrichment, 2007). While it is imperative to proceed slowly and gently through the defense response, completion of this cycle can be accomplished with a deliberate approach that utilizes titration and pendulation.

Completion of Threat Response. When the defensive survival response has been completed, (such as when arms that in the past could not protect the body, but now, through the SE process - using felt sense and slow, organic, and intentional movements - have an opportunity to feel their strength and move through their innate protective response), the system can then move into the completion of the defensive response. Completing the threat response will include dissipation of the autonomic energy that has accumulated and been stuck in the system since the threat response was interrupted. There may be a discharge of the accumulated energy at this point in the process that may include shaking, trembling, goosebumps, vibrations, perspiration, or motor muscular movements. The discharge and completion of the response may conclude with yawning or deep sigh-like breaths. At this time, there may also be a return to exploratory orienting and baseline physiological function (Foundation for Human Enrichment, 2007).

Exploratory Orienting. The exploratory orienting phase of the defensive cycle often follows the completion of the defensive response, and it signals that the defensive cycle is coming to completion. At this point in the cycle, the individual returns to engagement with the outside environment. Potential cues that exploratory orienting is happening for the individual may include eyes opening (if they have been closed) and noticing the space and others around them. The individual is usually open, relaxed, and engaged during the exploratory orienting phase. To support integration and the defensive cycle completion, it is helpful for the therapist to

take time during this phase. Taking time to notice and name the details of the environment and the inner experience of safety allows the ANS to know that the cycle is complete and that the individual is safe. Taking time to notice and name their experience also supports access to an embodied remembrance of these sensations as future resources.

Control Centers of the Body

The control centers for the human body include the brain, spinal cord, and nervous system (Waxenbaum et al., 2019). Very simply stated, the nervous system is comprised of two anatomical branches that include the central nervous system and the peripheral nervous system. The central nervous system is comprised of the brain and spinal cord. The peripheral nervous system is subdivided into two subcategories that include the sensory system and the motor system. The sensory system consists of afferent, or sensory neurons, which convey information from receptors in the body's periphery to the brain and spinal cord (Waxenbaum et al., 2019). The motor system consists of efferent, or motor neurons, which convey information from the brain and spinal cord to the muscles and glands (Waxenbaum et al., 2019).

The motor system can be further subdivided into two distinct subcategories, the somatic nervous system and the autonomic nervous system. The somatic nervous system conducts impulses from the brain and spinal cord to skeletal muscle, causing responses or reactions to changes in the external environment (Waxenbaum et al., 2019). The autonomic nervous system (ANS) conducts impulses from the brain and spinal cord out to smooth muscle tissue such as the smooth muscles of the intestines, the cardiac muscle tissue of the heart, and the glands (Waxenbaum et al., 2019).

The Autonomic Nervous System

The autonomic nervous system (ANS) acts involuntarily and it conducts impulses from the brain and spinal cord out to smooth muscle tissue such as the smooth muscles of the intestines, the cardiac muscle tissue of the heart, and the glands (Waxenbaum et al., 2019). The ANS regulates heart rate, blood pressure, respiration, digestion, and sexual arousal. The organs affected by this system receive nerve fibers from two branches of the ANS, the sympathetic branch and the parasympathetic branch. The ANS sympathetic branch activates or speeds up activity, and the parasympathetic branch restores or slows down activity and allows for social engagement (Waxenbaum et al., 2019).

Vagus Nerve. The vagus nerve, also called the "wandering nerve", is the tenth cranial nerve and one of the longest nerves in the body (Howland, 2014). The vagus nerve is an essential part of the autonomic nervous system (ANS). Through bidirectional communication of the vagus nerve, the brain and organs of the body communicate (Howland, 2014). The vagus nerve is a mixed nerve, meaning it is composed of twenty percent efferent fibers that relay signals from the brain to the body and eighty percent afferent sensory fibers that relay information from the body to the brain (Howland, 2014). According to Porges (2018), the predominant role of the vagus nerve is to relay information from the internal organs to the brain. The vagus nerve connects the brain with the heart and lungs, stomach, digestive system, liver, pancreas, gallbladder, kidneys, and spleen. It provides primary control for the parasympathetic dorsal vagus and ventral vagus branches of the autonomic nervous system and plays an essential role in regulating metabolic homeostasis. When the ANS is regulated, it supports homeostasis and metabolic well-being, when it is dysregulated, each of the organs and systems connected with the vagus nerve are affected (Porges, 2018).

Initial View of the Autonomic Nervous System

Before the mid-1990s, the autonomic nervous system was viewed as having two separate and oppositional branches: the sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS). The sympathetic branch is the gas pedal of the nervous system that produces the energy needed for movement. It helps prepare for the protective mobilizing responses of fight or flight (Foundation for Human Enrichment, 2007). The parasympathetic nervous system is responsible for the relaxation response of rest and digest and supports discharge of the arousal of sympathetic activation (Foundation for Human Enrichment, 2007). Before the formation of the polyvagal theory, it was viewed that these two systems primarily responded to stress cues somewhat like the mechanisms of an automobile – the gas pedal was the sympathetic mobilizing response. In contrast, the brake pedal was a parasympathetic response of rest, relaxation, and digestion (Foundation for Human Enrichment, 2007). It was viewed that these ANS branches were responsible solely for homeostatic rest and digest and the sympathetic stress response.

Polyvagal View of the Autonomic Nervous System

The development of the polyvagal theory (described below in Foundations of the Polyvagal Theory) has transformed our understanding of autonomic nervous system responses. Instead of viewing the ANS as being composed of two oppositional branches that regulate physiological responses to safety and danger cues, the polyvagal theory outlines a more intricate and nuanced system that is also responsible for social engagement (Porges, 2018). According to the polyvagal theory, the parasympathetic branch comprises two separate branches: an ancient dorsal vagal branch and the newer ventral vagal branch. Together, the three distinct branches include the dorsal vagal pathway of the parasympathetic branch, the sympathetic branch, and a

second, more recently developed branch of the parasympathetic branch, the ventral vagal pathway (Porges, 2018). The polyvagal theory suggests that each of these distinct branches responds predictably, in an evolutionarily hierarchical manner, in response to safety and danger cues. The polyvagal view of the autonomic nervous system offers a deeper understanding of the complex responses humans can exhibit in the face of safety, threat, and ongoing danger (Porges, 2018).

Healthy Autonomic Nervous System Response

A healthy, functional autonomic nervous system has a full range of ongoing cycles of activation and discharge of both the parasympathetic and sympathetic branches of the nervous system (Foundation for Human Enrichment, 2007). The system functions with a full range of response and resilience. When an individual's nervous system is healthy, balanced, and at rest and responds with resilience, the person may appear relaxed and at ease and with alert senses. The individual will be embodied and present and will respond appropriately and responsively in various circumstances to environmental safety and threat cues. When either the dorsal parasympathetic or sympathetic system is activated, the system can move freely through the activation cycle and resolve through a natural and organic discharge cycle. The person will experience choices and options and display a capacity for self and co-regulation (Foundation for Human Enrichment, 2007).

Dysregulated Autonomic Nervous System Response

The nervous system can become dysregulated when regulatory mechanisms are interrupted in some way (Foundation for Human Enrichment, 2007). Dysregulation can occur because of "stimulation being introduced too fast or too soon, or when it is too much for normal resiliency to process" (Foundation for Human Enrichment, 2007, p. B1.8). In this instance, the

natural completion of the activation cycle does not happen. Levine likens ANS dysregulation to driving a car with both the gas and brake pedal fully engaged, which would cause a severe and erratic response. Similarly, ANS dysregulation is characterized by extreme rigidity or erratic responses. The sympathetic nervous system can become stuck in ongoing activation, which causes hyperactivity, hypersensitivity, hypervigilance, panic, rage, elation, or mania (Foundation for Human Enrichment, 2007). When the dorsal parasympathetic is stuck in the ongoing defense response of collapse, the resulting experience could include symptoms of depression, disconnection, a sense of deadness, powerlessness, and exhaustion (Foundation for Human Enrichment, 2007). When both the sympathetic and dorsal sympathetic nervous system are stuck in over activation simultaneously, it may result in "anxiety with underlying depression, muscle rigidity in one area of the body, and low muscle tone elsewhere, and diarrhea alternating with constipation" (Foundation for Human Enrichment, 2007, B1.9).

Foundations of the Polyvagal Theory

The polyvagal theory is a theory of how the autonomic nervous system (ANS) functions; it was developed through decades of research by psychiatrist and researcher Stephen Porges (Porges, 1995). The polyvagal theory comprises three organizing principles that outline how the autonomic nervous system functions to support how humans move through and experience themselves and their world. The three organizing principles are (a) in response to cues of safety or threat, the autonomic nervous system functions predictably and hierarchically, based on the phylogenetic evolution of the autonomic nervous system as it evolved in vertebrates from fish to mammals; (b) neuroception (a term coined by Porges to describe subconscious autonomic nervous system sensing that is constantly occurring) plays a crucial role in ANS responses; and (c) the ANS was designed for social engagement, and it longs to co-regulate with other nervous

systems (Porges, 2003). The three organizing principles describe how the ANS senses safety and danger cues from inside and outside of the body and how the nervous system responds to these cues predictably and hierarchically to support survival and social engagement.

First Organizing Principle of the Polyvagal Theory – Hierarchy

The first organizing principle of the polyvagal theory is that the ANS functions in an organized, predictable, and hierarchical way (Porges, 2003). As Porges researched the phylogenetic evolution of the ANS as it evolved in vertebrates from fish to mammals, he identified a phylogenetic pattern consisting of three distinct evolutionary stages. During each phase of evolution, a unique branch of the autonomic nervous system emerged (Porges, 2003). The first iteration of the nervous system included an unmyelinated parasympathetic dorsal vagus branch. When responding defensively, the parasympathetic dorsal vagus branch is involved in energy conservation and produces a self-protective conservation and collapse response. In the second evolutionary development, the myelinated sympathetic nervous system branch developed, which allowed for mobilization in response to threat. In the third and most recent development, the ANS developed another myelinated parasympathetic branch, the ventral vagal branch, which allows for the downregulation of the nervous system so that mammals can engage socially. Together, these three ANS branches offer mammals three distinct channels from which to respond to cues of safety and threat; each branch has a unique and evolutionarily beneficial response.

Parasympathetic Nervous System - Dorsal Vagus. The oldest and most primitive branch of the ANS is the parasympathetic dorsal vagal system (Porges, 2018). The dorsal vagal design originated in early vertebral/segmental fish species about 600 million years ago (Levine, 2018). When the parasympathetic dorsal vagus is not responding defensively, it supports health,

growth, and restoration via the subdiaphragmatic organs. When it functions in service of organismic protection, the parasympathetic dorsal vagal system causes immobilization, metabolic conservation, and shutdown. The parasympathetic dorsal vagal system supported the survival of vertebral and segmented fish by triggering immobilization, metabolic conservation, and overall shut down so that prey had difficulty sensing or seeing them. The system functions similarly in mammals, including humans. This primitive dorsal vagal pathway is unmyelinated and originates mid-spine in the dorsal nucleus of the vagus. The dorsal vagal system primarily regulates the organs below the diaphragm (subdiaphragmatic), including the liver, stomach, gallbladder, kidneys, intestines, colon, and reproductive organs (Levine, 2018). The polyvagal theory hypothesizes that the unmyelinated vagal fibers of the dorsal vagal system primarily remain dormant until there is a life threat (Porges, 1995). When the system responds defensively in mammals, it manifests as death feigning, syncope (fainting), and dissociation (Porges, 1995). According to Porges (2005), if trauma is inflicted upon the subdiaphragmatic area, such as during rape, birth, surgery, or injury, this can specifically trigger dorsal vagal responses such as depression, dissociation, digestive disorders, irritable bowel syndrome, fainting, and other dorsal vagal responses.

Sympathetic Nervous System. The second ANS development, the development of the sympathetic nervous system (SNS), occurred approximately 400 million years ago during the reptilian period (Levine, 2018). Sympathetic nerves originated from inside the vertebral column, near the middle of the cord, and extended from the upper thoracic region of the spine to the upper lumbar region (Porges, 2007). The nerve fibers of the SNS are myelinated, meaning that information can flow through them quickly. The SNS activates the fight or flight response to prepare the body for mobilizing physical activity. This mobilization for fight or flight allows

individuals to fight or flee in the face of danger. Humans experiencing sympathetic nervous system arousal may notice increases in respiration, heart rate, blood pressure, sweat production, adrenaline in the blood, and a decrease in digestion (Levine, 2018).

Parasympathetic Nervous System - Ventral Vagus. During the third stage of phylogenetic evolution, which occurred in mammals around 200 million years ago, a newer, myelinated ventral vagal branch of the parasympathetic nervous system emerged (Levine, 2018). The ventral vagal system integrates into the brainstem and utilizes efferent pathways to regulate the heart and lungs with the striated muscles of the face and head (Porges, 2018). The initial function of the ventral vagal system is to coordinate sucking, swallowing, breathing, and vocalizing. The heart to face connections of the ventral vagal branch function to convey physiological state through facial expression and vocal prosody (Porges, 2018). The ventral vagal system also regulates the middle-ear muscles to optimize listening for vocal social communication (Porges, 2018). Through the evolution of the parasympathetic ventral vagal system, mammals developed the capacity to determine social cues of safety and danger.

Second Organizing Principle of the Polyvagal Theory - Neuroception

The second organizing principle of the polyvagal theory is neuroception - a term Porges coined to describe how neural circuits subconsciously scan for cues of safety, danger, and life-threat (Porges, 2004). Neuroception occurs below the level of conscious awareness. The ANS scans for safety, danger, or life threat cues, triggering a cascade of neurobiological prosocial or defensive responses (Porges, 2004). The nervous system must assess cues of security and threat for mammals to engage socially and form relationships. If threat is not detected, the nervous system uses the vagal brake to inhibit the primitive defensive responses of fight, flight, or freeze.

For humans to participate in social engagement and form relationships, defensive responses such as fight, flight, or freeze, must be subdued (Porges, 2004).

Neuroception occurs within the body, between nervous systems, and within the environment (Dana, 2021). Neuroception within the body constitutes an individual's nervous system scanning the health and well-being of their bodily organs and systems. Neuroception between nervous systems involves scanning for safety, or danger cues from another's ANS. Neuroception of an environment consists in scanning the immediate environment (this could be a room, a building, or an area) for cues of safety or danger. An individual's nervous system continuously evaluates the environment through the senses, triggering ANS prosocial or defensive responses. This information is then relayed to primitive parts of the brain (Porges, 2004).

Third Organizing Principle of the Polyvagal Theory - Social Engagement

The third organizing principle of the polyvagal theory is the principle of social engagement. According to Porges (2003), social engagement (sometimes called social connectedness) evolved as *the primary biological imperative* for mammals in their quest for survival. Humans need other humans to survive. Social engagement enables closeness and co-regulation that begins with the mother-infant relationship and extends through the lifespan with significant others (Porges, 2003).

Heart-Face Connection. The social engagement system functions to form a heart-face connection that coordinates the heart with the muscles of the head and face. This system coordinates sucking, swallowing, breathing, vocalizing, and hearing (Ogden, 2018). Two essential features are expressed when the social engagement system is fully developed. The first feature includes an increase in the influence of the cardiac pacemaker to slow heart rate and

inhibit the sympathetic fight or flight mechanism. The second function conveys physiological state via facial expression and vocal prosody. This function also regulates the middle-ear muscles to optimize species-specific listening within the frequency band used for social communication (Porges & Lewis, 2010). The theory emphasizes the importance of safety cues through reciprocal social interactions to down-regulate and dampen defensive responses of immobility, fight, flight, or freeze (Porges, 2015).

When individuals have not had the opportunity to access reliable co-regulation with a secure other, they may have a compromised ability to access their ventral vagal social engagement system. They may exhibit observable social engagement deficits that can include compromised oral motor defensiveness that impedes sucking and eating and contributes to digestive issues, sound sensitivities, lack of vocal prosody, speech and language delays, blunted facial expression, difficulties in listening and following verbal directives, difficulties in social communication and poor eye-contact. Lack of access to reliable co-regulation may also produce behavioral state regulation difficulties such as hyperarousal resulting in anxious, distractable, and impulsive behaviors (Porges, 2018). Because closeness and co-regulation are biological imperatives, each of us craves closeness with others. For those who have experienced complex or developmental trauma, their ANS may not have had the opportunity to co-regulate with safe others consistently and reliably. As a result, these individuals may approach relationships from a defensive state that causes relationships and closeness with others to be challenging or painful.

