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Polyvagal Informed Embodied Mindfulness:

An Online Program

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GMIND 7500: Thesis

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Abstract

During the COVID-19 health crisis, facilitators of Mindfulness-Based Programs were prompted to provide virtual options for navigating stressors. In response, I developed a program that integrated embodied mindfulness and Polyvagal Theory to support healthcare students and professors in higher education. This rationale paper defines embodiment and explains how embodied mindfulness through a Polyvagal lens can be used to provide safer options for practitioners and people experiencing high stress. The program highlights awareness of the physiological state as primary, offering opportunities to create autonomic flexibility and self-regulation through vagal toning already embedded in some contemplative practices. This awareness may offer practitioners opportunities to effectively navigate adverse meditation experiences and help healthcare and other at-risk populations combat stress, burnout, and isolation from pandemic circumstances. The creative thesis presentation details the curriculum overview, planning and delivery process.

Keywords: embodied mindfulness, polyvagal informed, mindfulness-based programs, vagal toning

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Polyvagal Informed Embodied Mindfulness: An Online Program

Nursing students and professors at The College of New Jersey (TCNJ) were part of the healthcare field that experienced a variety of stressors as they helped serve the COVID-19 crisis but also moved their in-person program to an online format. The loss of in-person peer and institutional support left students feeling isolated and more vulnerable to anxiety and depression (Noh, 2017; Tang et al., 2020). Collective feelings of threat due to lockdowns, masks, and social distancing also heightened anxiety. In this and many settings the ability to feel safe may be impaired. As Porges (2020) suggested, the "pandemic impacts our biological imperative to connect" (p. 136).

The incidences of stress, isolation, and pandemic circumstances has elevated the need for more research regarding how to not only regulate the nervous system when there is a threat but also how to thrive in these uncertain and unprecedented times (Poli et al., 2020; Horesh & Brown, 2020). Studies have shown that mindfulness training and practice can be effective at alleviating burnout, stress, anxiety, and depression, as well as fostering resilience and wellbeing (Chiappetta et al., 2018; Morgan et al., 2014; Reyes, 2020; Strauss et al., 2021; Valley & Stallones, 2018).

Mindfulness-Based Programs (MBPs) that are body-oriented, integrating awareness and movement, have shown to be effective in helping individuals self-regulate more than mind training alone (Loizzo, 2018; Lucas et al., 2018; Price & Hooven, 2018; Schmalzl et al., 2014; Segal et al., 2018). Additionally, the integration of polyvagal principles into programming to highlight the vagus nerve and its role in regulating the autonomic nervous system (ANS) is currently being applied in clinical organizations to address these same needs. Awareness of the physiological state and understanding of vagal pathways embedded into mindfulness

programming may help prepare individuals to mediate stress and reduce the potential for adverse effects during mind training practices.

During my internship at TCNJ's Center for Integrative Wellness I created and delivered an 8-week online program called Polyvagal Informed Embodied Mindfulness (PIEM), a stress reduction program for busy nursing students and professors. This integrative body-oriented mindfulness program emphasizes present moment awareness of the physiological state offering opportunities to shift states using vagal toning practices, thereby increasing the ability to self-regulate. The program is designed to increase positive feelings of embodiment and wellbeing through an integration of vagal toning and mindfulness practices.

For the creative component of this thesis, I created a presentation outlining the details of the curriculum, including the approach used to inform the development of the program, the organization of weekly themes in each session, and the delivery process. In this rationale paper, I explore the following questions: 1) How can embodied mindfulness potentially be a safer option than mind training alone? 2) What is polyvagal theory and its associated methods? and 3) How can polyvagal toning exercises be integrated into an online embodied mindfulness program? I address the first two questions in my literature review. In my discussion section, I then address the third question, outlining how I created the PIEM program.

Literature Review

According to ancient texts, the Buddha said, "Monks whoever develops & pursues mindfulness immersed in the body encompasses whatever skillful qualities are on the side of clear knowing" (as cited in Bhikkhu, 2013, para. 18). In this literature review, I delve into why being immersed in the body—in other words, embodiment—is a crucial aspect of awareness and

embodied mindfulness, before presenting essential aspects of polyvagal theory and how vagal toning can help make mindfulness practices safer.

