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Rhythm and Safety of Social Engagement: Polyvagal Theory Informed Dance/Movement Therapy

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Abstract

The polyvagal theory has exerted great influence on the field of clinical therapy since the 1990s by proposing an understanding of the psychological expression seen in clients as a reflection of their physiological state of safety or threat of danger. When affect and psychological states are viewed through the lens of the autonomic nervous system directed by neuroception through bidirectional vagal nerve information, therapeutic presence and somatic therapy practices, such as those utilized in the field of dance/movement therapy, become more conceivable as best practices to treat a variety of psychological conditions to include trauma recovery, autism spectrum disorders, and depression. By engaging in dance/movement therapy techniques clients gain body awareness, regain trust in integrating their body's sensory information through interoception, strengthen affect regulation, express emotions and access implicit memories through non-verbal expression. By activating the reciprocal nature of the social engagement system, clients gain social skills and build on the positive experiences of social engagement. Polyvagal theory provides a consistent measurable foundation from which to practice embodied therapies with a variety of populations.

Keywords: Polyvagal Theory, Dance/Movement Therapy, Social Engagement System, Trauma, Autism Spectrum Disorders, Depression, Interoception, Neuroception, Heart Rate Variability

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Nothing grows the brain better than movement. -Bruce Perry

As Dance/Movement Therapists, we recognize that the body is the site of all human experience. -Amber Elizabeth Gray

The past several decades has shown an increase of interest in mind/body connection practices among the general population and medical and psychotherapeutic professions. The polyvagal theory, originated by Dr. Stephen Porges, is one such practice that has shed light on the intimate interplay of communication between the brain, nervous system, and the body which helps determine how we as humans respond to our environments, perceive a sense of danger or safety, regulate emotions, and enter into social encounters with each other. The vagus nerve is the 10th cranial nerve. It is a bidirectional nervous system pathway containing both afferent (visceral and sensory messages from the body to the brain) and efferent (motor messages from the brain to the body) nerve endings. (PESI, Inc, 2011) This multibranched nerve innervates several areas of the abdominal region, the diaphragm, heart, lungs, pharynx, larynx and several facial muscles responsible for conveying and interpreting emotional messages through facial expressions. (Porges, 2001) Through this route of neural communication, referred to as neuroception, the autonomic nervous system assess and determines outside of consciousness if the body needs to respond with a sympathetic "fight or flight" response or a dorsal vagal parasympathetic response of "freeze or submit" when danger is perceived, thus, implicating the vagus nerve's role in trauma experiences, memory storage, and recovery. The polyvagal theory

identifies the nerve innervations within the middle ear, facial, and vocal regions as primary mechanisms of the social engagement system, signaling safety and social connection with other individuals or warning and threat through facial expressions and vocal prosody.

The implications for the polyvagal theory's application in mental health as an embodied therapeutic approach aligns naturally with the work of dance/moment therapists. The work of dance/moment therapy (DMT) begins and ends with the body. The inextricable relationship between mind and body is inherent to the work of a dance/movement therapist as "movement is the primary medium dance/movement therapists' use for observation, assessment, research, therapeutic interaction and interventions." (adta.org) Through therapeutic movement interventions, dance/movement therapy can address clients' goals of increasing healthier interpersonal social relationships, developing a greater sense of safety in one's own body, increasing self-awareness, empathy, affect regulation, processing trauma (including developmental and complex trauma), accessing implicit memories, physical and emotional/mental developmental support, and to support of a variety of emotional and mental health diagnosis.

Mental health therapists focus on creating an environment of empathy, compassion and nonjudgement for the client to feel safe enough to become vulnerable to the therapeutic relationship and process. Movement and embodied therapy practices rely on elements of nonverbal communication, ritual, rhythm, sensory engagement, symbolism, interoception, expansion of movement patterns, movement analysis, and the joyful engagement of self-expression through creativity to establish trusting therapeutic relationships and achieve therapeutic goals. Implementing the tenets of polyvagal theory to support dance/movement practices will bring a deeper clinical understanding to the intuitive nature of the embodied work

of a dance/movement therapist. Having a clearer understanding of the bidirectional physiological nature of the top-down (mind to body) and bottom-up (body to mind) neural communication of the vagus nerve will readily inform which embodied (DMT) intervention practices and theories will provide the most benefit for a variety of therapeutic populations.

In recent decades additional embodied practices have been developed and studied particularly for the treatment of trauma by well-known therapists such as Bessel van der Kolk MD., Pat Ogden, PhD., and Peter Lavine, PhD.(Werbalowksy, 2019) The leading theories, supported by neurobiological research and imaging, reinforce embodied therapies as the most effective approach to helping clients process and move past experiences of trauma. This is in part due to trauma memories being stored as implicit memories which can be triggered by sensory stimuli. Licensed clinical social worker Deb Dana (2018) recognized the potential benefits of polyvagal theory to the general mental health field and has worked extensively with Dr. Stephen Porges to bring about this awareness of creating a sense of safety with clients in a therapeutic setting. Board Certified Dance/Movement Therapist (BC-DMT) Amber Elizabeth Gray has utilized polyvagal informed dance/movement therapy in her work with refugee and torture survivors. (Gray, 2017, 2018, 2019) Other embodied practices such as mindfulness and trauma informed yoga practices are applying the knowledge of the vagus nerve and polyvagal theory to support their neurological understanding of treating trauma through these techniques.