Vagal Brake. The expression of social engagement behaviors unique to mammals depends on state regulation by the vagal brake (Porges, 2007). The myelinated ventral vagus functions as an active vagal brake which can rapidly inhibit or disinhibit vagal tone to the heart, influencing the intrinsic rate of the heart's pacemaker (Porges et al., 2003). This enables

individuals to rapidly engage and disengage with objects and others to promote self-soothing behaviors and calm states (Porges, 2018). Deb Dana, LCSW, a clinician, consultant, author, and instructor who has collaborated with Porges to create the Polyvagal Institute, an online platform that offers programs on how to utilize the polyvagal theory, likens the vagal brake to bicycle brakes. When the bicycle brake is released, the bicycle will speed up. When the vagal brake is released, heart rate spontaneously increases. When the bicycle brake is activated, the bicycle slows. As the vagal brake activates, the influence on the heart's pacemaker slows the heart down (Porges & Dana, 2018). The activation of the vagal brake allows humans to down-regulate defensive fight, flight, or freeze states so that they can engage socially (Porges & Dana, 2018).

The Importance of Co-Regulation for Self-Regulation. The polyvagal theory postulates that co-regulation is first necessary for a nervous system to learn how to self-regulate (Porges, 2015). An optimal example of this is the reliably available mother or caregiver who provides an infant with opportunities for high-quality reciprocal interactions. As the mother or caregiver interacts with the infant, cues of safety that emanate from the mother serve as neural exercises that regulate the infant's physiology and behavioral state (Porges, 2015). Bidirectional and reciprocal interactions allow the mother's regulated nervous system to inform the infant's nervous system, and the regulation of the infant's nervous system helps calm the mother. If these co-regulatory neural pathways are adequately exercised with reasonably reliable and reciprocal co-regulating interactions, this effectively teaches the young nervous system to regulate with others and within oneself. If opportunities for co-regulation are disrupted or unreliable, the infant's ability to regulate with another and with self is at risk (Porges, 2015).

Attachment Theory

Attachment theory was introduced by John Bowlby, a psychoanalyst and researcher, who examined the link between maternal loss and later personality development (Bretherton, 1992). His research and theory were expanded upon by Mary Salter Ainsworth, a developmental psychologist and researcher, and then later expanded upon again by Mary Main and Judith Solomon (Main & Solomon, 1986). In their research, Bowlby and Ainsworth found that the behavioral responses exhibited by infants to the availability and attention given by a primary caregiver were indicative of global patterns of how one forms, patterns, and maintains relationships throughout the lifespan (Fraley, 2010). Bowlby and Ainsworth suggest three distinct attachment styles of infants to their mothers that were evident from their research and later Main and Solomon (1986) added a fourth style to attachment style classification system. The four attachment styles are secure; avoidant (sometimes referred to as anxious-avoidant); anxious (sometimes referred to as anxious-ambivalent or anxious-resistant); and disorganized (Fraley, 2010). Research shows that relational patterned attachment styles set in infancy continue through adolescence and into adulthood (Brown & Elliott, 2016). However, with secure others who offer consistency, security and attuned attention, those with avoidant, anxious, or disorganized attachment styles can learn new patterns of relating that support a more secure attachment (Brown & Elliott, 2016).

Secure Attachment

According to Bowlby's research, an infant who displays secure attachment is easily comforted and soothed by their mother after a brief separation (Fraley, 2010). The infant interacts with the caregiver as a safe and secure haven from which the child can explore the world and receive comfort and support (Levy et al., 2011). As adults, individuals with secure

attachment styles typically see themselves as competent and worthy of respect and view others as supportive and helpful. They also tend to perform well on academic tasks and exhibit flexible social behaviors (Kennedy & Kennedy, 2004).

Avoidant Attachment

An infant who displays an avoidant attachment style will display minimal or no distress upon separation from their caregiver and subsequently ignore or avoid them upon their return (Fraley, 2010). An avoidant attachment style is commonly associated with a caregiver who is unresponsive to an infant's needs or rejects the infant's attempts for proximity. In response to the unresponsive or rejecting caregiver, the infant will distance themselves to reduce their emotional stress. The avoidant attachment style is observed by organized, controlling strategies to manage and minimize emotional affect (Kennedy & Kennedy, 2004). Children who present with an avoidant attachment style are likely to withdraw and resist seeking help, which inhibits them from forming satisfying relationships with others. Because of this, they are generally less effective in managing stressful situations and may even demonstrate aggressive and antisocial behaviors (Kennedy & Kennedy, 2004).

Anxious Attachment

An infant who displays an anxious attachment style will display more significant levels of distress when the mother leaves the infant. Upon the mother's return, the infant will commonly appear to exaggerate their response to gain closeness with the mother (Kennedy & Kennedy, 2004). An anxious attachment style is commonly associated with primary caregivers who are unreliable or have poor timing in responding to their infant. Individuals with an anxious attachment style may experience a high level of inner turmoil and anxiety and exaggerate

expressions of distress to gain closeness with others (Kennedy & Kennedy, 2004). They may also use guilt or blame to receive the attention they crave (Pepping et al., 2018).

Disorganized Attachment

An infant with a disorganized attachment style will commonly display emotional reactions that are unpredictable and maladaptive (Kennedy & Kennedy, 2004). Research suggests that infants who display disorganized attachment style frequently have caregivers who are psychotically distressed or dealing with unresolved personal loss (Solomon & George, 2011). As adults, individuals with a disorganized attachment style may present a range of behaviors that involve either under controlled or over controlled emotional expression such as impulsive verbal and physical anger, difficulty expressing emotion, and aggression or violence towards romantic partners. They may also withdraw and have difficulty handling conflict. A disorganized attachment style can cause severe challenges in interpersonal and social relationships (Kennedy & Kennedy, 2004).

Music Therapy

Kenneth Bruscia, professor, author, and leader in the music therapy profession, spent over twenty-five years researching, thinking about, discussing with experts in the field, and analyzing the essential components of a definition of music therapy. In the third edition of *Defining Music Therapy* (2013), he speaks to the complexities of defining precisely what music therapy is; the definition requires expansive boundaries to hold the myriad of ways that music therapy can occur and needs to describe what it is accurately. To this aim, Bruscia offers a working definition crafted from his years of work, "Music therapy is a reflexive process wherein the therapist helps the client to optimize the client's health, using various facets of music experience and the relationships formed through them as the impetus for change. As defined

here, music therapy is the professional practice component of the discipline, which informs and is informed by theory and research" (Bruscia, 2013, p.36).

Components of Bruscia's Definition

Bruscia (2013) breaks down, defines, and discusses each component of the working definition that he has offered. Several components of his working definition important for this thesis include reflexive process; optimize the client's health; facets of music experience; relationships formed through them (them being the facets of music experience); the impetus for change; and the professional practice component of the discipline. Bruscia writes eloquently and precisely about each of the above component definitions. It is challenging to synthesize his words as they have been meticulously chosen to describe and define the concepts he offers. For this thesis, I will attempt to summarize each of these components; for a whole picture of their definitions, I suggest referencing Bruscia's book.

Reflexive Process. As Bruscia (2013) discusses it, music therapy as a reflexive process asks the therapist to notice, name, evaluate, and modify (when needed) their work with the client through ongoing self-observation and inquiry, collaboration with the client, and consultation with supervisors and experts in the field. The process of being reflective asks that the therapist remains engaged and informed within themselves, the client, and others, about the client's safety, needs, well-being, and progress through the therapy process. It also asks that the therapist be mindful of the stage of therapy that the client is in so that music therapy experiences support their developmental needs.

Optimize Client's Health. To optimize the client's health implies that the therapist is providing intentional opportunities to support the client in moving into their "highest level of potential in becoming healthy, both specifically and individually" (Bruscia, 2013, p. 40). In this

definition, Bruscia speaks to health as including all parts of one's being - physical, mental, emotional, social, spiritual, and in relation to the greater environment. Optimizing the client's health speaks to supporting the client in achieving the highest level of potential and wholeness as congruent with their needs and capacities.

Facets of Music Experience. According to Bruscia (2013), music experiences are multifaceted as they involve the client, the context (environmental, and inter- and intrapersonal), the process, and the product through which "individuals create meaning and beauty through sound, using the arts of composition, improvisation, performance, and listening" (p. 41). The multifaceted nature of the music experiences considers the outer environment, the internal environment, the relationship of the therapist and client, and how music is used to create meaning and beauty through listening, improvising, re-creating, and composing. Through engaging in multifaceted music experiences, beauty and meaning are created and heard to address therapy's musical, physical, mental, emotional, spiritual, and relational purposes.

Relationships Formed Through Them. Relationships formed through them speaks to how explorations through music experiences reveal physical, mental, behavioral, social, and spiritual relational manifestations, such as the relationship a client has with their body, an aspect of their personality, or between themselves and another (Bruscia, 2013). Music therapy experiences allow the client opportunities to explore the already occurring relationships that exist within themselves, with others, and the environment in which they live.

Impetus for Change. According to Bruscia (2013), the impetus for change arises from both outcome oriented and experience-oriented music experience strategies. Outcome oriented experiences are music experience strategies that invoke and awaken targeted change within the client or their relationships. Experience oriented strategies utilize music as the medium through

which the client identifies, explores, evaluates, rehearses, and implements the targeted therapeutic aim. Both outcome-oriented and experience-oriented strategies can produce either outward change (observable change) or inner change (change within the client). The changes that occur can be either personal, interpersonal, or ecological.

Professional Practice Component of the Discipline. Bruscia (2013) states that music therapy is a professional discipline of practice in which appropriately qualified therapists provide music therapy services within a client-therapist agreement that compensates the therapist for their expertise. In this discipline of practice, it is required that the therapist utilize theory and research to inform their practice. Services the music therapist provides are defined by the professional therapist-client relationship and the specific optimal health aims of the client.

Music Therapy Methods

As Bruscia defines it, a music therapy method is “a particular type of music experience used for assessment, treatment, and/or evaluation” (2013, p. 128). Bruscia outlines four distinct music therapy methods that clinical music therapists utilize in their work that include improvisational, re-creative, compositional, and receptive. Each method has its own therapeutic potentials and applications and requires and supports the development of client-specific skills.

Improvisational. Improvisational music therapy methods involve the client making up music, in the moment, through singing, playing an instrument, or creating a melody, rhythm, or song. Improvisational music therapy methods allow for the client to express themselves nonverbally through instrumental play, or verbally through vocalizing or singing. The client may improvise by themselves, in tandem with therapist support, or with a group. The therapist may provide support and a structure for the improvisation so that the client experiences a sense of safety and freedom in their personal creative process. Music therapy improvisation can support

client goals of developing personal awareness, self-expression, identity formation, exploring aspects of the self, working through difficult emotions, developing the capacity for interpersonal respect, intimacy, and boundaries, and developing creativity, spontaneity, and playfulness (Bruscia, 2013).

Re-creative. Re-creative music therapy methods involve the client learning, singing, playing, or performing precomposed music (either with or without an audience). The client may re-create the music using voice, instruments, or both, by themselves, in tandem with the therapist, or with a group. Bruscia states that re-creative music therapy methods support clients in living through their own feelings while also identifying and sharing feelings with others. Re-creative music therapy methods could be indicated for those who are developing sensorimotor skills, an ability to perceive, interpret, and communicate their ideas and feelings, a sense of personal identity, empathy for and with others, and a sense of community. Re-creative music therapy interventions can also be used to support clients in improving interactional and relational skills (Bruscia, 2013).

Compositional. Compositional music therapy interventions are compositions such as songs, lyrics, instrumental pieces, or any kind of musical product that the client composes, sometimes with the assistance of the therapist. The therapist may be responsible for the technical aspects of the composition, such as adding a harmonic accompaniment or operating the software or equipment. Compositional music therapy interventions can support clients in exploring personal and therapeutic themes lyrically and musically, and in developing skills in organizing and expressing their thoughts and feelings, decision-making skills, and the ability to integrate and synthesize parts into the wholes (Bruscia, 2013).

Receptive. Receptive music therapy interventions involve the client listening to live or recorded music and responding to the experience verbally, silently or in another modality (Bruscia, 2013). The experience is designed in accordance with the client's goals and may focus on a particular aspect of the music such as the physical, emotional, spiritual, intellectual, or aesthetic aspect. Receptive music therapy interventions can support clients in evoking bodily responses, affective states, images and imagery, and memories; stimulating relaxation, peak or spiritual experiences; promoting receptivity; and connecting the listener to a community or sociocultural group.

Problem Statement

Somatic-based therapies that support improved ANS regulation, co-regulation, trauma renegotiation and integration are being recognized as important components for the treatment of stress and trauma related symptoms (Porges & Dana, 2018). Music therapists who work with clients with trauma histories may have limited theoretical research to guide their treatment processes. This process model attempts to use various theories and the somatic experiencing model to support trauma renegotiation and integration, regulation, and co-regulation for clinical music therapy planning and intervention.

Purpose Statement

The purpose of this thesis is to provide a theoretically informed process model of somatic experiencing for the clinical music therapist and to articulate considerations for the integration of music therapy interventions and embedded elements of music to support the outcomes of co-regulation, regulation, and trauma renegotiation and integration for adults addressing complex or developmental trauma.

Chapter 3: Methods

Epistemological Position

To clarify the structure of the research design, it is helpful for the researcher to state the philosophical orientation of the study's methodology. Epistemology is a "way of understanding and explaining what we know" (Crotty, 2020, p. 3). Epistemology offers a philosophical ground for deciding what kinds of knowledge are possible and ensuring that they are adequate and legitimate (Crotty, 2020). The philosophical orientation of this study is constructionism. Crotty (2020) defines constructionism as "the view that all knowledge and therefore all meaningful reality as such is contingent upon human practices, being constructed in and out of interaction between human beings and their world and developed and transmitted within an essentially social context" (p. 42). According to the constructionist view, meaning is constructed, not discovered. Seymour Papert, who spent five years working at Piaget's Center for Genetic Epistemology, proposed constructionism as a learning theory and advocated that learning is most beneficial when the learner constructs a tangible product as part of the learning process (Papert, 1980). Papert stresses that constructionism is not only the construction process of a meaningful product for the learner, but that to get the full benefit of the learning, the creation process and end product must also be shared with others (Amineh & Asl, 2015). The intended outcome of this research study is a process model of somatic experiencing for the clinical music therapist with considerations for integration of music therapy interventions and embedded elements of music to support co-regulation, regulation, and trauma renegotiation and integration for adults addressing complex or developmental trauma.

Implementation Science

Implementation science is "the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practice into routine practice and, hence, to improve the quality and effectiveness of health services" (Eccles & Mittman, 2006, p. 1). The field of implementation science was borne out of a desire to achieve more evidence-based practice (EPB) in health care and related areas of professional practice by providing practices grounded in a theoretical approach to understanding why implementation succeeds or fails (Nilsen, 2015). In his book *Diffusion of Innovations* (1962), Everett Rogers offers that innovations' spread, or diffusion, are social processes. Implementation science engages the context in which clinical implementation is diffused rather than controlling the context of the research (Bauer & Kircher, 2020). According to Nilsen (2015), early research-to-practice models commonly depicted linear processes in which research was transferred from producers to users. However, more recent models place an emphasis on the context in which research is implemented and highlight the importance of facilitation to support the process. Thus, models have shifted from focusing on production, diffusion, and dissemination of research to implementation. Nilsen, who conducted a narrative review of selective literature to identify key theories, models, and frameworks used in implementation science, proposes that it seeks to accomplish three overarching aims and does so through five categories of theoretical approaches (2015).

Three Aims of Implementation Science

According to Nilsen (2015), there are three aims of implementation science that include "(1) describing and/or guiding the process of translating research into practice, (2) understanding and/or explaining what influences implementation outcomes, and (3) evaluating implementation"

(p. 2). Together, five distinct categories of theories, models, and frameworks, described below accomplish these three aims of implementation science.

Five Categories of Theories, Models, and Frameworks

As outlined by Nilsen's research, the five categories that make up the theoretical approaches used in implementation science are process models, determinant frameworks, classic theories, implementation theories, and evaluation frameworks. Process models, also called planned action models, offer practical guidance in planning and executing implementation strategies. Determinant frameworks, classic theories, and implementation theories describe determinants that influence or are hypothesized to influence implementation outcomes. Evaluation frameworks specify constructs and concepts that may be operationalized and measured (Nilsen, 2015). The category that best fits the intended purpose of this thesis is the process model.