Embodiment

Embodiment is a research topic of interest in education, social psychology, neurobiology, and contemplative neuroscience because of its impact on learning, social engagement, and wellbeing. The term "embodied awareness" is used in the interpretation of mindfulness "as an interaction between the mind, body and external world" (Stanley, 2012, as cited in Khoury et al., 2017, p. 1162). Varela (as cited in Schmaltz et al., 2014) expanded the definition of embodiment to include the first-person phenomenological experience crucial to embodied cognition. This perspective highlights that investigator positionality will influence how we define everything in research. For example, Impett et al. (2006), theorists in feminist studies, defined embodiment as "awareness of and responsiveness to bodily sensations" such that when increased through mind-body exercises, it may reduce "self-objectification" (p. 40). Positive Psychology proponents Cebolla et al. (2016) interpreted the feeling of being embodied as a combination of a "sense of ownership, location, and agency of the body" (p. 1297).

Anthropologist Harris (2016) described feeling embodied as a "visceral, felt, enlivened bodily experience" (para. 1). This feeling of aliveness points to the vagus nerve linked to predictable physiological states. The vagus, a pair of cranial nerves (referred to in the singular), that originate in the brainstem wandering down the body innervating the neck, throat, chest, and diaphragm affecting the heart, lungs, gastrointestinal tract and ending at the abdominal cavity (Howland, 2014). The vast influence of the vagus nerve serves as a bidirectional pathway to mediate physiological states which allow people to experience the body, like feeling connected to the body and others, being mobilized to action, and feeling immobilized or disconnected.

Vagal influences affect homeostatic processes such as digestion and regulation of the autonomic nervous system.

The vagus nerve plays several critical roles. First, it serves as a conduit between the major organs and glands to the brainstem. It is the main nerve of the parasympathetic nervous system, a branch of the autonomic nervous system (ANS). This direct communication of sensory and motor nerves enables individuals to feel the body. Secondly, it assesses risk and safety in the internal and external environments. The vagal influences function unconsciously, below perception and conscious awareness, continually regulating the autonomic nervous system. Porges (2004) coined neuroception to describe this unconscious risk assessment. Neuroception of danger may include actual life threats or perceived threats—setting off involuntary defensive strategies designed to protect metabolic resources and survival (Porges, 1995b, 2004, 2009, 2017a). For this paper, the view of being embodied is as a fully integrative human experience where the physiological state is the primary field of awareness. This awareness is influenced by sensing internal and external contextual factors that affect autonomic flexibility, impacting thinking, emotions, and behavior.

Embodied Mindfulness

Since mindfulness has become a widely recognized self-care tool, individuals under stress may seek it out as a practice to calm the mind. While Buddhist traditions teach four foundations of mindfulness, practitioners in secular settings may regard mindfulness as mainly a mind training that neglects the rest of the body by focusing on what is happening in the mind/brain. Embodied and body-based practices that help regulate physiological states may offer safer opportunities for people to practice mindfulness, especially for healthcare workers who face high rates of burnout related to trauma or secondary trauma. According to Van Dam et al.

research suggests some types of mindfulness practice may harm practitioners. Lindahl et al. (2017) exposed critical work regarding adverse reactions in mindfulness practitioners. The researchers examined the incidences of unfavorable phenomenology in contemplative practices. They studied practitioners and practice domains to understand how meditators navigate and integrate challenging experiences. Factors influencing meditation practice include intrapersonal, relational, environmental, behavioral, and individual mental and physical health history.

Lindahl et al. (2017) pointed out traditional Buddhist practitioners may regard challenges as progress as a part of a larger framework. In contrast, Western practitioners who may be engaging in mindfulness practices for therapeutic reasons may regard adverse reactions as a deterrent to practicing. If individuals practice meditation to feel better, will challenging experiences keep meditators from practicing? Lindahl et al. noted that 78 percent of participants report a change in motivation or goals because of challenging experiences (p. 16). Researchers agreed more research is needed to determine if practices being used for a have a calming effect may be causing harm (Lindahl et al., 2017; Van Dam et al., 2018a, 2018b).

One downfall of mindfulness, mainly as mind training, is that the mind can wander anywhere. The Default Mode Network may keep people entranced with thoughts about the past through self-referential thinking patterns. Rumination about painful emotions, traumatic memories, overwhelming sensations, future thinking, planning, and worry can fill the time, potentially leaving only momentary glimpses of what is happening in the present moment. Britton et al. (2013) studied critical concepts of attention regulation on wellbeing and found that contemplative training intends to reduce the Default Mode Network activity, which is responsible for focusing on the self. Being human is a complex experience of emergent properties, sensory and motor processes, and feedback loops that influence and shape the

nervous system, which is constantly navigating contextual factors regarding the environment, internal dialogue, beliefs, and the relational world.