The future of therapy is through embodiment as supported by the current neurological understanding of mind/body integration on mental health and wellness. Research has primarily focused on embodied approaches to treating trauma, but it is important to expand the conversation to other therapeutic populations with as much interest as trauma informed practices. In this literature review, I will explore the commonalities between polyvagal theory and

dance/movement therapy practices. I will illustrate the foundational role the social engagement system plays in influencing the success of therapeutic relationships and of embodied therapeutic interventions. I will investigate the theory's application to trauma recovery, as well as, additional populations, such as Autism Spectrum Disorders, Depression Disorders, and general mental health and wellness challenges that may benefit from polyvagal informed dance/movement therapy.

Literature Review

Polyvagal theory was introduced by Dr. Stephen Porges during his Presidential Address to the Society for Psychophysiological Research in Atlanta, GA on October 8, 1994. (Timeline, n.d.) Through his research on the 10th cranial nerve, known anatomically as the vagus nerve, the function and influence of this multibranched bidirectional neurological pathway on the autonomic nervous system (ANS) has shed broader light on and deepened the scientific understanding of the mutually influential relationship of mind/body integration on mental and physical health and wellness through the autonomic physiology of perceived safety and danger. This deeper understanding of the integrated neurobiological-psychological dance of physical and emotional responses to cues of safety and danger have been embraced by the psychotherapeutic field, particularly in the specialization of trauma recovery.

The vagus nerve is the 10th cranial nerve of the autonomic nervous system. As a bidirectional neural pathway, the vagus nerve contains nerve endings that are both efferent, brain to body messages, and afferent, sensory response messages from the visceral body to the brain. There are four times as many afferent nerve endings (80%) leading from the body to the brain (bottom up) than efferent nerve endings (20%) from the brain to the body (top down). (Dana, 2018; Geller & Porges 2014; Porges, 2017) This ratio of neural messaging, in the context of the

polyvagal theory, implies the clinical importance of sensory information from the visceral body's role in lived experiences, affect regulation, and psychological healing. The polyvagal theory postulates the importance of afferent information in the autonomic nervous system's quest to interpret safety or danger from the environment and within the presence of other human beings through the mechanisms of neuroception and the social engagement system. (Geller & Porges, 2014)

Central to understanding the psychotherapeutic influence of the polyvagal theory is understanding the evolutionary role of the autonomic nervous system for detecting safety or danger, regulating and expressing emotions, and the ability to engage in or withdraw from social interactions. The autonomic nervous system consists of two branches: the sympathetic nervous system (mobilization, fight/flight response) and the parasympathetic nervous system (relaxation response, immobilization/freeze/faint response) (Porges, 2001, 2017; Dana, 2018). Additionally, Dr. Porges's (2017) research has identified "most of the neural pathways of the parasympathetic nervous system travel through the vagus nerve" (p.193) and the parasympathetic branch consists of two separate vagal pathways: the ventral (front/phylogenetically newer) vagal pathway and the dorsal (back/phylogenetically older) vagal pathway. In the polyvagal theory, the autonomic nervous system responds to internal and external stimuli within a hierarchy of these three neural pathways. Porges (2017) and Geller and Porges (2014) explain

> These three involuntary autonomic subsystems are phylogenetically ordered and behaviorally linked to three global adaptive domains of behavior: (a) social communication (e.g. facial expression, vocalization, listening), (b) defensive strategies associated with mobilization (e.g. fight-or-flight behaviors), and (c) defensive

> immobilization (e.g., feigning death, vasovagal syncope, behavioral shutdown, and dissociation). (p.193) (p.181)

The vagus nerve "connects the brain directly to bodily organs" (Porges, 2017, p.193) accurately reflecting the Latin meaning "the wandering nerve" (Dana, 2018; Werbalowksy, 2019) as the vagus originates at the brain stem traveling down the body to innervate into the heart, lungs, diaphragm, and stomach as well as fascial muscles, eyelids, muscles of the middle ear and the throat. (PESI, 2011; Dana, 2018; Porges, 2017; Werbalowksy, 2019)

The research of polyvagal theory indicates the main function of the vagus nerve's relationship with the autonomic nervous system is to recognize signs of safety and danger through a body-based platform. The specific muscles and visceral organs that each area of the vagus nerve innervates correlates to functions of either the sympathetic or parasympathetic nervous systems of the autonomic nervous system and how these systems are activated, in what situations, and in what phylogenetic order. If cues of danger are present through specific facial expressions, body posture or low tone of voice the sympathetic nervous system (SNS) is engaged and alarm systems signals activate the amygdala to prepare for a fight or flight response. If cues of safety are present through affable facial expressions, relaxed body posture, higher pitches and melodic voice tones of prosody, the parasympathetic nervous system (PNS) and social engagement systems are activated allowing the person to disengage/depress defense responses opening up to vulnerability of shared experiences with others and the environment comfortably. Geller and Porges (2014) explain the polyvagal theory as "the neural mechanisms through which physiological states communicate the experience of safety and contribute to an individual's ability either to feel safe and spontaneously engage with others, or to feel threatened and recruit defensive strategies" (p.181)