Process Models (Planned Action Models). Process models, also called planned action models, guide translating research into practice by outlining stages of the research-to-practice process. Many of the process models originated in nursing, and they highlight important aspects that need to be considered in implementation practice. These models also commonly prescribe stages, or steps, to be followed in translating research into practice and offer practical guidance in the planning and implementation strategies (Nilsen, 2015).

Development of the Theoretically Informed Process Model

The purpose of this thesis is to provide a theoretically informed process model of somatic experiencing for the clinical music therapist and to articulate considerations for the integration of music therapy interventions and embedded elements of music to support the outcomes of co-

regulation, regulation, and trauma renegotiation and integration for adults addressing complex or developmental trauma.

With the intentionality of the first aim of implementation science (describing and guiding the process of translating research into practice), and the associated process model suggested to realize that aim (Nilsen, 2015), I am going to summarize and visually depict a theoretically informed process model as described in the purpose statement. I will start with grounding the reader in an understanding of how unaddressed complex or developmental trauma impacts an adult. Two theories (polyvagal theory and attachment theory) that inform the somatic experiencing (SE) therapy model will be described and depicted as it relates to those experiencing trauma. Next, for the clinical music therapist who may be working with adults addressing complex or developmental trauma, I will integrate and illustrate what somatic experiencing is and how it is supported by the previously described polyvagal and attachment theories.

With this accumulated knowledge, I will provide an overview of Brusica's (2013) description of the four music therapy methods and the embedded elements of music. I will depict how the four music therapy methods and embedded elements of music integrate into the somatic experiencing model. As a therapeutic modality music therapy methods are highly adaptable, based on a client's skills and abilities, preferences, and the desired treatment outcomes. The integration of music therapy methods to support the somatic experiencing model of therapy requires that the music therapist takes into consideration the theoretical frameworks of the polyvagal theory and attachment theory. To accomplish this aim, integrating music therapy methods to support somatic experiencing trauma renegotiation and integration will include using music to enhance sense perception awareness; provide a supportive and regulating counter

trauma resource; offer experiential, sonic and somatic experiences of titration and pendulation; provide experiential social engagement and support, and support moving through the threat response cycle with embodied awareness and musical representation and symbolism. As considerations for the clinical music therapist, I will provide an example of a music therapy method used to address each core SE concept. Lastly, I will offer polyvagal and attachment theory-informed considerations for the clinical music therapist.

Chapter 4: Results

The purpose of this thesis is to provide a theoretically informed process model of somatic experiencing for the clinical music therapist and to articulate considerations for the integration of music therapy interventions and embedded elements of music to support the outcomes of co-regulation, regulation, and trauma renegotiation and integration for adults addressing complex or developmental trauma.

Impacts of Complex or Developmental Trauma

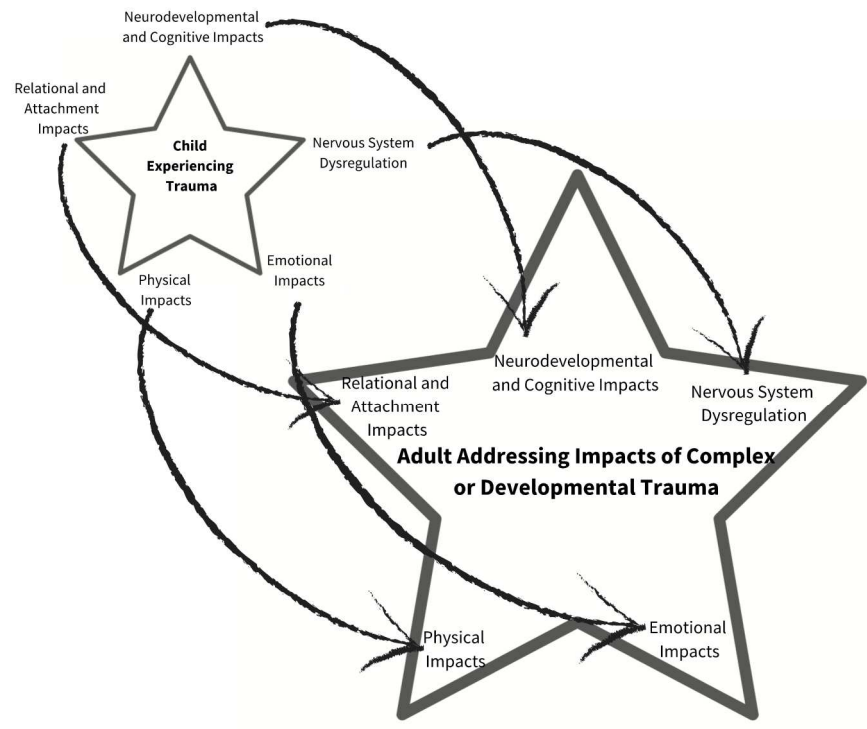
Adults living with the after-effects of unaddressed developmental or complex childhood trauma commonly report numerous painful intrapersonal and interpersonal challenges. They frequently struggle with cognitive, emotional, physical, and relational difficulties and nervous system dysregulation. They may experience anxiety, depression, loneliness and isolation, health issues, addiction, engaging in self-harm and risky behaviors, and difficulties experiencing a coherent sense of identity, finding meaning, satisfaction, and purpose in life. The impacts of complex or developmental trauma commonly create painful present-day challenges that include difficulty experiencing a personal sense of safety within oneself and in connection with others, making co-regulation and self-regulation challenging.

Figure 1 below illustrates the impact on an individual's adult development when a child has experienced ongoing complex or developmental trauma that has been unaddressed. The smaller star at the top left of the figure represents the child who experienced ongoing trauma during early critical formative development such as in infancy or childhood. Stars can be a metaphor to signify light and brilliance, so the shape of the star is used here to show that inherent to the child is their innocence, creative brilliance, and body wisdom. There is nothing wrong with the child, they are whole as they are. The bigger star on the right side of the figure represents the

adult living with the aftermath of the effects of childhood complex or developmental trauma. The adult is also a star, signifying their inherent innocence, creative brilliance, and body wisdom. However, due to childhood complex or developmental trauma, there are one or more lasting impacts, that when are unaddressed can include neurodevelopmental or cognitive impacts, nervous system dysregulation, emotional dysregulation, physical health challenges, and challenges with relational and attachment patterns. Each star point represents a type of impact that may result from the trauma the child experienced. However, if left unaddressed, the adult can retain the impacts of unaddressed complex or developmental trauma. The arrows originate with the smaller child star and point to the larger star, representing that the adult has retained the unaddressed impacts of complex or developmental trauma.

Figure 1

Impacts of Complex or Developmental Trauma



Polyvagal Theory

The polyvagal theory is a theory of the autonomic nervous system developed by Stephen Porges in the early 1990s (Porges, 1995). The theory describes how the autonomic nervous system (ANS) functions in service of self-protection and connection (Porges, 2003). As stated by Porges, the polyvagal theory comprises three organizing principles: (a) the ANS functions predictably and hierarchically, (b) it utilizes subconscious neuroception to continuously scan for danger and safety cues, and (c) co-regulation is a biological imperative (Porges, 2003).

According to the polyvagal theory, there are three distinct ANS branches: the dorsal vagal parasympathetic branch, the sympathetic branch, and the ventral vagal parasympathetic branch. Each of the three ANS branches produces a unique response to safety and threat cues. When the dorsal vagal parasympathetic branch is activated in service of organismic protection, it produces immobility, conservation, and shut down responses. When the sympathetic branch is activated in service of protection, it produces a mobilization, fight, or flight response. The ventral vagal branch forms what Porges calls the social engagement system; it monitors for and produces social cues of safety and danger. When the individual's ANS neuroception detects signals of safety, the individual can respond from a state of openness and availability for co-regulation and social engagement. The polyvagal theory states that these three branches of the ANS respond predictably and hierarchically to safety and danger cues (Porges, 2003).

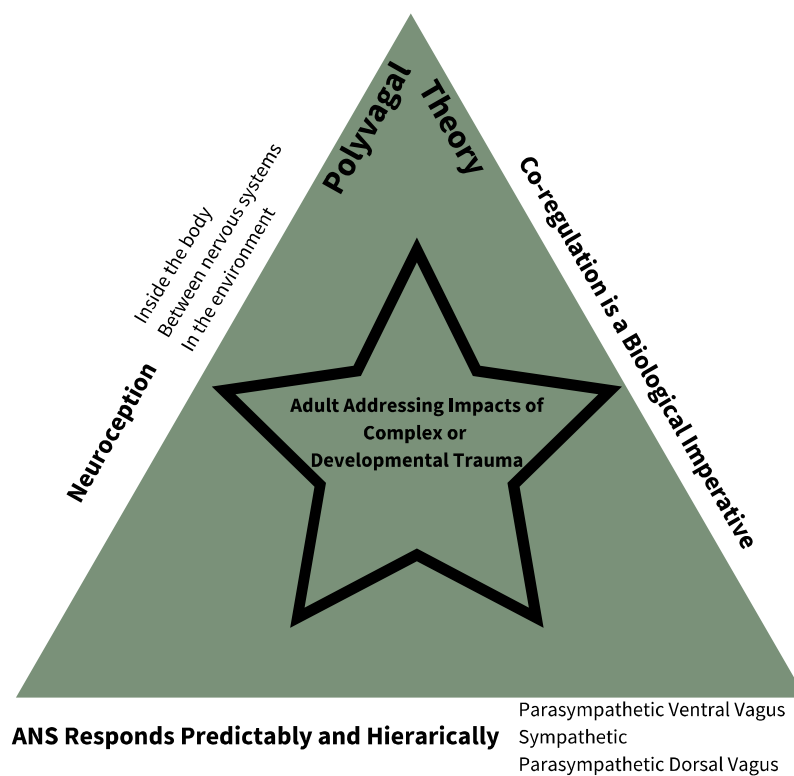
The second organizing principle of the polyvagal theory is the principle of neuroception. Neuroception is a term Porges coined to depict how the ANS constantly scans for safety and danger cues below the level of conscious awareness. Neuroception occurs inside the body as the ANS scans for the health and well-being of the organs, tissues, and bones, bi-directionally between nervous systems and out in the environment (Porges, 2004).

The third organizing principle of the polyvagal theory is that co-regulation is a biological imperative. The survival of the species depends on humans being safe with others. It is hard-wired into our physiology that we require co-regulation as an imperative to our health and well-being personally and collectively (Porges, 2003).

Figure 2 below depicts the polyvagal theory. Each side of the triangle represents one of the organizing principles of the polyvagal theory. The three ANS branches (parasympathetic ventral vagus, sympathetic, and parasympathetic dorsal vagus) are the foundation of the triangle, symbolizing that the response state of the ANS determines how the adult is within themselves, and with others. Neuroception and the three ways that neuroception occurs are the left side of the triangle. Co-regulation as a biological imperative is the right side of the triangle.

Figure 2

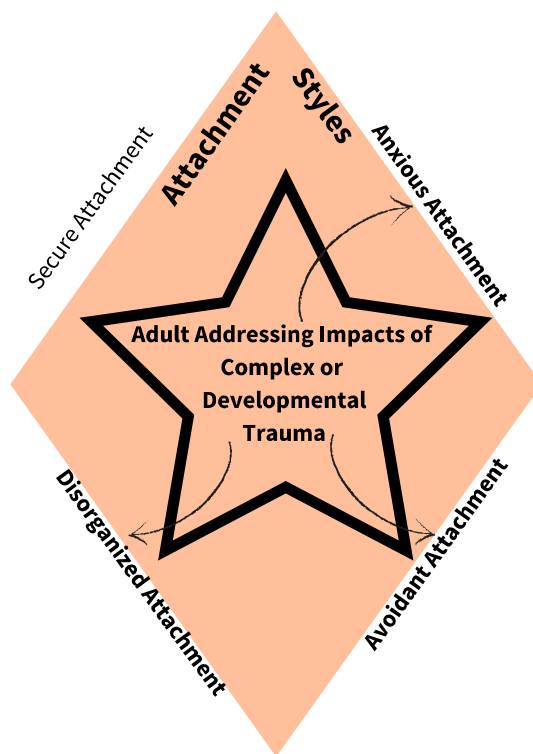
The Polyvagal Theory



Attachment Theory and Attachment Styles

Attachment theory was initially developed in the 1960s by John Bowlby (Bowlby, 1969) and later expanded on by Mary Ainsworth and has since been revised and updated by attachment researchers and theorists in the field (Bretherton, 1992). Attachment theory states that distinct attachment styles are formed in infancy that play out in childhood, adolescence, and adult relationships (Bretherton, 1992). Currently, attachment theory posits four distinct attachment styles that include secure, anxious, avoidant, and disorganized. Those with a *secure attachment style* feel relatively safe in engaging in and maintaining supportive, honoring, and mutually reciprocal relationships. The *anxious attachment style* is denoted by behaviors such as thinking highly of others but being insecure in one's sense of worth or deservingness, which causes anxiety for the individual in close relationships. An *avoidant attachment style* can be observed in those who appear independent and self-sufficient and as though they do not need intimate relationships in their lives. A *disorganized attachment style* can be observed in those with erratic or inconsistent behaviors in relationships that vacillate between being anxious and avoidant (Bretherton, 1992).

Figure 3 below depicts an adult who is addressing complex or developmental trauma in the middle of a diamond representing the four attachment styles described by attachment theory. The bold font attachment styles of anxious, avoidant, and disorganized attachment are close to the diamond and have arrows pointing to them from the adult star. It is not uncommon for adults with complex or developmental trauma to display or identify with the insecure attachment styles of anxious, avoidant, or disorganized. The words "Secure Attachment" are in regular font (rather than bold) and somewhat detached from the diamond to illustrate that this attachment style may feel difficult to achieve when the complex or developmental trauma has been unaddressed.

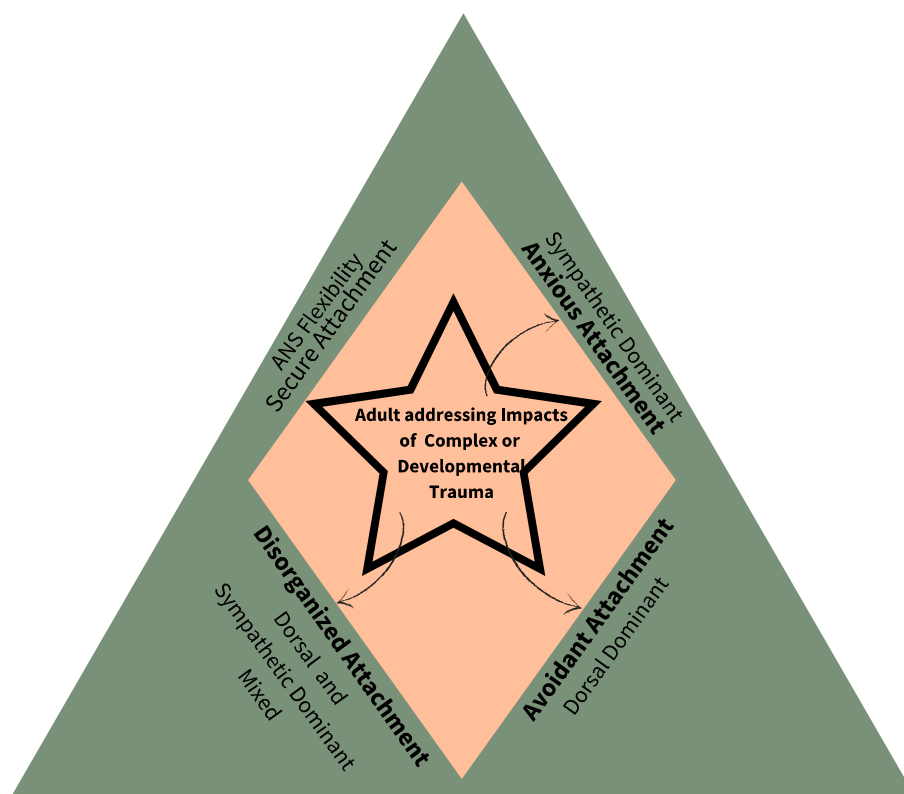
Figure 3*Attachment Styles***Intersection of the Polyvagal Theory and Attachment Styles**

The polyvagal theory offers a new lens through which to view attachment styles. The secure attachment style occurs when an individual can flexibly navigate relational dynamics, interactions, and changes with appropriate ANS safety and protective responses. Insecure anxious, avoidant, and disorganized attachment styles result from the relational defensive response patterns established in infancy and childhood. An anxious attachment style results from a relational sympathetic dominant protective response established early in life. An avoidant attachment style results from an ANS protective dorsal relational response pattern developed during infancy and childhood. A disorganized attachment style is a mix of both dorsal and sympathetic protective responses that was established early in life.