Lindahl et al.'s (2017) study with expert and novice practitioners showed that most meditation disturbances were the result of concentration practices like Focused Attention and Open Monitoring. The Affective and Somatic domains had the highest number of incidences reported. While 75 percent of participants reported having experienced positive effects, 82 percent of participants also reported having negative experiences like fear, anxiety, panic, or paranoia. Other experiences include depression, dysphoria, and grief at 57 percent. Somatic phenomenology, including pressure, breathing changes, cardiac changes, fatigue, gastrointestinal distress, dizziness, or syncope were reported at 88 percent (p. 16). While not mentioned in the study, the symptoms reported may indicate autonomic defensive strategies via vagal influences.

Porges (2017b) posited it may not necessarily be the type of practice that elicits negative experiences in meditators but rather an individual's capacity to feel safe. Feeling safe is deeply embedded in the physiology of our nervous system and is at the core of experiential practices that help and not hurt. Cooper et al. (2020) investigated how study participants navigate disruptive energetic or kinesthetic experiences through self-regulation practices. While reframing was helpful, participants used a variety of embodied practices to manage experiences, in addition to taking a break from the practice. Movement practices, massage, chanting, visualizations, and setting intentions are all actions that help downregulate defensive autonomic nervous system reactions. When experiences are too intense or feel threatening, individuals have a biological drive to self-regulate, and the body is a resource that is right here, right now.

The focus on embodied mindfulness offers practitioners contemplative practice with the potential for active self-regulation built in. Research in mindfulness shows interoceptive

awareness as a critical component in emotional and behavioral self-regulation. According to Price and Hooven (2018), interoception is the ability to feel sensations in the body, helping to make sense of our internal experience by evaluating and using the information to self-regulate (para. 3). In interoception research, it is a consensus that the connection between the physiological and the emotional state is essential for self-regulation (Ceunen et al., 2016; Fustos, 2012; Price & Hooven, 2018). The sensory system is responsible for signaling homeostatic emotions that regulate the body and the brain-like thirst or hunger (Strigo & Craig, 2016), and for sending pain signals, enabling feelings of embodiment (Craig, 2008; Herbert & Pollatos, 2012). These interoceptive skills may also increase awareness in contemplative practice (Bornemann et al., 2015; Farb et al., 2007; Farb et al., 2012; Farb et al., 2015).

Price and Hooven (2018) showed the impact of bodily awareness on mindfulness using an interoceptive skill-building approach called Mindful Awareness in Body-Oriented Therapy. The study suggested emotional regulation is dependent on awareness of sensory signals, reiterating that interoceptive skills like mindfulness are crucial to wellbeing (para. 1). Modalities like Mindfulness-Based Cognitive Therapy, which are designed to cultivate body awareness, have been found to support individuals in recovery from depression (Segal et al., 2018). Michalak et al. (2012) found Mindfulness-Based Cognitive Therapy to effectively treat depression and argued the "embodied effects" may help researchers uncover the causes (p. 197). Increasing interest in embodiment research supports Lucas et al.'s (2018) argument for embodied practices for cancer patients using Mindfulness-Based Movement to maneuver participants from passive to more active habits as an effective coping and management strategy for dealing with the disease.

Researchers Kok and Singer (2016), in a 9-month mental training program called the "ReSource Project," designed a longitudinal study comparing three types of practices that revealed different effects. Investigators demonstrated the body scan increased interoceptive awareness the most out of the three meditation practices. Singer and Engert (2019) also differentiated between meditation protocols, noting that practices yield different results. Attention to the body has the most positive change in "increased interoceptive and emotional awareness" (p. 154). Actively increasing awareness of the body through body practices increases our interoceptive skills. Consider the impact of disruptions in the interoception system: difficulty detecting internal signals; decreased feelings of wellbeing; deregulation of homeostatic functions; and decreased ability to initiate survival mechanisms (Price & Hooven 2018; Schulz & Vogele, 2015). Experts note disruptions in safety are commonly due to developmental and attachment issues, autism, and trauma (Levine & Frederick, 1997; Ogden & Minton, 2000; Payne et al., 2015).