Embedded within the polyvagal theory is a “neurophysiological circuit” “that integrates the regulation of muscles of the face and head with the ANS” (Patriquin, Hartwig, Friedman, Porges, & Scarpa,2019, p.187) referred to as the *social engagement system*. The physiological states stimulated by the vagus nerve are communicated via the social engagement system. The vagus nerve endings innervating into the striated (voluntary) facial muscles are responsible for emotional expressions which convey the internal physiological and emotional state of an individual. (Geller et. al, 2014) These facial expressions are interpreted via another individual’s autonomic social engagement system as cues of safety and an invitation to engage in social interaction or as cues of danger and the need to engage defense systems. Accompanying facial expressions within the social engagement system are the larynx and pharynx of the throat region which are responsible for prosody (intonation of speaking). Modulation of voice conveys additional cues of intention and physiological state of being, creating an intention of soothing and calm, as a mother’s voice calming a child, indifference as in depressive states or physical illness, or as a warning characterized by deep growl like tones. (PESI, 2011) Geller and Porges (2014) propose within “the polyvagal theory, the face and voice are powerful conduits through which safety is communicated to another.” (p.185)

The polyvagal theory establishes the autonomic nervous system’s role of continuously monitoring and detecting cues of safety and danger from internal (visceral) sensory information and environmental cues. (Porges, 2017, 2004; Geller et. al, 2014) The polyvagal theory also observes a person’s “responses to risk are often immediate and virtually reflexive” (Devereaux, 2017a., p. 29) indicating the bidirectional neural interpretations and responses of the vagus nerve occur outside of conscious awareness. (Dana, 2018; Devereaux, 2017a.; Geller et. al, 2014; PESI 2011; Porges, 2004, 2017; Werbalowksy, 2019) To distinguish this neural awareness from

conscious perception, Dr. Porges created the term *neuroception* to describe the process by which the autonomic nervous system monitors our sense of safety. (Dana, 2018; Devereaux, 2017a.; Geller et. al, 2014; PESI 2011; Porges, 2004, 2017; Werbalowksy, 2019)

Porges (2004) explains "even though we may not be aware of danger on a cognitive level, on a neurophysiological level, our body has already started a sequence of neural processes that would facilitate adaptive defense behaviors such as fight, flight, or freeze." (p. 20) Polyvagal theory further postulates that neuroception not only monitors safety cues from the environment but is also a "bidirectional communication *between* the nervous systems" (Geller et. al, 2014, p.182) of people around us influencing our ability to socialize and create healthy bonds with other individuals. Neurception influences our ability to interact with others via the social engagement system through "potent cues of safety or danger that are detected by cortical areas and…are communicated interpersonally from movements of upper part of the face, eye contact, prosody of voice, and body posture." (Geller et. al, 2014 p.184) When neuroception detects signals of danger in the presence of another person we may not be able to consciously name the danger "and we are left with a "gut" (visceral) feeling that alerts us to discomfort within a social interaction" (Geller et. al, 2014, p.182) Understanding emotional expressions as physiological states created by the vagal response of the autonomic nervous system in response to neuroception and the social engagement system, as proposed by the polyvagal theory, has profound implications for the field of mental health therapy and embodied counseling practices such as dance/movement therapy.

Polyvagal Theory Applied to the Clinical Setting

Dr. Porge's polyvagal theory has found a place in the clinical setting of mental health therapy through establishing therapeutic value in setting a safe therapeutic environment and

through the therapist's therapeutic presence. (Dana, 2018; Geller et. al, 2014) Applying polyvagal theory to the clinical therapy setting recognizes a client must feel safe through vagal neuroception before they are able to physiologically engage in meaningful productive therapy. Geller and Porges (2014) assert, "effective therapeutic work is only possible when the client feels safe and secure in the therapy setting." (p.178) Examining the "therapeutic presence theory of relationship" (p.185), Geller and Porges (2014) propose the "neuroscience and biobehavioral mechanisms" (p. 178) of therapeutic and *relational* (p.186) presence through the lens of the polyvagal system may be monitored by "vagal regulation of the heart by quantifying the respiratory sinus arrhythmia component of heart rate variability." (p.189) Geller and Porges (2014) further propose

> during therapy, the repeated present-moment encounters provide a 'neural' exercise of the social engagement system. As these neural exercises enhance the efficiency and reliability of the neural pathways inhibiting the defense systems, the client acquires a greater accessibility to feelings of safety, openness, and self-exploration. (p.181)

Through the application of the physiological understanding of polyvagal theory's necessity for safety, therapeutic presence, by way of the social engagement system, becomes both the foundation for therapeutic intervention and the intervention itself. As the client and therapist coregulate safety "over time, consistently offered present-centered encounters with the therapist can strengthen the client's emotional regulation." (Geller et. al, 2014, p. 185)

Therapeutic presence is equally important for "the therapist to attune to and recognize (i.e. in the facial expression of the client) when the client is not feeling safe" (Geller et. al, 2014, p.185) When this occurs, therapists can utilize the elements of the social engagement system, "through…warmth and prosody of voice, soft eye contact, open body posture, and receptive and

accepting stance" (Geller et. al, 2014, p.184) to help the client recover their sense of safety and "down-regulate the client's defenses and promote positive growth and change" (Geller et. al, 2014, p.183)