Figure 4 depicts the intersection of the polyvagal theory and four attachment styles. The secure attachment style requires ANS flexibility in relationships. Due to complex or developmental trauma, the ANS can become habituated to relational protective responses that are depicted above. The anxious attachment style is evident by a sympathetic dominant response. The avoidant attachment style is a dorsal dominant response. The disorganized attachment style is a mix of dorsal and sympathetic over and under activation patterns. The anxious, avoidant, and disorganized attachment styles are in bold font next to the sides of the diamond. The secure attachment style is in regular font to depict that while secure attachment is available, it may not be the most prominent style the adult who is addressing the impacts of complex or developmental displays. The ANS dominant protective response related to the attachment pattern is labeled in standard font. Curved black arrows point out from the star (the adult addressing the impacts of complex or developmental trauma) to the three attachment style patterns commonly associated with unaddressed complex or developmental trauma.

Figure 4

Intersection of Polyvagal Theory and Attachment Styles



Somatic Experiencing

Somatic experiencing (SE) is a body-based model of therapy developed by Peter Levine in the 1970s. The model was developed to support individuals in releasing activation energy that had remained stuck in the autonomic nervous system after stressful or traumatic events due to ANS overwhelm. Accumulated and stuck ANS activation energy can cause many physical, mental, and emotional symptoms that contribute to PTSD and PTSD-like symptoms (Levine, 1997). SE involves supporting clients in developing their sense perception (how the body communicates through sensations, inner images, behaviors, affect, and mental meaning-making), decoupling fear from activated protective responses, and allowing the body to slowly move

through the entire defensive response cycle to support improved ANS flexibility and regulation (Foundation for Human Enrichment, 2007).

As the body moves through the previously thwarted response, this teaches the ANS how to complete the ANS activation cycle and supports the discharge of activation energy. Utilizing careful attention and awareness of the sense perception to support ANS movement through the complete activation and discharge cycle offers an embodied conclusion to the activation of the ANS. Completing incomplete threat responses allows for greater ANS flexibility. Allowing the ANS to complete this cycle helps the body remember that it has survived, the event is over, and it can be open to life in the present moment.

Somatic experiencing concepts that I deemed relevant for the clinical music therapist based on my training and clinical wisdom include tracking sense perception, counter vortex resourcing, titration and pendulation, and trauma renegotiation and integration. According to the SE model, tracking sense-perception includes supporting the client in developing the capacity to be with both external and internal sensory information through five channels that include (a) sensation, (b) image, (c) behavior, (d) affect, and (e) meaning. Tracking sensation includes noticing information that arises from inside the body, such as sensations of constriction, relaxation, temperature, heaviness, lightness, and tingling. Developing skill in tracking sense-perception engages the brain stem where the ANS survival responses are housed and slows the nervous system down to support ANS regulation (Foundation for Human Enrichment, 2007). Tracking the image channel involves noticing internal images that appear as one engages with their inner experience. Tracking behavior involves noticing how the body moves and responds in subtle and not-so-subtle ways. Tracking affect involves developing the capacity to be with emotion as it arises. Tracking meaning involves noticing the cognitive meaning that arises in

response to a stimulus or the story one attaches to information revealed by the other channels. Everyone has sense perception channels that are more developed than others. Part of the SE process includes supporting individuals in developing awareness of the most available sense-perception while also developing the capacity to notice other channels of perception as they arise.

Counter vortex resourcing involves supporting the client in noticing experiences of ease, comfort, or pleasure and creating experiences that bring greater ease, comfort, and pleasure to support autonomic nervous system regulation. Tracking and attending to moments of ease, comfort, and pleasure helps improve ANS flexibility and regulation.

For the purposes of simplifying information for the process model, I have combined the SE concepts of titration and pendulation into one category. According to the SE model, titration involves introducing a small amount of activation energy and utilizing sense perception to track ANS response to the activation energy while supporting the ANS in allowing the activation energy to move through a defense cycle into completion. Pendulation involves gently oscillating awareness between places of contraction and expansion.

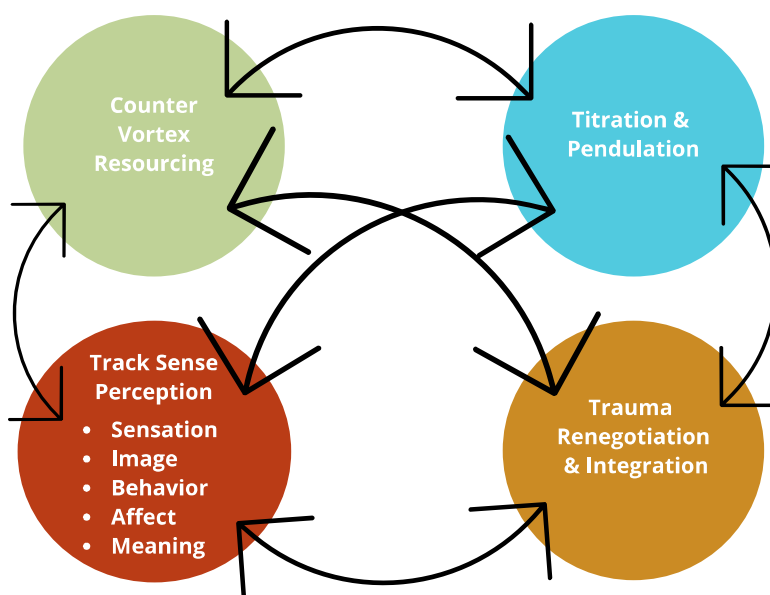
Trauma renegotiation and integration combine all the other concepts to complete previously thwarted protective responses to support greater ANS regulation and flexibility that allows the body to know that the event is over. The trauma renegotiation and integration concepts include arrest response, startle response, defensive orienting, defensive response, completion of threat response, and exploratory orienting.

Figure 5 depicts the four categories of concepts that contribute to the somatic experiencing model. The four SE concept categories include tracking sense perception, counter vortex resourcing, titration and pendulation, and trauma renegotiation and integration. Each

concept category is depicted by a colored circle to show differences among the four categories and each colored circle is labeled with the specific concept or concepts it represents. Black arrows represent that each concept category relates to the other concepts. While I have offered a linear explanation of each of the concepts, in the somatic experiencing process, the concepts may not be utilized in a linear progression. Instead, the practitioner draws from the SE concepts as relevant to where the client is in their own process and the work being done in session. For example, it is important for the client to have an embodied experience of being settled and present (which includes the somatic experiencing concepts of tracking sense perception of ease and presence and counter vortex resourcing) before exploring or introducing a topic that may have associated activation energy (such as with the somatic experiencing concept of titration).

Figure 5

Somatic Experiencing Model of Therapy Concepts



Intersection of Somatic Experiencing Model with Polyvagal Theory and Attachment Styles

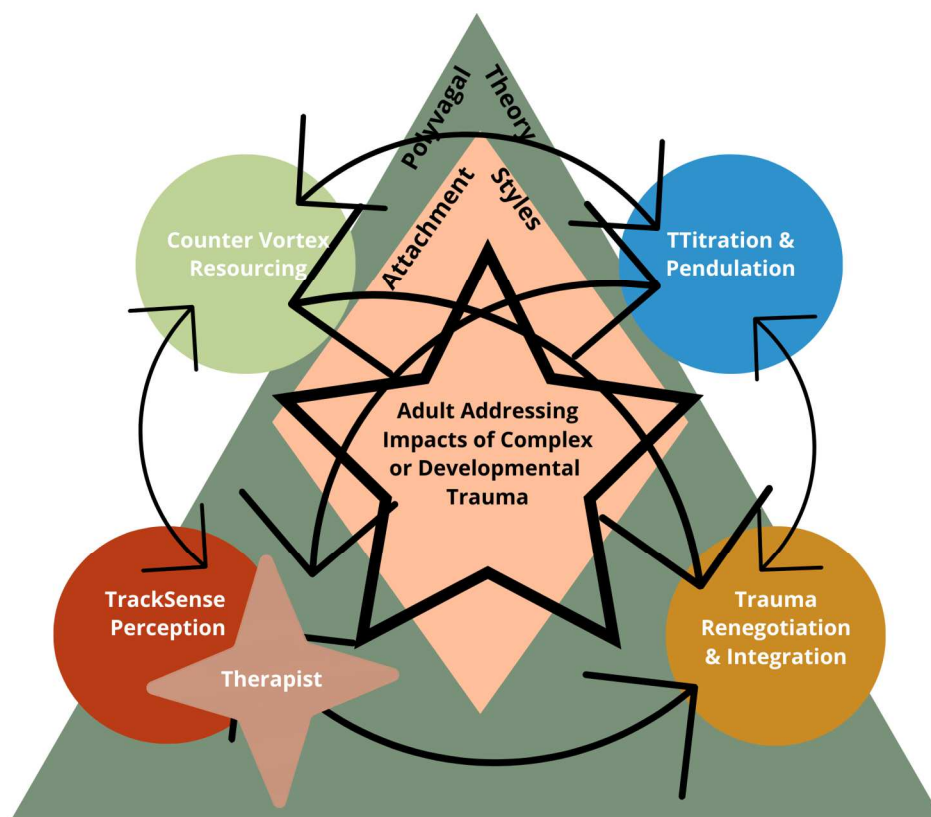
When viewed through the lens of SE, trauma is not an event but rather nervous system dysregulation that occurs when the body is not able to complete the self-protective defense cycle after a stressful or threatening situation. The SE process is designed to address ANS rigidity to support the body in completing defensive cycles so that the individual can move from a physiological state of protection into a state of openness and availability to life. The polyvagal theory offers a physiological model for how the ANS functions and how it can become stuck in defensive responses. It also provides a rationale for how, with safe and attuned support, defense responses can be dampened as the social engagement ventral vagus is activated. In many ways, the SE model of therapy is a relational model of therapy. As individuals address relational patterns through the SE process, they are subsequently able to make new choices in how they engage in relationships. They are more able to recognize how their own ANS patterning contributes to relational dynamics and address patterns that are causing challenges or pain. Addressing painful relational patterns through the SE process allows them freedom to make new choices in relationships. The polyvagal theory explains how and why SE works and it offers a map for improved social engagement which in turn, can impact greater flexibility with improved attachment skills.

Figure 6 below represents the intersection of somatic experiencing with the polyvagal theory and attachment styles. The foundational triangle represents the polyvagal theory and the three organizing principles of the theory. The diamond represents the four attachment styles described by attachment theory. Colored circles depict the four categories of somatic experiencing concepts. The colored circles are connected with black curved arrows to depict that the categories relate to and interact with the others in the somatic experiencing process to support

client ANS flexibility, co-regulation, and regulation. There are also two stars in figure 6. The larger star is on the right and represents the adult addressing the impacts of complex or developmental trauma. The smaller, four-pointed star on the left is the therapist. The therapist is overlapping the sense perception circle depicting that the therapist utilizes their sense perception for ANS self-regulation and to support attunement and co-regulation as the client moves through the SE process.

Figure 6

The Intersection of Somatic Experiencing with Polyvagal Theory and Attachment Styles



Four Music Therapy Methods and the Embedded Elements of Music

In his book, *Defining Music Therapy* (Bruscia, 2013), Bruscia states that there are four music therapy methods that music therapists use in their work that include receptive, recreative, composition, and improvisation. Receptive music therapy methods involve the client listening to

live or recorded music and responding to the experience verbally, silently, or through another modality. Recreative music therapy methods involve the client singing, learning, performing, or playing precomposed music. Compositional music therapy methods involve the client composing lyrics, songs, instrumental pieces, or any kind of musical product. Improvisational music therapy methods involve the client making music more spontaneously through singing, playing an instrument, or creating a rhythm, melody, or song (Bruscia, 2013).

Music therapists assert that music is a powerful modality that can bring about change. Because there can be many elements that make up the whole of music and a therapeutic musical experience, music can also be complex. Commonly identified individual elements of music are include rhythm, tempo, meter, timbre, pitch, melody, lyrics, harmony, mode, dynamics, form, texture, and style. For treatment planning and intervention implementation, music therapists must have an awareness and understanding of how specific music elements and their synthesis influence treatment outcomes (Hanson-Abromeit, 2015).

The Embedded Elements of Music for Somatic Experiencing

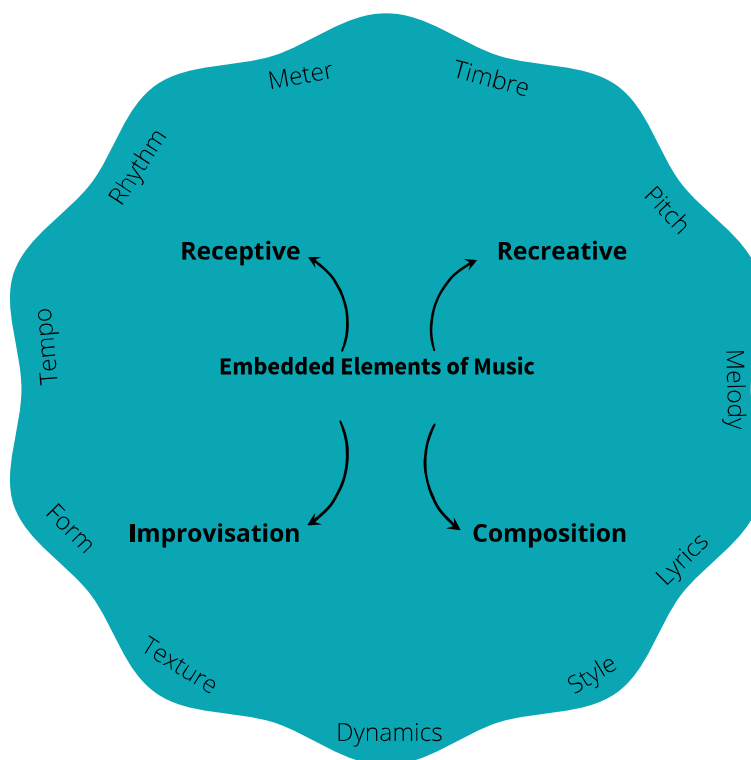
Music is wondrous and complex. Unique elements that contribute to the whole of music may include rhythm, tempo, meter, timbre, pitch, melody, lyrics, harmony, mode, dynamics, form, texture, and style. For targeted therapeutic purposes, music therapists have begun to recognize the importance of examining how each of the separate elements of music impact the whole of music as an experience for both those creating music (active) and those listening to it (passive). As Hanser (1999) stated, "It is up to the music therapist to manipulate melodic, rhythmic, and harmonic elements, taking into account individual needs and observed effects of different music" (p. 139). Hanson-Abromeit (2015) moves Hanser's statement a step further in her article, *A Conceptual Methodology to Define the Therapeutic Function of Music*. In this

article, she discusses the importance of considering the theoretical orientation and knowledge of the practitioner (which impacts how music therapy interventions are offered and the purpose of the interventions) and linking the specific element characteristics as they directly relate to client goals. Linking the theoretical orientation and knowledge of the music therapist with a theoretically supported features of a particular music element related to the client's goal provides a more precise articulation of why a specific musical element will be more or less effective (Hanson-Abromeit, 2015).

Figure 7 below depicts the four music therapy methods and the embedded elements of music. The wavy circle represents that the four music therapy methods and the embedded elements of music elements are connected and interwoven into the whole of how a music therapist utilizes music therapeutically. As a music therapist utilizes one of the music therapy methods, separate and combined elements of music will be a part of the music therapy method and intervention.

Figure 7

Four Music Therapy Methods and the Embedded Elements of Music



Integrating Music Therapy Methods and the Embedded Elements of Music into the Somatic Experiencing Process

The four music therapy methods and the embedded elements of music can be integrated into the somatic experiencing process to support the client in addressing the impacts of complex or developmental trauma for outcomes of regulation, trauma renegotiation and integration, and more secure attachment. Receptive music therapy methods that utilize music elements to provide a neuroception of safety (such as a regulating tempo, affirming lyrics, steady rhythm, and simple harmonic structure) can support tracking sense perception, counter vortex resourcing, titration and pendulation, and trauma renegotiation and integration. Recreative music methods and the embedded elements of music (such as a strong tempo, empowering lyrics, and a straight-forward and predictable form) can be used to help develop skills in tracking sense perception, counter

vortex resourcing, and titration and pendulation. Composition music methods can reinforce tracking sense perception, counter vortex resourcing, titration and pendulation, and trauma renegotiation and integration. Vocal and instrumental improvisation music methods can be used to track sense perception, counter vortex resourcing, titration and pendulation, and trauma renegotiation and integration.