Individuals may have difficulty with mind training practices taken out of the context of a comprehensive framework (Lindahl et al., 2017). Individuals experiencing dysregulation due to high stress, burnout, trauma, or illness, may find regulation from practices that increase body awareness and movement (Lucas et al., 2018; Price & Hooven 2018; Schulz & Vogele, 2015). Researchers agree that body-oriented mindfulness practices can build greater interoceptive awareness and therefore increase self-regulation skills (Kok & Singer, 2016; Michalak, 2012; Price & Hooven, 2018; Segal, 2018).

Polyvagal Theory and Contemplative Practice

Polyvagal Theory is an evolutionary biobehavioral framework that explains how vagal influences help regulate the Autonomic Nervous System (ANS). The theory is based on three

organizing principles that describe the architecture of the mammalian autonomic nervous system—hierarchy, neuroception, and co-regulation (Porges, 1995b, 2004, 2009, 2017a).

Hierarchy

Porges' (2004) Polyvagal Theory describes the human evolutionary physiology of the vagus nerve going from the "primitive reptilian ancestral beginnings to the uniquely mammalian nervous system active today" (pp. 19–20). Over millions of years of evolution, the organizing hierarchy developed from oldest to newest—immobilization, mobilization, and social engagement (Porges, 2004). The principle of Jacksonian Dissolution describes how systems react in predictable ways using newer systems first then default to "recruiting older systems based on the neuroception of safety or threat" (Porges, 2009b, p. S88). In times of safety the physiological state is regulated via the parasympathetic ventral vagal pathways. Under stress, the ANS was thought to have only one adaptive defensive strategy through sympathetic paths. This led researchers to perceiving the ANS as an antagonistic system. The Polyvagal Theory uncovered a second defensive strategy in the human nervous system via the parasympathetic dorsal vagus nerve, making it a poly-vagal theory (Porges, 1996).

The vagus is the 10th cranial nerve and acts like a cable providing bidirectional communication between the body and the brain. It functions like a surveillance system that is continually looking for signs of safety and threat in the environment (Porges, 1995a). It is the longest nerve in the body, traveling through the neck, chest, diaphragm, and stomach. The vagus nerve originates in the brainstem and innervates the "larynx, pharynx, heart, lungs, and the gastrointestinal tract" (Howland, 2014, p. 66). It is integral to the ANS as a regulator of the body's physiological state and homeostatic functions. About 80% of signals from the vagus are sent via sensory fibers from the body to the brain, compared to 20% of motor signals originating

in the brain going to the body (Porges, 1995b; Howland, 2014). Sympathetic mobilization or parasympathetic immobilization is inhibited through engaging the vagal brake (Porges, 1992, 1995a, 1995b; Porges et al., 1996). The vagal brake dampens nervous system reactivity and assists in the autonomic flexibility needed to regulate the system. Vagal tone, determined through heart rate variability, is naturally enhanced by engaging in aspects of contemplative practices like breathing, posture shifts, and vocalizations (Porges, 2017b, p. 13).

Lindahl et al.'s (2017) study on meditation-related challenges showed characteristics of mostly defensive autonomic responses including derealization, somatosensory changes, and changes in sense of embodiment among others. Through a polyvagal lens, contemplative practices are natural regulators of the ANS, however experiences are also influenced by context-like feeling safe, which directly effects an individual's physiological state. Meditation effects are unpredictable without attention to the autonomic effect on the brain and body (Porges, 2017b). Due to the prevalence of nervous system dysregulation from chronic stress, negative contemplative experiences, and traumatic and secondary traumatic stress, more investigation is necessary into offering mindfulness more safely. Vagal influences are directly related to body-oriented and embodied practices that are being investigated to address disruptions in safety and potentially restore physiological safety. Leaders in Trauma-Sensitive Yoga, and Trauma-Sensitive Mindfulness, have been at the forefront in promoting safety in experiential practice programs (Emerson et al., 2009; Treleaven, 2018).