Polyvagal Theory and Dance/Movement Therapy

Therapeutic presence is an integral element to the nonverbal embodied work of dance/movement therapy in the practices of kinesthetic attunement, awareness, and empathy. Dance/movement therapy is the practice of embodied psychotherapy. The American Dance Therapy Association (ADTA) defines dance/movement therapy as "the psychotherapeutic use of movement to promote emotional, social, cognitive and physical integration of the individual." (adta.org) Originating from explorations of the modern dance movement (Levy, 2005) dance/movement therapy developed into a psychotherapeutic form utilizing "body movement, as the core component of dance" as "the means of assessment and the mode of intervention" (adta.org) to therapeutically treat a wide range of emotional, developmental, and psychological conditions since the 1940s and 50s. Dance/movement therapy expounds creative expression is a fundamental element of life and can often express thoughts and emotions human language fails to convey. For some populations, non-verbal expressivity is their only capability of communication. Dance/movement therapy is uniquely suited to utilize the social engagement system to provide therapeutic presence, an outlet for nonverbal expression, and therapeutic processing that fosters the sense of being seen, understood, and socially connected, all of which, promotes emotional, psychological and social well-being leading to experiences of improved mental health and quality of life (QOL). (Barton, 2011; Brauninger, 2012; Geller and Porges, 2014; Homann, 2010)

Dance/movement therapy interventions are multidimensional in the sense that the interventions "engage somatic, emotional, and perceptual processes simultaneously" (Homann, 2010, p.81) which provides the therapist and client an integrated and holistic approach to the therapeutic process. The ADTA organization tells us that "dance/movement therapists focus on helping their clients improve self-esteem and body image, develop effective communication skills and relationships, expand their movement vocabulary, gain insight into patterns of behavior, as well as create new options for coping with problems." (adta.org) Qualitative studies utilizing dance/movement therapy as the therapeutic approach support this statement by reporting improvements of clients' overall sense of well-being, reduction of stress and/or anxiety, reduction of depressive symptoms, improvements in self-awareness, self-esteem, and self-acceptance, and improvements in relationships with others. (Barton, 2011; Brauniger, 2012; Ritter & Low 1996) Quality of life, as utilized in Brauninger's (2012) randomized controlled trial examining the usefulness of dance/movement therapy on the effects of stress on QOL, was defined as "individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns." (WHOQOL Group, 1993) (p.1) Improvements to an individual's quality of life is a fundamental goal of all therapy and correlates to an improvement of psychological and social well-being. Ritter & Low (1996) (as cited in Payne West, 1984; Rossber-Gempton, & Poole, 1992) reflect on the efficacy of dance/movement therapy interventions to accomplish these therapeutic goals by stating,

> psychological and physical improvements have been attributed to DMT and can be categorized into five areas: resocialization and integration within a larger group system; nonverbal creative expression for emotional expression; total self -and body-awareness

> and enhanced self-esteem; muscular coordination, broader movement capabilities and tension release; and enjoyment through relaxation. In general, a holistic integration of emotional, spiritual and cognitive selves with the environment is the goal of DMT. (p.249)

Historically, dance was a natural medium for cultural unity, expression, and healing practices throughout ancient times and across civilizations. Dance was used as a form of spiritual journeying, healing, celebration, mourning, prayer, and community engagement. (Chaiklin, 2009) Before advancements in the multidisciplined field of neuroscience allowed for the ability of scanning and mapping brain activity during activities and emotional states, the use of dance as a healing medium was understood from an experiential and intuitive place of knowledge. However, today, modern technology allows us to map out and construct explanations with a scientific vocabulary the inherent connection between mind, body, individual, and community health that dance/movement therapy has always utilized instinctively. (Hindi, 2012) Homann (2010) postulates "dance/movement therapy is at the frontier of current trends in psychotherapy, which is just beginning to grasp the significance of the body's role in the perceptual process" (p. 81) while Hindi (2012) acknowledges the historical need for the support of a scientific vocabulary within the field of dance/movement therapy by reflecting

> although dance/movement therapy scholars have known on intuitive and theoretical levels that body awareness supports wellbeing few have articulated on a neuroanatomical level how body awareness may help to shape an individual's experience of oneself. This includes emotions beliefs, and actions, and how one makes meaning of those experiences. (p.130)

Research in dance/movement therapy has turned to neurobiology to "understand the interrelationship of the functionings of mind and body and…how these concepts can help dance/movement therapists understand, articulate and engage in our work in a more specific and nuanced way." (Homann, 2010, p. 81) Studies include examining techniques of dance/movement therapy such as attunement, kinesthetic empathy and awareness, interoception (Hindi, 2012), mindfulness (Barton, 2011), Authentic Movement (Tantia, 2010), mirroring, and applying the polyvagal theory to dance/movement therapy. (Devereaux, 2017 a., b.; Gray 2017, 2018, 2019)

Hindi (2012) distinguishes three categories of sensory processing that create body awareness; exteroception (external sensory stimuli), interoception (internal awareness of body and emotional sensations, and proprioception (the ability to know how the body is moving through space) (as cited in Hannaford, 2005; Rothschild, 2000). The polyvagal theory introduces the fourth perceptual awareness of neuroception. Though neuroception is theorized to operate outside of conscious awareness, by attending to the physical and emotional information provided through interoception the potential for these two systems to inform dance/movement therapy interventions is conceivable. Hindi further elaborates, "by understanding the process of interoception and the psychological implications of attending to interoception dance/movement therapists may be better able to support healthy emotional processing, perception formation and identity formation through interoception-focused interventions." (Hindi, 2012, p.130) Dr. Porges discusses the correlation of dance/movement therapy and neuroception by recognizing the common goal of detecting the "intentionality of biological movement including body movements, gestures, facial expressions and vocalizations." Devereaux, 2017a., p.29)

The polyvagal theory considers creating therapeutic presence and activating the social engagement system between client and therapist as essential to deep therapeutic work.