Music Therapy Methods to Support Tracking Sense Perception

The somatic experiencing model emphasizes developing the capacity to be with one's own sense perceptions; this emphasis can foster an embodied awareness, support tracking ANS activation and deactivation and moving through the trauma renegotiation and integration processes. Developing sense perception capacities includes noticing both internal and external sense perception. Internal sense perception includes interoception of visceral and muscular sensations, internal images, affect (emotion), and meaning making. External sense perception includes proprioception, visual, auditory, tactile, olfactory, and gustatory senses (Foundation for Human Enrichment, 2007). Developing skills in tracking sense perception engages the brain stem where the ANS survival responses are housed and slows the nervous system down (Foundation for Human Enrichment, 2007).

A clinical music therapist can support a client in developing their sense perception in two primary ways. The first way is by utilizing sense perception language and asking sense perception questions, the second is to provide music therapy interventions that support the individual in increasing their capacity to notice, be with, and allow sense perception to occur without being overwhelmed. Each of the four music methods can be used to develop and track sense-perception; a specific example from the music therapy literature used for this purpose is instrumental improvisation. Bruscia states that improvisational methods can stimulate and

develop the senses. Instrumental improvisation, such as drumming, can help clients be aware of breathing or heart rate patterns (Braddock, 1995). In her book, *Body Voices*, Carolyn Braddock states that when clients engage in drumming, the music therapist can support them in becoming aware of their breathing in relation to the drumming cycle to support breath regulation and bodily awareness. As individuals engage in instrumental improvisation, while being provided gentle prompts to notice how their instrumental improvisation engages and affects their sense perception, they can develop their capacity to witness and be with sense perceptions within the safe structure that the drumming provides.

Music Therapy Methods for Counter Vortex Resourcing

A resource is an anchor – either internal or external – that helps the client feel less activated and more at ease. Counter vortex resourcing is a process that occurs to connect one with their capacity for organization and connection; it provides the ANS with an experience of safety, ease, and even pleasure in the present moment that supports ventral vagal regulation. Counter vortex resourcing also helps the individual expand their capacity for navigating more intense sense perception (Foundation for Human Enrichment, 2007). Inner resources are processes that one can do on their own to create or produce an internal state of calm or ease. Inner resources can include experiences such as deep breathing, grounding exercises, humming, chanting, or singing exercises. External resources are processes that one does with others or in a community that produce a state of calm, ease, pleasure, or even joy. These can include experiences such as being with friends or family members who are safe and affirming, attending a yoga class, being in a support group, or singing or making music with a group. Engaging in music-making can be an excellent way to offer playful engagement within the safety and structure of the music intervention with the initial aim to support co-regulation and regulation.

As individuals track their felt sense while accessing inner or outer resources, this can support ANS regulation. If the counter vortex resourcing occurs with another or other individuals, this helps ANS safety with co-regulation. Counter vortex resourcing begins to move the ANS out of a defensive response into a ventral vagal response of safety, ease, and openness for connection.

The receptive music therapy method is one type of method used for counter vortex resourcing. In the article, "The Effects of Music Relaxation and Muscle Relaxation Techniques on Sleep Quality and Emotional Measures Among Individuals with Post-Traumatic Stress Disorder", Blanaru et al. (2012) investigated the impact of listening to music relaxation and muscle relaxation recordings on sleep quality and mood for individuals who developed PTSD in the wake of combat or terror attacks. Study results revealed that while listening to both music relaxation and muscle relaxation recordings improved sleep quality and mood for the participants, "music relaxation in particular was found to be effective and led to significant improvements in sleep measures and significant reduction of depression score" (Blanaru et al., 2012, p. 63). Experiencing ease, comfort, enjoyment, or success, and allowing the individual to notice how it is to be with those experiences in the moment, provides ANS resilience for titration, pendulation, trauma renegotiation, and integration phases of their therapy.

Music Therapy Methods for Titration and Pendulation

Titration and pendulation are concepts that the SE model uses to support the ANS in learning to navigate activation and deactivation cycles. The SE model emphasizes working slowly while tracking the felt sense to help the autonomic nervous system's capacity to navigate the activation and deactivation cycles. Titration includes working from a regulated state, introducing the smallest amount of activation energy, and then allowing the ANS to move

through the complete activation cycle into deactivation and settling to build regulatory ANS capacities with increasing amounts of activation. Pendulation is "the natural oscillation between opposing forces of contraction and expansion. This innate rhythm helps the client experience a sense of flow that contradicts the fixity of trauma" (Levine, 2018, p. 18). The pendulation process involves gently shifting inner awareness to support the ANS in navigating the activation and deactivation cycle, thus supporting regulation. Titration and pendulation are frequently used together to help develop ANS flexibility.

Porges states that play is a "neural exercise," meaning that play allows the ANS to practice moving from one ANS state to another (pendulate) from a ventral vagal state of safety and co-regulation. Play allows the ANS to simultaneously access the ventral vagal social engagement system with sympathetically activated ANS energy without aggression. Activating the ventral vagal social engagement system, combined with a playfully initiated sympathetic response, offers the ANS the capacity to learn transitory flow and resilience (Porges, 2018). An example that Porges offers is the game of peek-a-boo. When an individual and an infant are in a co-regulated ventral vagal state of safety, the individual can momentarily disappear, only to reappear a few moments later with a silly face and the words, "peek-a-boo." For the infant, a brief startle response at both the disappearance and the subsequent reappearance momentarily activates a defensive sympathetic nervous system response. As the individual and the infant laugh together, they reinforce their co-regulated ventral vagal state, dampening the defensive sympathetic state response state. Play in this fashion "teaches" the nervous system how to shift (pendulate) ANS states by employing the social engagement system to dampen the defensive sympathetic state (Porges, 2018).

An example of a music therapy method used for pendulation is improvisation. In an article, “A Pendulum Between Trauma and Life: Group Music Therapy with Post-Traumatized Soldiers”, written by Bensimon et al., (2012), the authors suggest a group therapy model for post-traumatized soldiers. In this article, the authors specifically discuss pendulation as part of the process. Through group drumming, the group participants would “oscillate between experiencing rage (trauma vortex) and releasing it (healing vortex)” (Bensimon et al., 2012, p. 231). Pendulation would also occur as the participants engaged in drumming improvisation and then completed the session with receptive music listening for the purposes of relaxation. Moving between the trauma vortex (as stated by the somatic experiencing stream of life metaphor) and the healing vortex allows the ANS to practice moving from one state to the other, pendulating between the two.

Individuals who have experienced complex or developmental trauma may struggle with sympathetic activation that does not overwhelm them or remind them of trauma-related triggers. They may be stuck in defensive responses of fight, flight, freeze, or collapse, limiting their social engagement and play capacity. Practicing pendulation through engaging with music offers the ANS opportunities to oscillate between two ANS responses with the support of music.

Music Therapy Methods for Trauma Renegotiation and Integration

In the somatic experiencing model, trauma renegotiation and integration include moving slowly and completely, utilizing the felt sense, titration and pendulation, through the threat response cycle. The threat response cycle includes the arrest response, startle, defensive orienting response (DOR), specific defense (fight, flight, or freeze), completion, and exploratory orienting response (EOR) (Foundation for Human Enrichment, 2007). According to Levine,

Renegotiation is not about simply reliving a traumatic experience. It is, rather, the gradual and titrated revisiting of various sensory-motor elements comprising a particular trauma. Renegotiation occurs primarily by accessing procedural memories associated with the two dysregulated states of the autonomic nervous system (hyper/hypo-arousal) and then restoring and completing the associated active responses. As this progresses, the client moves towards equilibrium, relaxed alertness, and here-and-now orientation. (Levine, 2015, p. 43-44).

As the body, and the ANS, move completely through previously incomplete defensive responses, into completion and exploratory orienting, this process discharges accumulated energy that has been stuck in the nervous system, allowing the system to integrate the experience into ANS regulation, which allows for a release of previously stuck or thwarted energy. Trauma renegotiation and integration through the somatic experiencing process allows the body and mind to integrate the traumatic experience(s) in such a way that an individual can distinguish between what is occurring in the present moment and what is from the past (van der Kolk, 2002).

An example of a music therapy method used for trauma renegotiation and integration is vocal improvisation, as described by Diane Austin in her article, "In Search of the Self: The Use of Vocal Holding Techniques with Adults Traumatized as Children" (2001). In her article, Austin describes using a vocal holding technique that involves the therapist playing a simple two (or sometimes more) chord structure, of which the client chooses the key and the number of chords. The client vocally improvises over the chord structure played by the therapist. Austin states, "Vocal holding techniques can induce a therapeutic regression in which early mother-child relatedness can be replicated and the client can have a reparative experience by

renegotiating crucial junctures where the relationship with the primary care-taker was ruptured” (Austin, 2001 p. 30).

The Embedded Elements of Music

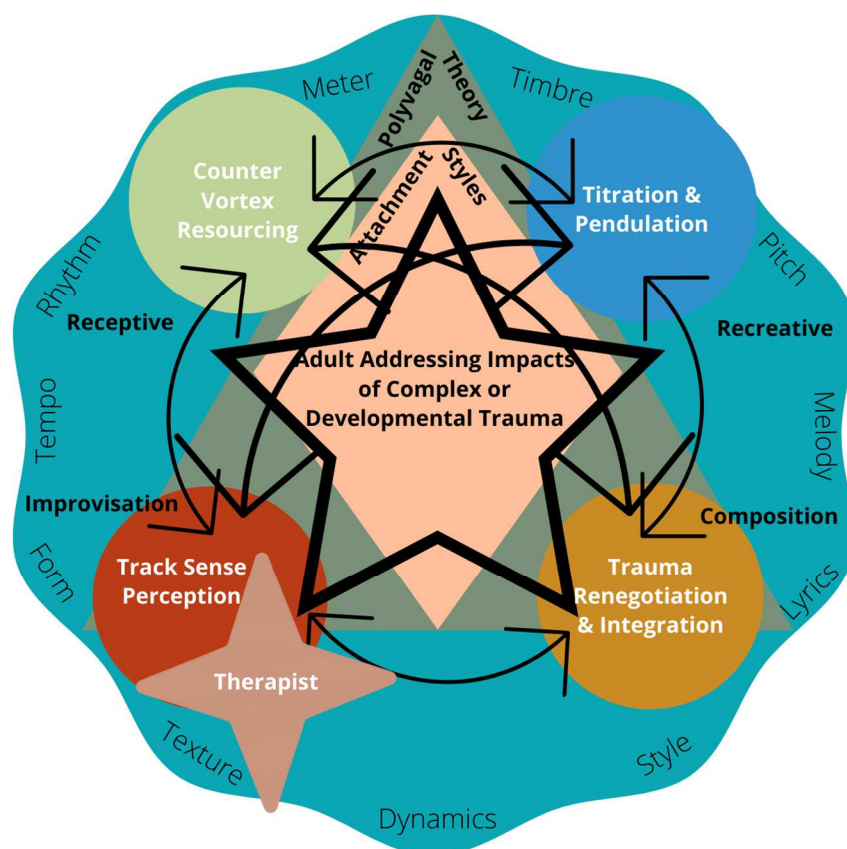
The process model presented in this thesis discusses integrating music therapy methods and the embedded elements of music into the somatic experiencing concept categories of tracking sense perception, counter vortex resourcing, pendulation and titration, and trauma renegotiation and integration. While each concept category leads to the overall purpose (goal) of somatic experiencing – the completion of incomplete defensive responses – each concept category also has its own aim. For example, tracking sense perception involves the client learning to attend to and be with sense perception that is comfortable, neutral, and even slightly uncomfortable, without overwhelming the autonomic nervous system. As the client learns to allow and attend to sense perception, this expands the ANS regulatory capacities (Foundation for Human Enrichment, 2007). The music therapy method example given above for developing tracking of sense perception is instrumental improvisation. In this example, several of the elements of music could function therapeutically (i.e., dynamics, timbre, tempo, lyrics, form, texture, and style) depending on the client’s trauma history, personality, personal preferences, and whether the music therapy method is active or passive. Defining how each of the elements of music is used within a music therapy method for the aim of the concept category being addressed is beyond the scope of this thesis. However, it is important that the music therapist be cognizant and considerate of the client-specific contextual considerations of how the separate elements of music contribute to the music therapy method being used.

Figure 8 below depicts the integration of the four music therapy methods and the embedded elements of music into the somatic experiencing therapy model for adults addressing

the impacts of complex or developmental trauma. The wavy circle representing the four music therapy methods and the embedded elements of music is the foundation of the figure depiction. The wavy circle surrounds the therapist and client and is underneath the polyvagal triangle and attachment style diamond, depicting that the music therapy methods and elements of music support and inform all of elements layered on top. The four music therapy methods can be used to support a neuroception of safety, therapist-client or client-client co-regulation, more secure attachment style, and each of the somatic experiencing concepts as the client moves through the SE process.

Figure 8

The Integration of Music Therapy Methods and Embedded Elements of Music into the Somatic Experiencing Model of Therapy for Adults Addressing the Impacts of Complex or Developmental Trauma



Contextual Facilitation Considerations for Implementation of the Process Model

According to the article *Making sense of implementation theories, models and frameworks*, Nilsen (2015) states that more recent process models emphasize facilitation and the context in which research is implemented. In this section of the process model, I offer key contextual considerations for implementing the process model of somatic experiencing (theoretically informed by the polyvagal and attachment theories) for the integration of clinical music therapy intervention. Key contextual considerations for treatment planning and intervention implementation include information gathered through the assessment process; therapy configuration; autonomic nervous system pattern considerations; co-regulation and attachment patterns; and neuroception of safety that includes neuroception of sound, within an environment, within a therapeutic relationship, and through the somatic experiencing process for the integration of clinical music therapy intervention.

Assessment

Treatment planning begins with an assessment process. The information gathered during the assessment will inform how the clinical music therapist proceeds with treatment planning and intervention implementation. Adults seeking therapy for the after-effects of unaddressed developmental or complex childhood trauma commonly report numerous painful intrapersonal and interpersonal challenges. For the clinical music therapist working with adults who are addressing the impacts of complex or developmental trauma, it is important to have an assessment process that provides initial information such as the client's presenting symptoms, a trauma history as related to the client's presenting needs, attachment patterns and challenges, personal resources and strengths, musical background and preferences, and personal goals for

therapy. Based on the information gathered in the assessment process, the clinical music therapist can begin treatment planning.

Contextual Treatment Planning Considerations

Based on the information gathered in the assessment process, the clinical music therapist can begin treatment planning. Contextual treatment planning considerations for the integration of music therapy into the somatic experiencing process include the therapy configuration; autonomic nervous system pattern considerations; co-regulation and attachment patterns; and neuroception of safety that includes neuroception of sound, within an environment, within a therapeutic relationship, and through the somatic experiencing process for the integration of clinical music therapy intervention.

Therapy Configuration. Somatic experiencing, as conceptualized and presented by Peter Levine, is a model for individual therapy. However, the SE concepts as presented in this thesis could also apply to group music therapy. In their article *Group Psychotherapy Informed by the Principles of Somatic Experiencing: Moving Beyond Trauma to Embodied Relationship*, Taylor and Saint-Laurent (2017) discuss how group therapy informed by the SE model can make group work "deeper and more effective" (Taylor & Saint-Laurent, 2017, p. S171).

Group music therapy in the treatment of trauma symptoms has shown promise as an intervention that can support an individual in solidifying their sense of identity and identity within a social group (Bensimon et al., 2008; MacIntosh, 2003; Pavlicevic, 1999; Taylor & Saint-Laurent, 2017). For individuals addressing relational impacts of complex or developmental trauma, group music therapy that is informed by somatic experiencing could provide a powerful avenue of treatment. Through the assessment process, a clinical music therapist who provides services for adults addressing the impacts of complex or developmental trauma can determine if

an individual, group, or a combination of individual and group music therapy approach may be most beneficial for the client. For individuals addressing relational challenges, small group or group music therapy that allows for exploring relational behaviors and patterns within the context of a safe community may be most beneficial. Individual therapy may be most helpful for those addressing trauma such as sexual abuse that requires great sensitivity and attuned support.

Autonomic Nervous System Pattern Considerations. Clinicians who work with individuals with trauma histories have found that the polyvagal theory offers a physiological rationale for why specific ANS response patterns occur, how trauma can cause ANS dysregulation, and how to support improved ANS flexibility and regulation (Porges & Dana, 2018). Knowing about the polyvagal theory supports clients as they work through the somatic experiencing process as it helps them understand how and why ANS activation and deactivation cycles occur, develop and track the felt sense, and provides a framework for the importance of addressing painful relational patterns as related to self-regulation and co-regulation.