Neuroception

The vagus mediates nervous system strategies based on information coming from the external and internal worlds. Neuroception is used to describe how the nervous system uses neural circuits, acting like a surveillance system, to determine safety or danger in the

environment (Porges, 2009a). Neuroception acts to continually assess risks of safety or threat in the environment-real or perceived. Vagal influences directly impact behavior due to its ability to inhibit defensive strategies (Porges 1995b, 2004, 2009b, 2017a). For example, suppose individuals find themselves in an uncomfortable situation where others are angry. If the individual feels threatened, then parasympathetic, ventral vagal influences will be inhibited. Sympathetic activation will initiate mobilization through fight or flight defenses regulating the homeostatic systems and providing all the resources to support that action. On the other hand, suppose an individual feels overwhelmed without the resources to meet the demands on the nervous system. In that case, they may experience a more ancient defense strategy immobilization experienced as shut down or collapse (Porges, 1995b, 2009b). Defense strategies may leave individuals disconnected from your body and feelings or wanting to pull the covers over their head and not want to engage with the world.

Understanding triggers, feelings of threat, and reactivity patterns may help mediate behaviors that may contribute to burnout, such as isolation (Porges, 2009b). Under threat, individuals experience sympathetic fight or flight or dorsal vagal activation that can lead to a collapse or may cause dissociation from the body, or feelings- inhibiting the capacity to connect with others. Feeling threatened inhibits the capacity to access the social engagement system, which is necessary for "health, growth and restoration" (Porges, 2011, p. 267).

Social behavior is mediated through feelings of safety and is integral to the social engagement system via safety cues from others through neuroception (Porges & Furman, 2011). The physiological regulation of the nervous system through vagal pathways supports the motivation for prosocial behavior, play, and co-regulation with others, which increases safety

(Geller & Porges, 2014). State changes are predictable as "shifts in the probability (and possibility) that specific behaviors and feelings will occur" (Porges, 2017b, p. 41).

Co-regulation

The last organizing principle of Polyvagal Theory is co-regulation, a biologically driven imperative to be prosocial (Porges, 1995b, 2004, 2009b, 2011). The ANS continually regulates physiology through a "state-behavior interface" through social connection, movement, or recruiting systems to move towards regulation or shut down when overwhelmed by experiences (Porges, 2019, p. 24). When the Social Engagement System is active via the parasympathetic ventral vagal pathways, through the face-heart connection, it enables individuals to seek out others to feel safe with, especially when experiencing feelings of threat; this prosociality is shown to increase feelings of wellbeing (Porges, 2009b, 2017b; Porges & Furman, 2011).

A crucial foundation of self-regulation lies within the social engagement system, highlighting unique mammalian caregiving features. The face-heart connection gives humans the ability to communicate their approach state through facial expressions while caregiving. Babies are born into the world wired to co-regulate, needing care to survive. Vagal influences on the body and cues of safety are communicated relationally through facial expressions, non-verbal cues like eye contact, and tone of voice, thus integrating the autonomic regulation to the social engagement system (Geller & Porges, 2014; Porges, 1995b, 2004, 2009b, 2015, 2017a; Porges & Furman, 2011). One example is a mother reassuring her feeding infant with a soft gaze or smile. In addition to ingestion behaviors of sucking and swallowing, this face-heart connection helps regulate the infant's nervous system with soft vocalizations, tactile stimulation-stroking, and holding, rocking, rhythmic movement, essentially developing nervous system regulation through co-regulation (Porges, 1995a, 1995b, 2017a; Porges & Dana, 2018).

Researchers in attachment and trauma point to mammalian caregiving as an essential aspect of developing a healthy nervous system. Feldman (2016) developed Biobehavioral Synchrony Theory, highlighting the multisensory aspects of mammalian caregiving. The theory refers to the impact of biological and behavioral processes of attachment figures effect on self-regulation in infants. A healthy nervous system is influenced through responsive caregiving during sensitive periods of development. Individuals who didn't get what they needed may find programs like Mindful Self-Compassion that uses generative practices that encourage mammalian care practices toward oneself like gentle touch and soft vocalizations useful in reducing suffering (Neff & Germer, 2018). Contemplative practices naturally affect the autonomic nervous system through social gathering using prayer, shifts in posture, and attention to positive emotions. Porges (2017b) pointed out that contemplative practices are neural exercises that the "newer vagal circuit may mediate" and have been used in rituals and practices that bring people together, like dancing around the fire (p. 27).

Embodied in a Virtual Space

One silver lining in the COVID-19 circumstances is it pushed people to make connections online. Many classes and courses were forced to deliver online if they wanted to continue to support students and mindfulness practitioners. Benefits of bringing Mindfulness Based Programs (MBPs) online are cost-effectiveness, ease of access, and low entry barriers. If one has access to a computer and can learn basic conferencing skills, then the barrier to entry is low. The question remains whether asynchronous or live classes are more effective.