Dance/movement therapy techniques such as utilizing kinesthetic awareness, kinesthetic empathy, slow deep breathing, Authentic Movement, reciprocal movements, and mirroring appear to naturally engage the social engagement system and sooth neuroceptive responses which "keeps the sympathetic nervous system contained, restricting it from going into defense." (Devereaux, 2017a., p. 31)

The dance/movement therapy intervention of mirroring invites clients to attune to the therapist or another group member through kinesthetic empathy, presence, and simultaneous non-verbal gesturing or movement expressions. To successfully participate in mirroring the client must feel seen, energetically held, safe with the other individual, and "accepted by another with one's full range of emotions." (Homann, 2010, p. 90) within the therapeutic environment. Homann (2010) further reflects, "moving together creates a powerful relational experience and often stimulates a deep subjective feeling of connection." (p. 96) Mirroring illustrates the commonalities of polyvagal theory and dance/movement therapy "by implementing reciprocal movements with social engagement behaviors, dance/movement therapists support the neural mechanisms involved in optimizing mental and physical health." (Devereaux 2017a., p.35)

Trauma Therapy

The polyvagal theory's perspective of psychological states reflecting an autonomic neurobiological state supports the growing attention to somatic based therapy interventions for trauma healing. Traumatic experiences are stored as implicit memories. These implicit memories are not stored in an organized manor in the brain, but rather as fragmented segments of non-verbal, sensory, and preconscious memories. (Homann, 2010; Werbalowksy, 2019) Because implicit memories are stored without a verbal processing component, leading trauma therapists and researchers have acknowledged the limitations of traditional talk therapy and are

increasingly exploring body based somatic psychotherapy approaches. Homann (2010) reflects "dance/movement therapy…begins from the body, offering direct access to implicit processing. This is what makes dance/movement therapy a compelling and complex resource for intervention." (p. 92)

Amber Grey, BC-DMT (2017) has worked with Dr. Porges since 1998 incorporating the polyvagal theory into her work with torture and trauma survivors in Haiti. Of her work with these trauma survivors she observes, "emotional and psychological state shifts are not possible nor are they likely to have longevity without physiological state shifts. These state shifts can only occur working with the direct experience of the body." (Gray, 2017, p.44)

Trauma experiences disrupt the internal balance of (neurological) homeostasis and either initiates a mobilizing (fight/flight) sympathetic nervous system response or a dorsal vagal parasympathetic response of freeze or faint (disassociating). When these intense experiences overwhelm the nervous system and emotional regulation is inhibited, the ability to trust sensory information, perceptions, and feelings becomes unreliable. Neuroception may become hyper aroused sending false signals of danger inhibiting the ability to stay within the "window of tolerance" (Corrigan, Fisher, and Nutt, 2011; Levine and Land, 2016; Quillman, 2013) leaving clients to wade through

> a bewildering array of cognitive, emotional, and physiological symptoms; emotions of fear, shame and rage; numbing of feelings and body sensations; overactivity of the stress response system; and painful, negative beliefs about the self that serve to intensify the distressing feelings and body responses. (Corrigan et. al, 2011, p.17)

As discussed previously, a core concept of dance/movement therapy interventions is to be present with the body. Through this presence and awareness of natural body rhythms (e.g.

heartbeat, breathing), sensations, and preferred movement patterns the client is able to utilize the body to make meaning of emotions and body sensations, integrate emotional and physical experiences, and self-direct emotional regulation. Polyvagal theory informed dance/movement therapy provides a framework to work through the dissociative nature of trauma by returning the overstimulated autonomic nervous system (vagal pathways) through body-based practices. Quillman (2013) offers "much of the work of treating trauma is to help the patient move from dorsal vagal hypoarousal (dissociation) or sympathetic hyperarousal (terror/rage) to ventral vagal connection (social engagement)." (p.358) Utilizing the principles of the polyvagal theory, therapeutic presence, kinesthetic empathy, and attunement can bring a client back to safety, trust, and into a state of social engagement. Furthermore, dance/movement therapy techniques such as mirroring, witnessing in Authentic Movement, deep breathing, body, posture, and movement awareness engage the client into a safe trusting relationship with the therapist and, once again, with their own body and self. Gray (2017) observes "trust is built on safety, and relationships are built on trust. Safety begins in the body" and that "music, movement, dance, and rhythm, are activities that provide an immediate resource to shift physiological states." (p.44)

An additional aspect of trauma recovery to consider is the client's sense of control of themselves, relationships, and the environment. Trauma experiences often involve having one's sense of control violated. Regaining the feeling of autonomy is important in the client's ability to trust their body and perceptions. Werbalowksy (2019) points out "in most body-based intervention techniques, the locus of control is in the client." (p. 22) Utilizing polyvagal theory informed interventions allows the client to regain control of their autonomic nervous system responses; to bring themselves back into a ventral vagal, social engagement state.