The polyvagal theory offers clients hope as it states that social engagement is a biological imperative and that the nervous system longs to co-regulate and be regulated (Porges, 2018). With attuned support, the ANS can learn new patterns of response that allow one to be with themselves, others, and their environment in more resourced, comfortable, and secure ways. The ANS can learn to dampen protective responses to improve regulation, co-regulation, and social engagement in safe environments and with safe and attuned individuals. Understanding the polyvagal theory will support the music therapist as they navigate and support the client through the somatic experiencing process.

Autonomic Nervous System Mapping. Deb Dana, a clinician, author, and instructor specializing in teaching the polyvagal theory, likens the autonomic nervous system to a ladder

(2018). The ladder metaphor reminds one that to get from the dorsal vagal state of collapse to the ventral vagal state of openness and engagement, the ANS must first navigate through the sympathetic state of activation. Conversely, if the ANS is in a ventral vagal state of ease and engagement and becomes taxed, stressed, or threatened, it will first move into the sympathetic response. The ANS will shift into the dorsal vagal response state of collapse and conservation if the sympathetic branch becomes overwhelmed. Dana has published several books about utilizing the polyvagal theory in clinical practice and everyday life. Her books offer exercises to support individuals in developing personal awareness, insight, and a greater sense of control.

In her books, Dana offers a set of polyvagal-inspired maps and exercises that can be used to befriend, track, and work with one's own ANS states (Dana, 2018). Using Dana's ANS maps and practices allows one to identify the images, colors, sounds, inner textures and sensations, thoughts, perspectives of self, others, the world, and behaviors that each ANS state produces. Working with the polyvagal maps and exercises allows one to notice and name the inner experience accompanying a state to understand how being in a particular nervous system state colors one's perspective of themselves, others, and the world. Working with the maps and exercises also provides insight into how one can intentionally work with and support ANS state shift changes. As clients begin to recognize their ANS patterns and responses, they can also notice how to shift ANS defensive responses. The music therapist can utilize Dana's maps and exercises to support the client in learning about their own ANS response patterns. The information gleaned from the practices can inform music therapy interventions that support the client through the somatic experiencing process. For example, a client who completes a mapping exercise that illuminates that their ANS tends to respond from a dorsal dominant protective response, and they want to become more comfortable allowing sympathetic mobilizing energy

into the system, a music therapist can support the client in exploring this pattern through music therapy methods. Through referential instrumental improvisation, a client could put their inner protective dorsal experience into music, such as using slower tempos, deeper pitched instruments, and a grounding timbre. From the referential instrumental exploration of the dorsal state, the client would be invited to slowly introduce a bit of sympathetic-sounding energy into the improvisation, such as a faster tempo, a higher-pitched instrument, and a brighter timbre or change of meter. As they introduce the sympathetic-sounding energy to the referential improvisation, the therapist can support the client in noticing how their playing impacts their physiological responses.

Co-Regulation and Attachment Patterns. Individuals addressing the impacts of complex or developmental trauma may have difficulty perceiving safety and danger cues from other individuals (Porges, 2015). For the music therapist working with adults with complex or developmental trauma, it is helpful to support clients in identifying which dominant protective ANS social engagement patterns may be occurring in their relational interactions. It is also beneficial for the music therapist to understand that a neuroception "mismatch" may occur and the client may feel threatened by the attuned and compassionate care of the therapist. For adults addressing the impacts of complex or developmental trauma, it is common that the early formative ANS patterning developed to be in a perpetual defensive state that causes a neuroception "mismatch." A neuroception "mismatch" occurs when an individual is, in fact, safe, but the ANS does not register safety cues; thus, the individual struggles to calm defense responses in safe environments. A mismatch also occurs when neuroception does not register danger when actual danger is present (Porges, 2015). An authentically embodied, present, and attuned music therapist can provide gentle prompting and feedback to support the client in

noticing these patterns. They can also utilize the therapeutic relationship and music therapy interventions to help embodied awareness. Supportive, authentic therapist-client co-regulation, over time, will also support the client in recognizing the embodied components to more secure attachment.

Neuroception of Safety. Being in a safe state is a prerequisite for optimal social behavior, and it is crucial for accessing higher brain structures that allow humans to be creative and generative (Porges, 2015). The polyvagal theory emphasizes that for infants to learn the skill of co-regulation, feeling safe requires that the ANS sense a unique set of cues that occur from reciprocal social interactions. The social sensory cues required include hearing a prosodic voice accompanied by warm facial expressions and gestures and gentle tactile cues (Geller & Porges, 2014). The neuroception of these sensory safety cues is critical for an infant to learn regulation as they down-regulate defensive ANS state response of fight, flight, freeze, and collapse. Porges states that even when there is damage to a sensory system, this redundancy in sensory cues illicit safety cues that will support the child's neuroception of safety and, thus, regulation (2015). When the child does not have the opportunity to learn co-regulation skills through safe and reliable interactions, the ANS may sense danger cues even when it is safe (Porges, 2015).

Neuroception of Sound. The polyvagal theory posits that evolution made mammals highly sensitive to sense perception for survival. Neuroception of sound requires the structures of the ears (and their relationship to the heart, lungs, and other organs) to be tuned to hear frequencies that signal both safety and danger. According to Porges and Rossetti (2018), mammals have a species-specific frequency bandwidth that optimizes acoustic signals; this bandwidth is termed the "frequency of perceptual advantage." Primary social cues occur within this bandwidth, such as a mother cooing to her infant or a conversation between friends. Higher

frequencies (such as a baby's cry) or lower frequencies (such as low rumbles) will register as danger to the ANS. Evolutionarily, this supported survival as when babies need care, it is required that the caregiver sense their need. Low frequencies can signal environmental dangers that may require mobilization. The polyvagal theory suggests that if the ANS responds defensively through immobility, fight, flight, or freeze, these autonomic defense states may alter sound sense perception. Sounds that would typically register a sense of safety may be perceived as dangerous, and those that are dangerous may not be perceived as such (Kolacz et al., 2018).

The ANS listens for danger and safety cues in three ways that include *inside* the body, in the *environment*, and *between* nervous systems (Dana, 2020). Neuroception occurs differently for everyone based on temperament, experiential history, current physical and emotional input from the body, existing physical conditions, and current states of mind (Ossefort-Russell, 2018). To foster a neuroception of safety, the clinical music therapist needs to consider and inquire into how the client is experiencing the therapeutic environment, the relationship and attunement with the therapist, and the music therapy methods being used. The intention of the therapist to support a neuroception of safety, and attuned and gentle inquiry into the client's embodied experience of these (which also contributes to developing skill in tracking sense perception), will provide for a foundation upon which to build a neuroception of safety within the environment, the therapeutic relationship, and through the therapy process.

Neuroception of Safety Within the Environment. It is helpful for the music therapist to be mindful of supporting a neuroception of safety within the therapeutic environment. The polyvagal theory indicates that low pitch sounds are associated with environmental predators, and intense high sounds are associated with pain and danger (such as a baby's high-pitched scream). Both low and intense high pitch sounds can elicit defensive ANS responses (Flater,

2020; Porges, 2008). While music therapists commonly work in a variety of clinical settings and sometimes have little control over environmental factors to support a neuroception of safety, it is essential to ensure client confidentiality and, when possible, dampen environmental low and high intensity/high pitch sounds which may trigger a nervous system defensive response. This can include using music with a melodic range that is within the frequency of perceptual advantage (the range of human vocalizations), warm and inviting rhythms and timbre, and predictable meter and form.

Neuroception of Safety Within the Therapeutic Relationship. The polyvagal theory suggests that bidirectional autonomic nervous system communication occurs between people (Geller & Porges, 2014; Porges, 2011). To foster a neuroception of safety *between* nervous systems, it is helpful for the clinical music therapist to be present, open, and grounded and have some capacity to track their sense perception and ANS states. An embodied awareness and understanding of their nervous system state, rhythms, and preferences allows the therapist to be an embodied and authentic regulating presence for the client. Embodied self-awareness of the therapist also serves as a resource to support the client in tracking their felt sense. When appropriate, the therapist can share what they are noticing within themselves as a reference point for the client.

Another way that a clinical music therapist can promote a neuroception of safety is with warm facial cues and vocal prosody. The polyvagal theory describes a neural connection between the striated muscles of the face, inner ears, and throat (voice) with the heart. Utilizing warm prosody, facial expressions, and postures provides a "portal through which neural regulation of physiological states can be exercised through social engagement" (Geller & Porges, 2014, p. 185). A music therapist who is present, grounded, available, and utilizes a rich and

prosodic voice paired with authentic, warm facial features, open body posture and body language can support a client's neuroception of safety. By offering a genuine, attuned presence, the therapeutic relationship can help the client's capacity for non-defensive social engagement, which impacts both self and co-regulation over time. By offering a genuine, attuned presence, the therapeutic relationship can help the client's capacity for non-defensive social engagement, which impacts self and co-regulation over time. To support a neuroception of safety within the therapeutic relationship through music therapy methods and the embedded elements of music, the music therapist can utilize a simple and predictable form, instruments that can provide a grounding tempo or pulse such as a bass metallophone, and allow the client context, choice and opportunities for connection through interactive music-making.

All relationships, even therapeutic ones, move through moments of closeness and rupture. For reciprocal, secure co-regulation to occur, the ventral vagal social engagement system needs to learn how to navigate experiences of rupture, repair, and reunion. Those in a constant state of ANS dysregulation likely participate in a relationship from a defensive state of fight, flight, freeze, or collapse. This may contribute to painfully dismissing or exaggerating rupture and making repair and reunion difficult or impossible. The clinical music therapist who is aware of these essential components of relating can offer support in navigating rupture, repair, and reunion through the therapeutic and somatic experiencing process.

While it will be helpful for a client to practice navigating the relational rupture, repair, and reunion cycle within a therapist and client relationship, group work can also provide a rich and supportive environment in which to practice these skills. The neural exercise of dyadic or group therapeutic play can offer opportunities to navigate the closeness, rupture, repair, and reunion cycle. In their article, "Group Psychotherapy as a Neural Exercise: Bridging Polyvagal

Theory and Attachment Theory," Flores and Porges (2017) state, "The group, informed by polyvagal theory, functions as an ideal 'neural exercise' to promote the biobehavioral adjustments of several psychosocial processes that are associated with attachment styles, emotion regulation, stress reactivity, and social relationships" (p. 1). Dyadic or group therapies that utilize the polyvagal theory, in combination with music therapy intervention integrated into the somatic experiencing process, can provide opportunities for strengthening the social engagement system through offering vocal and facial cues of safety to foster prosocial behavior affect regulation and psychological and physiological well-being. The supportive elements of music, such as grounding and predictable rhythms, encouraging lyrics, a predictable form, and warm timbre, and music therapy methods that allow for relational interaction such as interactional instrumental or vocal improvisation, can provide a structure of safety that enhances the relational experience and provides an avenue to practice these crucial relational skills.

Neuroception of Safety Through the Therapy Process. To support a client's neuroception of safety within the therapeutic process and during music therapy interventions, the music therapist can offer *context* for an intervention, client *choice*, and available, attuned *connection* (Dana, 2018). Judith Herman, psychiatrist, researcher, instructor, and author of *Trauma and Recovery* (1992), emphasizes normalizing the physiological responses to trauma to reduce fear and shame. Providing the client with *context* may include providing educational information about the polyvagal theory and how to recognize signs of ANS activation and deactivation, regulation or dysregulation, the somatic experiencing process, the types of music therapy methods and interventions that will be utilized and their purpose, and attuned therapist observations through the therapy process. Supporting the client in developing their sense

perception by asking sense perception questions also offers context for what is occurring for the client and the therapist.

To provide client *choice* through the therapeutic process, the music therapist can support the client in making choices that reflect the autonomic state, sense perceptions, subtle inclinations, embodied awareness, and preferences throughout the therapy process and during music therapy interventions. To provide opportunities for *connection*, it is helpful for the music therapist to offer embodied authentic presence and be a ventral vagal regulating resource. It may also be beneficial for the music therapist to meet the client in the client's ANS state to be a regulating resource of connection there.

Table 1 below includes contextual considerations, from assessment to intervention implementation, for the music therapist who is working with adults addressing the impacts of complex or developmental trauma with a somatic experiencing approach that integrates music therapy intervention into the process for the aims of co-regulation, regulation, and trauma renegotiation and integration. The table consists of three columns. The left column contains essential assessment considerations, and the middle column contains important treatment planning considerations. In the right column are the four music therapy methods (and variations of each method as described by Bruscia (2013)) and the embedded elements of music. In this thesis, I have offered a single music therapy method example from the literature appropriate for each SE concept category. Based on the assessment and contextual treatment planning considerations, the clinical music therapist must determine which music therapy method is most appropriate for the client.

Table 1*Contextual Considerations for the Integration of Music Therapy into the SE Process*

Assessment	Contextual Treatment Planning Considerations	Intervention Implementation
<p>Presenting Symptoms</p> <ul style="list-style-type: none"> • Physical • Mental • Emotional • Spiritual • Relational • Nervous system dysregulation 	<p>Neuroception of Safety</p> <ul style="list-style-type: none"> • Sound • Within the environment • Within the therapeutic relationship • Through the therapy process 	<p>Improvisation</p> <ul style="list-style-type: none"> • Instrumental nonreferential • Instrumental referential • Song improvisation • Vocal nonreferential improvisation • Body improvisations • Mixed media improvisations • Conducted improvisations
<p>Brief Trauma History</p>	<p>Therapy Configuration</p> <ul style="list-style-type: none"> • Individual • Group • Both individual & group therapy 	
<p>Attachment Patterns & Challenges</p> <ul style="list-style-type: none"> • Secure attachment • Anxious attachment – sympathetic dominant • Avoidant attachment – dorsal dominant • Disorganized attachment – mix of sympathetic and dorsal over and under activation 	<p>ANS Patterns</p> <ul style="list-style-type: none"> • Ventral vagal • Sympathetic – over-activation/under activation • Dorsal vagal – over-activation/under-activation 	<p>Recreation</p> <ul style="list-style-type: none"> • Instrumental re-creation • Vocal re-creation • Performance • Musical productions • Musical games and activities • Conducting
<p>Resources & Strengths</p>		<p>Composition</p> <ul style="list-style-type: none"> • Song transformation • Songwriting • Instrumental composition • Notational activities • Music collages
<p>Music Background & Preferences</p>		
<p>Goals for Therapy</p>		<p>Receptive/Listening</p> <ul style="list-style-type: none"> • Somatic listening • Entrainment • Resonance (toning) • Vibroacoustic music • Music biofeedback • Music relaxation • Meditative listening • Subliminal listening • Stimulative listening • Eurythmic listening • Perceptual listening • Action listening • Contingent listening • Motivational listening • Music appreciation activities • Song (music) reminiscence • Song (music) regression

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- Induced song (music) Recall
 - Song (music) communication
 - Song (lyric) discussion
 - Projective listening Projective sound
 - Identification
 - Projective storytelling
 - Song choices
 - Projective movement to music
 - Projective drawing to music
 - Imaginal listening
 - Directed music imaging
 - Unguided music imaging
 - Guided music imaging
 - Guided interactive music imaging
 - Self-listening (Bruscia, 2013)

Embedded Elements of Music

- Rhythm
- Tempo
- Meter
- Timbre
- Pitch
- Melody
- Lyrics
- Harmony
- Mode
- Dynamics
- Texture
- Form
- Style

Chapter 5: Discussion

The purpose of this thesis is to provide a theoretically informed process model of somatic experiencing for the clinical music therapist and to articulate considerations for the integration of music therapy interventions and embedded elements of music to support the outcomes of co-regulation, regulation, and trauma renegotiation and integration for adults addressing the impacts of complex or developmental trauma. The theories that informed the process model were polyvagal and attachment theories.

Implementation science is "the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices (EBPs) into routine practice to improve the quality and effectiveness of health services and care" (Nilsen, 2015, p. 2). Implementation science has three aims and is comprised of five categories of theories, models, and frameworks. This thesis is based on the first aim of implementation science, "describing and guiding the process of translating research into practice" (Nilsen, 2015, p. 2). The method by which this aim was accomplished was through description and depiction of a process model. A model is a deliberate simplification of a phenomenon or a specific aspect of a phenomenon. A process model involves specifying "steps, stages, or phases in the process of translating research into practice, including the implementation and use of research" (Nilsen, 2015, p. 3). According to Nilsen, models do not need to be completely accurate depictions to have value. The process model of somatic experiencing for the clinical music therapist described and depicted in the previous chapter is an original process model that combines theories and a model of somatic-based therapy with evidence from the literature.