Prior to COVID-19, Kemper and Khirallah (2015) presented a curriculum for a cost-effective, asynchronistic alternative to in-person training for busy health professionals to combat stress and burnout. The "Mind-Body Skills Training for Resilience, Effectiveness, and

Mindfulness" now called the STREAM program, focused on increasing mindfulness, resilience, and empathy training using various mind-body skills in 12 1-hour modules. The study showed only 42 of the 1,031 registrants completed all 12 modules; half attended at least one session. While investigators saw a decrease in stress and increase in resiliency in participants, more research is needed to look at the efficacy of asynchronous delivery and determine the amount of training needed to obtain results (p. 249). As shown, the commitment to attend a training that is not live may be diminished. Though Toivanen et al. (2017) proposed that in general web based MBPs are a potentially effective delivery method for mobility and health concern populations and found no evidence that asynchronous versus synchronous made any difference, positive results were found for "pain acceptance and coping" (para. 5). The mobility issue may have made the difference between the two previously mentioned studies.

In a feasibility study, Tree and Patterson (2019) addressed barriers to entry for mindfulness programs. Researchers described marginalized populations identifying as "lesbian, gay and bisexual" living in rural areas in Online Mindfulness-Based Stress Reduction programming (para. 1). A decrease in stress was shown in all participants, through stress due to "vigilance and vicarious trauma" was decreased in participants that identify as women (para. 4). The global pandemic in 2020 presented not only a threat to physical health but a mental health crisis. Pizzoli et al. (2020) addressed MBPs delivered online to study the alleviation of physiological stress due to social isolation during the COVID-19 health crisis. The study included guided pre-recorded audio clips using either a body scan, pleasant sounds from nature, or deep breathing exercises. Results showed body scans and breathing practices reduced stress more than listening to natural sounds among participants (para. 4-5). Virtual learning in higher education creates additional stressors for healthcare students due to lockdowns and

recommendations for social distancing. Social isolation presents a problem for all individuals, but social support has been shown to reduce the incidences of burnout in specifically in healthcare workers (Noh, 2017).

In response to student mental health, El Morr et al. (2020) created a Mindfulness Virtual Community an 8-week intervention that utilized Cognitive-Based Therapy principles to address the physiological state of students. Anxiety, depression, and stress were investigated through multiple questionnaires before and after the program. The online mindfulness-based intervention used "psychoeducation and relevant mindfulness videos to provide anonymous one-to-one peer conversations, community discussions, and 20-minute live video class sessions" (para. 3). The investigators suggested large populations may benefit from the Mindfulness Virtual Community online intervention. Though no statistical reduction in stress was reported, reductions in depression and anxiety were significant (para. 5).

New trends in research are moving toward merging ancient practices with innovations in technology by providing potential solutions from the emerging field of virtual reality, a relatively expensive technology. Chavez et al. (2020) used virtual reality to administer a mindfulness-based intervention in a feasibility study with homeless youth that showed reductions in anxiety but not in "physiologic stress" (para. 5). Though emerging quickly as a popular form of delivery in the literature, more research is needed to determine the safety and efficacy of virtual reality in mindfulness-based interventions. Researchers agree that web-based interventions have many benefits, including the ability to provide a means of connection during times of social isolation, low-cost opportunities to provide services with a low barrier to entry, and maybe more inclusivity for individuals that are disabled or feel disenfranchised (Kemper & Khirallah, 2015; Pizzoli et al., 2020).

This literature review features the impact of embodiment in Mindfulness-Based Programs adopted to address safer and more effective ways to practice and increase self-regulation in various settings and circumstances. The mindfulness programs mentioned focused on mental health, social isolation, pain management, coping, stress, and self-compassion. Applying Polyvagal principles to contemplative practices expands bodily awareness's breadth to include the physiological state. For example, the neuroception of safety and threat uncovers the hierarchy of predictable patterns regarding vagal influences affecting autonomic regulation. This framework suggests the biologically driven importance of co-regulation and the capacity to be prosocial. Autonomic nervous system defenses impact our behavior, emotions, and cognition, and vagal toning naturally found in contemplative practices can actively dampen those defenses, allowing social engagement. Rising interest in programs using technology to reduce isolation, like the Mindfulness Virtual Community, not only has the potential to increase resiliency but create community.