Loizzo (2018) recognizes a nuanced perspective of embodied trauma treatment when he stated

> given the growing recognition that the neurobiology of trauma is not restricted to major life stressors or obvious traumas, but applies across the whole range of chronic stressors and microtraumas experienced in childhood and everyday life, the potential uses of embodied contemplative practice may extend to the larger domain of mental health and public health.(p.2)

Whether an experience of trauma is a singular impactful event or any variation of chronic states of stress, these experiences are recorded in the body. The versatility and inter-relational quality of dance/movement therapy is suitable to address all trauma experiences.

Autism Spectrum Disorders

The social engagement system is presented as the cornerstone for healthy mutually enriching relationships imperative for humans to not only survive but thrive in life. However, for individuals diagnosed with an autism spectrum disorder (ASD), many of the key components of the social engagement system (e.g. eye contact, emotional expressivity through facial expressions, and vocal prosody) may be hampered. Interpretations of social cues and gestural communications from others may be misunderstood or seemingly ignored. This inability to recognize facial cues limits comfort with social interactions and the ability to build social reciprocity via the social engagement system. (Bal, Harden, Lamb, Vaughan Van Hecke, Denver, & Porges, 2010; Patriquin et. al, 2019) Bal et. al (2010) reflects “understanding emotions is a key element in social interactions because it enables individuals to accurately recognize intentions of others and fosters appropriate responses.” (p.358)

Central to interpreting social facial expressions of emotion is eye gaze. Consistently, direct eye contact or poor eye gaze to facial regions of emotional expression have underpinned characteristics of autism spectrum disorders. Bal et. al (2010) presented a study to examine autonomic influences on the accuracy of emotion recognition through monitoring "eye gaze patterns and visual attention." (p.359) Bal et. al (2010) proposed "information gathered from visual processing using eye tracking technology may help clarify the nature of emotion perception impairments in children with ASD because distinct scanning strategies may underlie the difficulties these children experience when recognizing emotional facial expressions." (p. 359) Bal et. al (2010) further explored the influence of the autonomic nervous system on accurate emotional recognition within autism spectrum disorders by considering the influence of respiratory sinus arrhythmia (RSA) of the polyvagal theory on the ability to socially engage in eye contact and detect emotional cues. Higher RSA levels indicate the ability to regulate the sympathetic nervous system and enter comfortably into social interactions while lower RSA indicates less ability to regulate into a calmer physiological state, thereby staying in an elevated stress state and unable to attend to appropriate social cues. (Bal et. al, 2010; Patriquin et. al, 2019) Bal et. al (2010) attempted to understand the connection of autonomic state (RSA), emotion recognition through eye gaze patterns and social engagement in children with autism spectrum diagnosis. Their findings concluded children with ASD displayed lower RSA inhibiting their ability to emotionally regulate to calmer states of social engagement. RSA influenced the rate of accurate emotional recognition and time eye gaze patterns spent in the facial area of the other person's eyes. (Bal et. al, 2010)

Patriquin et. al (2019) utilized the polyvagal theory's basis of neurception, RSA, and social engagement to inquire if just as ASD diagnosis exists on a continuum, RSA and social

engagement abilities also present on a continuum influenced by intellectual impairments coinciding with the ASD diagnosis. Their findings suggested individuals with less intellectual impairment displayed higher RSA, more flexibility in autonomic regulation, and more social engagement abilities. The study concluded "while social difficulties are evident across the entire spectrum, there may be more pervasive difficulties across contexts in intellectually impaired individuals, whereas difficulties in individuals with ASD without intellectual impairment may be more pronounced in unfamiliar social situations." (Patriquin et. al, 2019, p. 194) This study provides important therapeutic insight to understanding the range of neuroception and social engagement system difficulties that may coincide with autism spectrum disorders.

Mulcahy, Davies, Quadt, Critchley, and Garfinkel (2019) bring to light the role of interoception and the difficulties of "discrimination of emotional intonation of speech (affective prosody)" (p.2) of autism spectrum disorder. The study suggests difficulty sensing interoceptive information may reduce the ability to infer emotions of others which "for many individuals with ASC [autism spectrum conditions] prosodic impairment may exacerbate awkward social communication." (Mulcahy et. al, 2019, p.2) The findings of this study encourage developing interoceptive understanding of one's own emotional state as necessary for accurately inferring the emotional cues of others. Intreoception, as discussed earlier, is an inherent facet of dance/movement therapy that would support recognitions of affect prosody and increase social engagement abilities.

Dance/movement therapy research and interventions with autism spectrum disorders center around themes focused on self-awareness, body image, social interactions, motor coordination, self-expression, empathy, and emotional regulation. (Devereaux, 2017a. 2017 b.; Hildebrant, Koch, & Fuchs, 2016; Mastrominico, Fuchs, Manders, Steffinger, Hirjak, Sieber,

Thomas, Holzinger, Konrad, Bopp, & Koch, 2018; Scharoun, Reinders, Bryden, & Fletcher, 2014) Integrating polyvagal theory to dance/movement therapy interventions may provide a "neural exercise" (Devereaux 2017 a., 2017 b.; Porges, 2004, 2017) to the vagal pathways helping to stimulate proper neuroception and functions of the social engagement system. Dr. Porges (2004) postulates "from a theoretical perspective, faulty neuroception-that is an inability to detect accurately whether the environment is safe or another person is trustworthy-might lie at the root of several psychiatric disorders" (p. 23) including autism spectrum disorders. For individuals who are receiving unreliable neuroceptive information, they may maintain a heightened sympathetic state and "detect risk when there is no risk and virtually all movements towards them may be interpreted, via neuroception, as dangerous" (Devereaux, 2017 a.) making social engagement difficult or impossible. Relying on dance/movement techniques that promote social engagement, attunement, mirroring, and meeting client "where they are at" (Devereaux, 2017 b.), dance/movement therapy helps address a variety of developmental, neurological, and social/emotional needs of individuals with autism spectrum disorders.