Clinical Implications

As a clinical music therapist who is also trained in somatic experiencing, I wanted to find a way to begin thinking about how to integrate music therapy interventions into the somatic experiencing process to support adults who are addressing the impacts of complex or developmental trauma to support co-regulation, regulation, and trauma renegotiation and integration. Experiencing complex and developmental trauma can result in autonomic nervous system dysregulation that may contribute to emotional dysregulation, difficulties with cognitive functioning, diminished self-concept and self-esteem, physical health implications, and an altered sense of one's ability to feel safe within themselves and with others. The impacts of complex and developmental trauma are often complicated and can require a multifaceted therapeutic approach.

Music has been found to influence the autonomic nervous system (Ellis & Thayer, 2010; Mojtabavi et al., 2020; Qin et al., 2020) and can support neuroception of safety and emotional regulation (Porges & Rossetti, 2018). Clinical music therapy has been used to address trauma's emotional, cognitive, physical, interpersonal, and relational impacts. As somatic experiencing (SE) is also used to address these same trauma impacts (Foundation for Human Enrichment, 2007), I wondered how a music therapist could utilize clinical music therapy interventions to support an adult going through an SE process to address the impacts of complex or developmental trauma. While music therapy and somatic experiencing are separate and unique therapy types, I wondered if there were places in the somatic experiencing process where clinical music therapy methods could offer an auxiliary pathway to support developing sense perception, counter vortex resourcing, titration and pendulation, and trauma renegotiation and integration.

This thesis offers a process model with polyvagal theory and attachment theory-informed considerations for the clinical music therapist who works with adults addressing the impacts of developmental or complex trauma, utilizing a somatic experiencing therapy model. It describes four somatic experiencing concept categories where music therapy can support an individual in the SE process, offers an example of a music therapy method used for each category, and suggests polyvagal and attachment theory-based considerations for clinical implementation.

Process Model Limitations

There are several potential limitations to the process model as presented in this thesis. Limitations include concern for simplification of research for the conceptualization and implementation of the somatic experiencing model of therapy, the polyvagal theory, and clinical music therapy. Each of these are uniquely complex and requires dedicated time and study to understand fully. Advanced training in somatic experiencing is required for the music therapist to call their work “somatic experiencing”. The thesis also offers limited music therapy literature examples of a single music therapy method and embedded elements of music used for each somatic experiencing category. Music therapy implementation considerations would be strengthened by additional research. Furthermore, there are scientific limitations about what we understand about the innerworkings of the human body that limit our understanding of how music influences the autonomic nervous system.

The first limitation is a concern for the simplification of research for the conceptualization of process implementation. While the process model represented in this thesis is a simplification of the research for implementation, in actuality, the somatic experiencing model of therapy, the polyvagal theory, and clinical music therapy are each uniquely complex. Understanding them, and how they relate (and how the attachment theory relates), requires

dedicated time and study. As a researcher, I have a bachelor's degree in music therapy am a board-certified music therapist. I am also a certified somatic experiencing practitioner and have taken a course on applying the polyvagal theory in a therapeutic setting. In graduate school I studied attachment theory as it relates to couples and family counseling. The process model presented in this thesis represents my current understanding of each and how they relate. I acknowledge that there may be aspects of these areas that I do not yet fully understand. My understanding of these areas, and how they relate, will continue to evolve and deepen with additional personal as well as clinical experience and training.

A second limitation for music therapists implementing this process model is that specific educational, experiential, and case consultation requirements are needed to become a certified somatic experiencing practitioner. It typically takes a trainee two to three years to complete all certification requirements. During the training, it is required that SE trainees attend training modules and take part in several personal sessions and case consultations with a SE-approved provider. The private sessions allow the trainee to have an embodied experience – over time – of the somatic experiencing process that supports the trainee's autonomic nervous system regulatory capacities. Case consultations help trainees conceptualize how to integrate SE within their work. When a music therapist has an embodied experience of the somatic experiencing process and has learned how to track and be with their felt sense, this contributes to trust in their inner regulatory rhythms and capacities. The music therapist's autonomic nervous system and embodied self-awareness are regulating resources for the client in the therapy process. While it can be helpful for a music therapist who works with clients with a trauma history to know about somatic experiencing, a clinical music therapist cannot call their work somatic experiencing without the proper training (Foundation for Human Enrichment, 2007).

Another limitation is that there is limited music therapy literature represented in the thesis about music therapy methods and the embedded elements of music appropriate for each somatic experiencing category. Each somatic experiencing concept category leads to a specific outcome that contributes to client's capacity for regulation, co-regulation and improved attachment patterns, and trauma renegotiation and integration. For example, learning skills in tracking sense perception allows a client to notice, name, and be with their own internal senses. Counter vortex resourcing allows clients to savor moments of ease, comfort, or joy to provide ANS resourcing. Therefore, it would be helpful to do a systematic review of the music therapy literature to identify additional music therapy methods, and the embedded elements of music, being used to address the aims of each SE concept category. A systematic music therapy literature review relevant to each SE concept category would provide the music therapist with additional rationale for choosing a specific music therapy method and the embedded elements of music to support a client as they move through the SE process. Such an endeavor was beyond the scope of this thesis. Systematic music therapy literature reviews for each concept category would also identify gaps in the literature that could be used for future research.

Lastly, our understanding of the autonomic nervous system and its influence on the brain, organs, and systems of the body, is limited by what science and technology can demonstrate. Even though technological, and scientific advances have allowed us to understand much about the innerworkings of the human body, there is still much that we do not know. While the polyvagal theory explains how the ANS functions in the service of safety, survival, and connection, it is only a theory. A theory is "a plausible or scientifically acceptable general principle or body of principles offered to explain a phenomenon" (Merriam-Wester, nd). As our understanding of the brain and the complex systems of the body continues to evolve with

technological and scientific advances, parts of the polyvagal theory may need to be updated as new scientific evidence emerges.

Future Research Based on this Process Model

The process model presented in this thesis is the beginning step of translating research into practice for the clinical music therapist integrating music therapy methods and the embedded elements of music into a somatic experiencing process. The intersection of clinical music therapy, somatic experiencing, polyvagal theory, and attachment theory for the purpose of co-regulation, regulation, and trauma renegotiation and integration is rich with opportunities for future research.

In this thesis, I offer an example of a single music therapy method (i.e., receptive, recreative, composition, or improvisation) that I found in the literature that is used for each of the four somatic experiencing category concepts aims (i.e., tracking sense perception, counter vortex resourcing, pendulation and titration, and trauma renegotiation and integration). As stated above, a subsequent research step could be to conduct a systematic review of the current music therapy literature to identify how music therapists working with individuals addressing complex or developmental trauma are already using the four primary music therapy methods and the embedded elements of music that could support each the SE concept categories aims.

Another relevant and consequential area of research for the clinical music therapist is to examine how specific elements of music (i.e., timbre, tempo, dynamics) influence the ANS through both the active and passive pathways. Music is complex, and each of the music elements is influential on the experience of music as a synthesized whole. According to the polyvagal theory, both active and passive pathways influence the autonomic nervous system. The active pathway requires conscious voluntary behaviors to influence the physiological response of the

ANS, such as playing an individual playing a drum and decreasing the tempo to influence slowing respiration. The passive (receptive) pathway is influenced by environmental and relational cues that do not require conscious awareness (Porges, 2018). Engaging a client in active music-making may impact the ANS differently than if music is used passively (receptively) in a session. In their preliminary study, *Active and Passive Rhythmic Music Therapy Interventions Differentially Modulate Sympathetic Autonomic Nervous System Activity*, McPherson et al. (2019) report that engaging in active rhythmic music therapy versus passive rhythmic music therapy “lead to a differential modulation of the sympathetic ANS” (McPherson et al., 2019, p. 241). For the clinical music therapist supporting a client through the SE process, it could be helpful to know how music therapy interventions and the embedded elements of music influence ANS function through both passive (i.e., receptive) and active engagement (i.e., composition, improvisation, re-creative) music therapy methods.

According to Porges and the polyvagal theory, when an individual is in a protective state, this may alter how sound is perceived (Kolacz et al., 2018). When a client is in a protective state, this could have implications for how they are receiving and perceiving clinical music therapy interventions. Biophysical markers such as heart rate variability (HRV), galvanic skin tests, and saliva tests that determine stress hormone levels may reveal the state of the ANS. Self-report surveys can illuminate how an individual perceives music as a whole, the elements that contribute to the whole of music, and music therapy methods. Research that examines how music and the elements that contribute to the music, such as tempo, dynamics, melody, and timbre, are perceived through self-report style surveys and biophysical markers may help further inform how music therapists make clinical decisions for adult clients who are addressing the impacts of complex or developmental trauma.

Conclusion

The purpose of this thesis is to provide a theoretically informed process model of somatic experiencing for the clinical music therapist and to articulate considerations for the integration of music therapy interventions and embedded elements of music to support the outcomes of co-regulation, regulation, and trauma renegotiation and integration for adults addressing complex or developmental trauma. Implementation science seeks to promote the uptake of research and evidence-based practices into routine practice to improve the quality and efficacy of services (Eccles & Mittman, 2006). One of the key models used in implementation science is the process model (Nilsen, 2015). According to Nilsen, a model “involves a deliberate simplification of a phenomenon or a specific aspect of a phenomenon” (Nilsen, 2015, p.2). A process model guides the process of translating research into practice and offers a simplification of steps, without “systematically structuring specific determinants associated with implementation success” (Nilsen, 2015, p. 1).

This thesis offers the stages of the somatic experiencing (SE) process and contextual considerations for the integration of clinical music therapy intervention. The SE stages described and depicted in the process model for the integration of music therapy intervention are tracking sense perception, counter vortex resourcing, titration and pendulation, and trauma renegotiation and integration. Also included in the process model are descriptions and depictions of the Bruscia’s four music therapy methods and the embedded elements of music. There is a single music therapy method example from the literature that can be used for each concept category and considerations for the embedded elements of music used in the music therapy method. The contextual considerations for process implementation are theoretically informed by the polyvagal

theory and attachment theory for the aims of co-regulation, regulation, and trauma renegotiation and integration for the adult who addressing the impacts of complex or developmental trauma.

For the clinical music therapist, this thesis emphasizes the importance of understanding the intrapersonal and interpersonal complexities that can arise for clients who are addressing the impacts of complex or developmental trauma. There are a myriad of impacts that can develop because of complex and developmental trauma that include physical, neurodevelopmental and cognitive, emotional, and relational impacts as well as autonomic nervous system dysregulation. Understanding the complexities of these impacts, on both personal and relational levels, will assist the music therapist in understanding how to assess and plan treatment and interventions.

This thesis also illuminates the requirements of a music therapist working from a body-based approach such as SE for the integration of music therapy for the treatment of complex or developmental trauma. A music therapist must receive proper education and personal training to provide services in this manner. To call the services “somatic experiencing,” one must be trained in the modality and completed all training requirements. To remain grounded and authentic with clients as they address the complexities of complex or developmental trauma, it is recommended that a music therapist engage in their own personal work so that they can use their sense perception, alongside their clinical training and wisdom, as a regulating resource for the client in the therapeutic process.

Another highlight of this thesis for the clinical music therapist is the importance of understanding autonomic nervous system states as described by the polyvagal theory. The polyvagal theory describes how the autonomic nervous system functions in service of safety, survival, and connection. The polyvagal theory describes how a regulated ANS functions, it explains how the ANS can become dysregulated as a result of trauma, and it suggests ways to

support regulation as described by the SE model of therapy. The polyvagal theory also provides a new lens through which to view attachment styles and how to promote more secure attachment patterns. Understanding the practical applications of the polyvagal theory in clinical work can support the music therapist as they assess and work with clients.

The polyvagal theory, attachment theory, and somatic experiencing model of therapy each offer a valuable lens through which to view working with clients. When they are combined, they offer a music therapist a relational approach to working with clients to address the complicated symptoms that may arise due to complex or developmental trauma. It is my hope that the information presented in this thesis offers music therapists new ways to think about how clinical music therapy interventions can be utilized in support of autonomic nervous system, co-regulation, regulation, and trauma recovery for adults addressing complex and developmental trauma.

References

- Abrams, Z. (2021, July). Improved treatment for developmental trauma. *Monitor on Psychology*, 52(5). <http://www.apa.org/monitor/2021/07/ce-corner-developmental-trauma>
- Ainsworth, M. D. S., & Bell, S. M. (1972). Mother-infant interaction and the development of competence. Grant Foundation. Office of Child Development. (pp. 1-36).
<https://files.eric.ed.gov/fulltext/ED065180.pdf>
- American Counseling Association. (2011). *Fact Sheet #15: Intrusive memories*.
https://www.counseling.org/docs/trauma-disaster/fact-sheet-15---intrusive-memories.pdf?sfvrsn=7bddd8be_2
- American Music Therapy Association. (2005). *What is music therapy?*
<https://www.musictherapy.org/about/musictherapy/>
- American Psychiatric Association, Asociación Americana de Psiquiatría, APA, & A.P.A. (2013). *Diagnostic and statistical manual of mental disorders : DSM-5*. (Fifth edition.).
- Amineh, R. J., & Asl, H. D. (2015). Review of constructivism and social constructivism. *Journal of Social Sciences, Literature and Languages*, 1(1), 9-16.
- Asmundson, G. J., Stapleton, J. A., & Taylor, S. (2004). Are avoidance and numbing distinct PTSD symptom clusters? *Journal of Traumatic Stress: Official Publication of the International Society for Traumatic Stress Studies*, 17(6), 467-475.
- Austin, D. (2001). In search of the self: The use of vocal holding techniques with adults traumatized as children. *Music Therapy Perspectives*, 19(1), 22-30.
- Bauer, & Kirchner, J. (2020). Implementation science: What is it and why should I care? *Psychiatry Research*, 283, 112376–112376.
<https://doi.org/10.1016/j.psychres.2019.04.025>

- Beilharz, J. E., Paterson, M., Fatt, S., Wilson, C., Burton, A., Cvejic, E., ... & Vollmer-Conna, U. (2020). The impact of childhood trauma on psychosocial functioning and physical health in a non-clinical community sample of young adults. *Australian & New Zealand Journal of Psychiatry*, *54*(2), 185-194.
- Bensimon, M., Amir, D., & Wolf, Y. (2008). Drumming through trauma: Music therapy with post-traumatic soldiers. *The Arts in Psychotherapy*, *35*(1), 34-48.
- Bensimon, M., Amir, D., & Wolf, Y. (2012). A pendulum between trauma and life: Group music therapy with post-traumatized soldiers. *The Arts in Psychotherapy*, *39*(4), 223-233.
- Blanaru, M., Bloch, B., Vadas, L., Arnon, Z., Ziv, N., Kremer, I., & Haimov, I. (2012). The effects of music relaxation and muscle relaxation techniques on sleep quality and emotional measures among individuals with posttraumatic stress disorder. *Mental Illness*, *4*(2), 59–65.
- Bonne, O., Brandes, D., Gilboa, A., Gomori, J. M., Shenton, M. E., Pitman, R. K., & Shalev, A. Y. (2001). Longitudinal MRI study of hippocampal volume in trauma survivors with PTSD. *American Journal of Psychiatry*, *158*(8), 1248-1251.
- Braddock, C. (1995). *Body voices: Using the power of breath, sound and movement to heal and create new boundaries*. Berkeley, CA: Page Mill Press.
- Bowlby, J. (1969). Attachment and loss: volume I: attachment. In *Attachment and Loss: Volume I: Attachment* (pp. 1-401). The Hogarth Press and the Institute of Psycho-Analysis.
<https://pep-web.org/browse/document/ip1.079.0001a>
- Bremner J. D. (2006). Traumatic stress: effects on the brain. *Dialogues in Clinical Neuroscience*, *8*(4), 445–461. <https://doi.org/10.31887/DCNS.2006.8.4/jbremner>

- Bretherton, I. (1992). The origins of attachment theory: John Bowlby and Mary Ainsworth. *Developmental Psychology*, 28(5), 759.
- Brown, D. P., & Elliott, D. S. (2016). *Attachment disturbances in adults: Treatment for comprehensive repair*. WW Norton & Co.
- Bruscia, K. E. (2013). *Defining music therapy*. Barcelona.
- Cloitre, M., Courtois, C.A., Ford, J.D., Green, B.L., Alexander, P., Briere, J., Herman, J.L., Lanius, R., Stolbach, B.C., Spinazzola, J., Van der Kolk, B.A., Van der Hart, O. (2012). The ISTSS Expert Consensus Treatment Guidelines for Complex PTSD in Adults. Retrieved from [http:// www.istss.org/ISTSS-Main/media/Documents/ComplexPTSD.pdf](http://www.istss.org/ISTSS-Main/media/Documents/ComplexPTSD.pdf)
- Cloitre, M. (2020). ICD-11 complex post-traumatic stress disorder: Simplifying diagnosis in trauma populations. *The British Journal of Psychiatry*, 216(3), 129-131.
- Cowell, R. A., Cicchetti, D., Rogosch, F. A., & Toth, S. L. (2015). Childhood maltreatment and its effect on neurocognitive functioning: Timing and chronicity matter. *Development and Psychopathology*, 27(2), 521–533. <https://doi.org/10.1017/S0954579415000139>
- Crotty, M. (2020). *The foundations of social research: Meaning and perspective in the research process*. Routledge.
- Dale, L. P., Carroll, L. E., Galen, G., Hayes, J. A., Webb, K. W., & Porges, S. W. (2009). Abuse history is related to autonomic regulation to mild exercise and psychological wellbeing. *Applied Psychophysiology and Biofeedback*, 34(4), 299.
- Dana, D. (2018). *The Polyvagal theory in therapy: engaging the rhythm of regulation (Norton series on interpersonal neurobiology)*. WW Norton & Company.
- Dana, D. (2020). *Polyvagal exercises for safety and connection: 50 client-centered practices (Norton Series on Interpersonal Neurobiology)*. WW Norton & Company.