Mirroring is a common technique used in dance/movement therapy applicable to a wide variety of populations and therapeutic goals. Mastrominico et. al (2018) and Hildebrandt et. al (2016) both utilized mirroring as the embodied intervention to study bolstering empathy through embodied techniques. Hildebrandt et. al (2016) states, "the general goal of the mirroring intervention for autism is the improvement of empathy emotion expression and interpersonal interaction…moreover, this includes the improvement of nonverbal empathetic skills, social competence, well-being, trust, body awareness, body image, and the distinction between self and other." (p.13) Mastrominico et. al (2018) reminds "the most decisive aspect in mirroring is the reflection of the quality of the movement rather than mechanically copy its precise shape" (p. 4)

increasing the therapeutic value of mirroring as an intervention choice for autism spectrum disorders.

When reflected in the polyvagal theory, mirroring accomplishes many prosocial actions which may help the autistic individual improve affect regulation and social skills. Mirroring can be thought of as a "neural exercises" for the vagus nerve. Mirroring involves attunement with another individual, reflecting back subtle emotional qualities of movement expressions that "promotes the development of an emotional, meaningful, and healthy relationship." (Scharoun, et. al, 2014, p. 216)

To successfully attune with another individual the social engagement system must be activated, and safety established. Purposeful visual attention must be given to gestures, movement patterns, and vocal expressions. As individuals become more aware of their own bodies, embodied emotional states, and grow in confidence, the goal of dance/movement therapy is that clients are better able to recognize emotional and social cues from others fostering deeper interpersonal connections. (Hildebrandt et. al, 2016, Mastrominico et. al, 2018, Scharoun, et. al, 2014)

Depression

*The Diagnostic and Statistical Manual of Mental Disorders (*DSM–*5*) (American Psychiatric Association, 2013) characteristics of depression include depressed mood, such as sadness, hopelessness, and feelings of worthlessness, a marked disinterest in previously loved activities, sleep disturbances, fatigue or a general loss of energy, low self-esteem, and an inability to focus. Due to symptoms of depressed mood, low energy, and low self-esteem, social isolation is often experienced by individuals experiencing depression. These characteristics of depressed

mood coincide with many features of a dorsal vagal state displaying “parasympathetic withdrawal.” (Schwerdtfeger & Friedrich-Mai, 2009, p.505)

In his PESI (2011) seminar, Dr. Porges defined depressive behaviors as “decreased motor activity, sluggishness, and flat affect.” He also stated that as a result of his work in the polyvagal theory he no longer considers depressive disorders an independent diagnosis, but instead, depressive states are “a retraction of the social engagement system and low vagal tone.” (PESI, 2011) In the case of depressive states, he offers the therapeutic focus should be on reactivating the social engagement system. Schwerdtfeger et. al (2009) lends support to that statement in studying the heart rate variability (HRV) in depressive subjects during their social interactions throughout a 24-hour period. The expectation was higher vagal tone lends to increased social engagement while lower vagal tone is associated with decreased social engagement and depressive symptoms. (Schwerdtfeger et. al, 2009) Their brief study showed evidence for supporting the polyvagal theory’s connection of HRV, social engagement, and changes in depressive mood state. An additional insight provided by the study was “increased vagal tone could be observed only when individuals with depressive mood interacted with their partner, family members or close friends. Social interactions with strangers or colleagues…were not accompanied by HRV in these individuals” (Schwerdtfeger et. al, 2009, p.505) which further supports the polyvagal theory’s perspective that “cardiac vagal tone should be elevated in security enhancing interactions only” (Schwerdtfeger et. al, 2009, p.505)

Polyvagal theory suggests creating a safe and secure setting with attuned presence is the first step to elevating out of depressive states back towards social engagement, as such, dance/movement therapy would be expected to be a proficient choice of therapy to reengage clients to greater vitality. Whether in individual or group work, dance/movement therapy’s first

steps are always to create a safe and attuned environment. Clients are met with nonjudgmental therapeutic presence, the ability to set the therapeutic pace, and have both movement and emotional energy mirrored or reflected back to them. Attuning to the breath, creating body awareness, and establishing kinesthetic attunement may last as long as the client needs gradually increasing energy and physical movements as the client indicates being ready. Dance/movement therapy techniques, as applied to address depressive disordered clients, exemplify Dr. Porges's (Devereaux, 2017a.) statement

> for mobilization to occur without fear, it needs not to be with fight or flight behaviors. To enable mobilization and immobilization to occur without fear, these behavioral states need to be modulated or functionally contained by features of the social engagement system such as facial expressions, prosodic voices, and positive hand and head gestures. (p. 31)

Karkou, Aithal, Zubala, and Meekums (2019) remind us that a vital difference between dance/movement therapy and dance as an art form is the therapeutic relationship. Met with therapeutic presence and a supportive environment, the depressed client can begin to mobilize into social engagement. Expressions of non-verbal meaning making may relay stories or feelings the client cannot yet put into words. Creating "links between body, thoughts, and feelings becomes important for people with depression who may experience a disconnect between what they feel, think, and/or do." (Karkou et. al, 2019, p.5) Having these movements met and reflected back with unconditional positive regard may help the depressed client lean into stronger social connections, first within the therapeutic environment and then in relationships outside of therapy. Isolation is often experienced by those suffering with depression. Through strengthening the social engagement system with polyvagal informed interventions, dance/movement therapy can

contribute to reducing symptoms of depression by helping the client recover their sense of vitality and connection to self and others.

Discussion

The polyvagal theory developed and introduced by Dr. Porges in the 1990s has cemented a place in the clinical therapy world as a reliable model to approach psychotherapy counseling through a mind/body lens. Tracing the influence of the 10th cranial nerve known as the vagus nerve psychological and emotional presentations are understood as a reflection of the present physiological state of the autonomic nervous system (ANS). The ANS is comprised of the mobilizing (fight/flight) sympathetic nervous system and the immobilizing (freeze/faint) parasympathetic nervous system. The main neurological influencer of the ANS, the vagus nerve, is bidirectional containing nerve endings sending top down (efferent) motor messages from the brain to the body, as well as, nerve endings sending bottom up (afferent) visceral messages from the body to the brain. Translated as the "wanderer" the vagus nerve originates in the brainstem and innervates into muscles of the eyes, middle ear, face, throat, heart, lungs, diaphragm, and stomach. The role of the bidirectional communication of the vagus nerve is to monitor, detect, and interpret signals of safety or danger from the environment and other individuals then transmit these signals through a subconscious neural understanding Dr. Porges calls neuroception. Neuroception interprets signals of facial expressions, head and body postures, gestures, low tone sounds and vocal prosody into warnings to escape or a safe invitation to approach. As proposed by the polyvagal theory, the parasympathetic branch of the ANS developed a phylogenetically newer pathway which allows individuals to interact socially

without hyper or hypo arousal of the ANS. This is the dorsal vagal parasympathetic pathway known as the social engagement system. When individuals are entrained to the social engagement system, facial expressions are pleasant, inviting and bright. Vocal tones are lighter, softer, and have a comforting cadence. Body posture and gestures are open and welcoming.

For clinical therapists, this state of social engagement is extremely important to treat clients from an embodied perspective. If a client is in hyper- (sympathetic response) or hypo- (parasympathetic) arousal, clients are not experiencing safety and are physiologically unable to engage with the therapist. The therapist must first reassure the client's nervous system through therapeutic presence and offering their own cues of social engagement to bring the client into a sense of safety. The neurological dance of the ANS and neuroception provides a physiological foundation to address several psychological disorders including trauma, behavioral and social challenges of autism spectrum disorders, stress and anxiety (a chronic hyper arousal state), and depression.

Dance/movement therapy is a therapeutic philosophy that is founded in embodied practices. However, research reveals many limitations to dance/movement therapy studies such as small sample size, being generally female gendered, qualitative studies greatly outnumber quantitative studies, and difficulty in the ability to design studies in a quantitative process as most of dance/movement therapy techniques are not codified, but, rather they are experiential and intuitive adjusting to the needs of the client moment to moment. Dr. Porges (Devereaux, 2017 a.) reflects on this limitation by stating

> conducting research to evaluate and to understand the mechanisms underlying clinical treatments is difficult and the treatment models applied by dance/movement therapists

> may not easily conform to the tight experimental designs used in clinical trials to document the effects of pharmaceuticals. (p.33)

He further reflects on the challenges of quantifying dance/movement therapy research by stating, "Therapists are intuitive…while clinicians tailor their treatment model to the dynamically changing features of their clients, researchers attempt to determine cause and effect relationships by applying experimental designs that exert a systematic control of treatment parameters." (Devereaux, 2017a., p. 33)

Despite the difficulties of designing dance/movement therapy studies, the polyvagal theory may support easing that difficulty. Having a very clear physiological map of emotional and psychological states presented by clients provides a cohesive language and reenactable measurable (i.e. heart rate variability) studies can be created versus experiential and intuitive results which are best represented in qualitative studies. An increase in quantifiable dance/movement therapy studies will help promote dance/movement therapy to greater standing within the growing field of embodied therapies.

It was the intention of this paper to illustrate the common factors between polyvagal theory and dance/movement therapy and to explore potential populations that may benefit from these combined approaches. Through the research presented, polyvagal theory and dance/movement therapy are complementary practices that easily support each other in the field of clinical therapy. Relying on the understanding of the vital importance of neuroception and the social engagement system, embodied psychotherapy practices can draw from dance/movement therapy's rich history of utilizing kinesthetic attunement and empathy. As the basis of dance/movement therapy is to attune to and with the client, gently reflecting back the emotional qualities that underlie movement creating a relational connection in which the client feels seen,

accepted, and held in safety, dance/movement therapy naturally fulfills the needs of the social engagement system. Incorporating polyvagal informed dance/movement therapy bridges “the crossroads of science and DMT-which itself sits at the crossroads of somatic psychology and creative arts psychotherapies-creates huge potential for our field [dance/movement therapy] to take a well-earned place at the forefront” (Gray, 2017, p.44) of the future of clinical therapy.

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THESIS APPROVAL FORM

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