- Dana, D. (2021). *Anchored: How to befriend your nervous system using polyvagal theory*. Sounds True.
- Davis, M. (1997). Neurobiology of fear responses: The role of the amygdala. *The Journal of Neuropsychiatry and Clinical Neurosciences*, 9(3), 382–402.
<https://doi.org/10.1176/jnp.9.3.382>
- Dvir, Y., Ford, J. D., Hill, M., & Frazier, J. A. (2014). Childhood maltreatment, emotional dysregulation, and psychiatric comorbidities. *Harvard Review of Psychiatry*, 22(3), 149–161. <https://doi.org/10.1097/HRP.0000000000000014>
- Drucker, A. (n.d). CRT. Learning Cellular Release Therapy. <https://www.learnrcrt.com/>
- Early Childhood Learning & Knowledge Center (n.d.). Trauma and Adverse Childhood Experiences (ACEs). Retrieved November 22, 2021, from <https://eclkc.ohs.acf.hhs.gov/publication/trauma-adverse-childhood-experiences-aces>
- Eccles, & Mittman, B. S. (2006). Welcome to Implementation Science. *Implementation Science: IS*, 1(1), 1–1. <https://doi.org/10.1186/1748-5908-1-1>
- Ehlers, A., Hackmann, A., Steil, R., Clohessy, S., Wenninger, K., & Winter, H. (2002). The nature of intrusive memories after trauma: The warning signal hypothesis. *Behaviour Research and Therapy*, 40(9), 995-1002.
- Ellis, R. J., & Thayer, J. F. (2010). Music and autonomic nervous system (dys) function. *Music Perception*, 27(4), 317-326.
- Foundation for Human Enrichment. (2007). *Somatic Experiencing Healing Trauma*. Foundation for Human Enrichment.
- Flater, B. (2020). *Safety and connection in the polyvagal theory. Implications for music therapy in mental health care* (Master's thesis, Norges musikkhøgskole).

- Flores, P. J., & Porges, S. W. (2017). Group psychotherapy as a neural exercise: Bridging polyvagal theory and attachment theory. *International Journal of Group Psychotherapy*, 67(2), 202-222.
- Fraley, R. C. (2010). A brief overview of adult attachment theory and research background: Bowlby's theory of attachment individual differences in infant attachment patterns. <http://labs.psychology.illinois.edu/~rcfraley/attachment.htm>
- Friedman, M. J. (2016). PTSD: National Center for PTSD. *PTSD History and Overview: A Brief History of the PTSD Diagnosis*. https://www.ptsd.va.gov/professional/treat/essentials/history_ptsd.asp
- Geller, S. M., & Porges, S. W. (2014). Therapeutic presence: neurophysiological mechanisms mediating feeling safe in therapeutic relationships. *Journal of Psychotherapy Integration*, 24(3), 178.
- Gendlin, E. T. (1982). *Focusing*. Bantam.
- Guy-Evans, O. (2021, June 11). *Somatosensory cortex*. Simply Psychology. www.simplypsychology.org/somatosensory-cortex.html
- Hanser, S. B. (1999). *The new music therapist's handbook* (2nd ed.). Berklee Press.
- Hanson-Abromeit, D. (2015). A conceptual methodology to define the therapeutic function of music. *Music Therapy Perspectives*, 33(1), 25-38.
- Hart, H., & Rubia, K. (2012). Neuroimaging of child abuse: a critical review. *Frontiers in Human Neuroscience*, 6, 52-52.

- Heller, D. P. (2019). *The power of attachment: How to create deep and lasting intimate relationships*. Sounds True.
- Herman, J. L. (1992). *Trauma and recovery*. BasicBooks.
- Howland R. H. (2014). Vagus Nerve Stimulation. *Current Behavioral Neuroscience Reports*, 1(2), 64–73. <https://doi.org/10.1007/s40473-014-0010-5>
- Kennedy, J. H., & Kennedy, C. E. (2004). Attachment theory: Implications for school psychology. *Psychology in the Schools*, 41(2), 247-259.
- Khalsa, S. S., Adolphs, R., Cameron, O. G., Critchley, H. D., Davenport, P. W., Feinstein, J. S., ... & Zucker, N. (2018). Interoception and mental health: a roadmap. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, 3(6), 501-513.
- Kolacz, J., Lewis, G. F., & Porges, S. W. (2018). The integration of vocal communication and biobehavioral state regulation in mammals: A polyvagal hypothesis. In *Handbook of Behavioral Neuroscience* (Vol. 25, pp. 23-34). Elsevier.
- Kuhfuß, M., Maldei, T., Hetmanek, A., & Baumann, N. (2021). Somatic experiencing effectiveness and key factors of a body-oriented trauma therapy: a scoping literature review. *European Journal of Psychotraumatology*, 12(1), 1929023-1929023.
- Levine, P. A. (2010). *In an unspoken voice: How the body releases trauma and restores goodness*. North Atlantic Books.
- Levine, P. A. (2015). *Trauma and memory: Brain and body in a search for the living past: A practical guide for understanding and working with traumatic memory*. North Atlantic Books.

- Levine, P. A., (2018). Polyvagal theory and trauma. In Dana, D., & Porges, S. W. (Eds.), *Clinical applications of the polyvagal theory: The emergence of polyvagal-informed therapies*. (pp. 3-26). W.W. Norton & Company.
- Levine, P. A., & Frederick, A. (1997). *Waking the tiger: Healing trauma: The innate capacity to transform overwhelming experiences*. North Atlantic Books.
- Levy, K. N., Ellison, W. D., Scott, L. N., & Bernecker, S. L. (2011). Attachment style. *Journal of Clinical Psychology*, 67(2), 193-203.
- Main, M., & Solomon, J. (1986). Discovery of an insecure-disorganized/disoriented attachment pattern. In T. B. Brazelton & M. W. Yogman (Eds.), *Affective development in infancy* (pp. 95–124). Ablex Publishing.
- MacIntosh, H. B. (2003). Sounds of healing: Music in group work with survivors of sexual abuse. *The Arts in Psychotherapy*, 30(1), 17-23.
- Malarbi, S., Abu-Rayya, H. M., Muscara, F., & Stargatt, R. (2017). Neuropsychological functioning of childhood trauma and post-traumatic stress disorder: A meta analysis. *Neuroscience & Biobehavioral Reviews*, 72, 68-86.
- McPherson, T., Berger, D., Alagapan, S., & Fröhlich, F. (2019). Active and passive rhythmic music therapy interventions differentially modulate sympathetic autonomic nervous system activity. *Journal of Music Therapy*, 56(3), 240-264.
- Merriam-Webster. (n.d.). Stot. In *Merriam-Webster.com dictionary*. Retrieved November 25, 2021, from <https://www.merriam-webster.com/dictionary/stot>
- Merriam-Webster. (n.d.). Theory. In *Merriam-Webster.com dictionary*. Retrieved May 4, 2022, from <https://www.merriam-webster.com/dictionary/theory>
- Merriam-Webster. (n.d.). Titration. In *Merriam-Webster.com dictionary*. Retrieved December 5,

- 2021, from <https://www.merriam-webster.com/dictionary/titration>
- Mojtabavi, H., Saghazadeh, A., Valenti, V. E., & Rezaei, N. (2020). Can music influence cardiac autonomic system? A systematic review and narrative synthesis to evaluate its impact on heart rate variability. *Complementary Therapies in Clinical Practice, 39*, 101162-101162.
- Nijenhuis, E. R., Vanderlinden, J., & Spinhoven, P. (1998). Animal defensive reactions as a model for trauma-induced dissociative reactions. *Journal of Traumatic Stress: Official Publication of The International Society for Traumatic Stress Studies, 11*(2), 243-260.
- Nilsen P. (2015). Making sense of implementation theories, models and frameworks. *Implementation Science: IS, 10*, 53. <https://doi.org/10.1186/s13012-015-0242-0>
- Ogden, P., Pain, C., & Fisher, J. (2006). A sensorimotor approach to the treatment of trauma and dissociation. *Psychiatric Clinics, 29*(1), 263-279.
- Ogden, P., (2018). Polyvagal theory and sensorimotor psychotherapy. In Dana, D., & Porges, S. W. (Eds.), *Clinical applications of the polyvagal theory: The emergence of polyvagal-informed therapies*. (pp. 3-26). W.W. Norton & Company.
- Ossefort-Russel, C. (2018). In Dana, D., & Porges, S. W. (Eds.), *Clinical applications of the polyvagal theory: The emergence of polyvagal-informed therapies (Norton series on interpersonal neurobiology)*. WW Norton & Company.
- Papert, S. (1980). " Mindstorms" Children. *Computers and powerful ideas*. Basic Books.
- Pavlicevic, M. (1999). Music therapy improvisation groups with adults: Towards de-stressing in South Africa. *South African Journal of Psychology, 29*(2), 94-99.

- Payne, P., Levine, P. A., & Crane-Godreau, M. A. (2015). Somatic experiencing: using interoception and proprioception as core elements of trauma therapy. *Frontiers in Psychology, 6*, 93-93.
- Pepping, C. A., MacDonald, G., & Davis, P. J. (2018). Toward a psychology of singlehood: An attachment-theory perspective on long-term singlehood. *Current Directions in Psychological Science, 27*(5), 324-331.
- Porges, S. W. (1995). Orienting in a defensive world: Mammalian modifications of our evolutionary heritage. A polyvagal theory. *Psychophysiology, 32*(4), 301-318.
- Porges, S. W. (2003). The polyvagal theory: Phylogenetic contributions to social behavior. *Physiology & Behavior, 79*(3), 503-513.
- Porges, S. W. (2004). Neuroception: A subconscious system for detecting threats and safety. *Zero to Three (J), 24*(5), 19-24.
- Porges, S. W. (2005). The role of social engagement in attachment and bonding. *Attachment and Bonding, 3*, 33-54.
- Porges, S. W. (2007). The polyvagal perspective. *Biological Psychology, 74*(2), 116-143.
- Porges, S. W. (2009). The polyvagal theory: new insights into adaptive reactions of the autonomic nervous system. *Cleveland Clinic Journal of Medicine, 76*(Suppl 2), S86.
- Porges, S. W. (2011). *The polyvagal theory: Neurophysiological foundations of emotions, attachment, communication, and self-regulation (Norton series on interpersonal neurobiology)*. WW Norton & Company.
- Porges, S. W. (2015). Making the world safe for our children: Down-regulating defense and up regulating social engagement to 'optimise' the human experience. *Children Australia, 40*(2), 114-123.

- Porges, S. W. (2018). Polyvagal theory: A primer. *Clinical applications of the polyvagal theory: The emergence of polyvagal-informed therapies*, 50, 69.
- Porges, S. W., & Dana, D. (2018). *Clinical Applications of the Polyvagal Theory: The Emergence of Polyvagal-Informed Therapies (Norton Series on Interpersonal Neurobiology)*. WW Norton & Company.
- Porges, S. W., Doussard-Roosevelt, J. A., Portales, A. L., & Greenspan, S. I. (1996). Infant regulation of the vagal “brake” predicts child behavior problems: A psychobiological model of social behavior. *Developmental Psychobiology*, 29(8), 697-712.
- Porges, S. W., & Lewis, G. F. (2010). The polyvagal hypothesis: common mechanisms mediating autonomic regulation, vocalizations and listening. In *Handbook of Behavioral Neuroscience* (Vol. 19, pp. 255-264). Elsevier.
- Porges, S. W., & Rossetti, A. (2018). Music, music therapy and trauma. *Music and Medicine*, 10(3), 117-120.
- Qin, Y., Zhang, H., Wang, Y., Mao, M., & Chen, F. (2020, August). 3D music impact on autonomic nervous system response and its therapeutic potential. In *2020 IEEE Conference on Multimedia Information Processing and Retrieval (MIPR)* (pp. 364-369).
- Roesler, T. A., & McKenzie, N. (1994). Effects of childhood trauma on psychological functioning in adults sexually abused as children. *Journal of Nervous and Mental Disease*, 182(3), 145–150.
- Rogers. (1962). *Diffusion of innovations*. Free Press of Glencoe.
- Shin, L. M., Rauch, S. L., & Pitman, R. K. (2006). Amygdala, medial prefrontal cortex, and hippocampal function in PTSD. *Annals of the New York Academy of Sciences*, 1071(1), 67-79.

- Shonkoff, J. P. (2016). Capitalizing on advances in science to reduce the health consequences of early childhood adversity. *JAMA pediatrics*, *170*(10), 1003-1007.
- Solomon, J., & George, C. (Eds.). (2011). *Disorganized attachment and caregiving*. Guilford Press.
- Somatic Experiencing International. (2021). *SE-101*. <https://traumahealing.org/se-101/>
- Spinazzola, J., Van der Kolk, B., & Ford, J. D. (2021). Developmental trauma disorder: a legacy of attachment trauma in victimized children. *Journal of Traumatic Stress*, *34*(4), 711-720.
- Substance Abuse and Mental Health Services Administration (SAMHSA). (2014). *Substance Abuse and Mental Health Services Administration. SAMHSA's Concept of Trauma and Guidance for a Trauma-Informed Approach*. HHS Publication No. (SMA) 14-4884.
- Taylor, P. J., & Saint-Laurent, R. (2017). Group psychotherapy informed by the principles of somatic experiencing: moving beyond trauma to embodied relationship. *International Journal of Group Psychotherapy*, *67*(sup1), S171-S181.
- Van der Hart, O., Nijenhuis, E. R., & Steele, K. (2006). *The haunted self: Structural dissociation and the treatment of chronic traumatization*. WW Norton & Company.
- Van der Kolk, B. A. (1994). The body keeps the score: Memory and the evolving psychobiology of posttraumatic stress. *Harvard Review of Psychiatry*, *1*(5), 253-265.
- Van der Kolk, B. A. (2002). Beyond the talking cure: Somatic experience and subcortical imprints in the treatment of trauma. In F. Shapiro (Ed.), *EMDR as an integrative psychotherapy approach: Experts of diverse orientations explore the paradigm prism* (pp. 57–83). American Psychological Association.

- Van der Kolk, B. A. (2009). Developmental trauma disorder: towards a rational diagnosis for chronically traumatized children. *Praxis Der Kinderpsychologie Und Kinderpsychiatrie*, 58(8), 572-586.
- Walker, E. C., Holman, T. B., & Busby, D. M. (2009). Childhood sexual abuse, other childhood factors, and pathways to survivors' adult relationship quality. *Journal of Family Violence*, 24(6), 397-406.
- Waxenbaum, J. A., Reddy, V., & Varacallo, M. (2019). Anatomy, autonomic nervous system. In: *StatPearls*. StatPearls Publishing.
- WebMD. (2021). *WebMD - What is Proprioception?* Retrieved November, 2021.
<https://www.webmd.com/brain/what-is-proprioception>
- World Health Organization (2020). *International statistical classification of diseases and related health problems* (11th ed.). <https://icd.who.int/>