Discussion

I created the Polyvagal Informed Embodied Mindfulness (PIEM) program for students and professors in higher education in response to disruptions in safety due to the COVID-19 pandemic. Though participants at TCNJ were not necessarily meditation practitioners, they were looking to increase feelings of safety and stability through embodied mindfulness practices. While believing feelings of embodiment might help program participants feel better, the real driving force behind creating this program comes from my own experience of knowing the healing power of what it feels like to be embodied—first, as a human being, with an acute sense of my nervous system through processes of regulation and dysregulation. This work is informed by a personal history of trauma and vicarious trauma as a helping professional in the social

services field. My sense of embodied awareness has been cultivated within the context of dealing with an autoimmune disease and the process of working with the body-mind-heart holistically. This is a salutogenic approach, focusing on whole-body wellness, that acknowledges symptoms as data, informing all the body systems.

In contrast, a fragmented, allopathic system model treats disease symptoms as though they are somehow separate from one another and apart from contextual factors. My fascination for the power of integration came from watching my children with occupational therapists initiating early intervention protocols for sensory integration dysfunction. The impact of "disruptions in integration" was apparent and so close to my heart. These experiences led me to reframe my understanding of the suffering not just with children but also with adults. As a licensed bodywork therapist, yoga continuing education provider, and mindfulness teacher, I have witnessed the struggles of hundreds of clients, students, and individuals. This drives me to investigate a few basic questions: Can integrating more vagal toning practices into mindfulness programs help individuals give themselves what they need in the moment? Can autonomic flexibility be intentionally built into programs to support foundational stability and enable participants to self-regulate and be good co-regulators for others?

Integrating Polyvagal Toning Exercises into an Embodied Mindfulness Program Online

Mindfulness as a mind training alone may not offer enough bodily awareness to support dysregulation in formal practice. Current trends from experts in treating disruptions in safety, chronic stress, and trauma use integrative body-oriented therapies to restore physiological and psychological safety (Levine & Frederick, 1997; Payne et al., 2015; Schmaltz, et al., 2014). Researchers showed mindfulness increases interoceptive awareness, an essential regulation skill that helps individuals connect body signals to feelings to make sense of experiences (Mahler et

al., 2020). However, Kaparo (2012) pointed to how somatic practices deepen the interoception, exteroception, and proprioception systems. Individuals are integrating those systems all the time without realizing it simply by attending to how we feel. Meehan and Carter (2021) support Kaparo's (2012) view, pointing to the potential for somatic practices to help support those living with chronic pain (Meehan & Carter, 2021, para. 1). Integration of information coming through the body to the brain may be the key to regulation and vagal toning offers real-time opportunities to regulate the ANS.

The PIEM program has several purposes. First is to highlight the sometimes-forgotten resource of being embodied and its capacity to create stability in contemplative practices. Second is to recognize that the total nervous system is the primary field of awareness, preceding thinking, feeling, and behavior. Finally, the approach is organized through a Polyvagal-informed lens, highlighting the physiological state that drives behavior, thoughts, emotion, and connection. Recognizing the predictable patterns of the physiological state is a part of the orienting practice and may enhance practitioners' capacity to tolerate unpleasant experiences. The program is designed to support the intrapersonal relationship between the observer and what is being observed. According to Gilbert (2014), cultivating a compassionate view of oneself is the key to calming the threat system and creating a sense of safety. Due to our evaluative society, self-compassion is an essential theme in each session, addressing any reactivity or critical inner voice that activates the threat system. The body of compassion research suggests offering self-compassion has the potential for higher levels of positive emotion especially in helping people accept their imperfections (Goetz et al., 2010; Neff & Germer, 2018; Yarnell & Neff, 2013).

In each session, PIEM brings opportunities for autonomic flexibility by actively recruiting cranial nerves through vagal toning that regulate the ANS. To clarify, this does not

denounce the importance of noticing things *as they are* as a part of contemplative frameworks. Still, basic concentration practices offer very little autonomic support when thoughts or sensations become overwhelming. How will individuals learn basic mindfulness skills if they cannot tolerate the foundational practices? With PIEM as a real-time resource for regulation the potential for commitment to practice may be expanded.

Several themes are adopted to support practitioner wellbeing through stability and safety. First is bringing awareness of physiological states, creating stability first through bodily or external anchors and aligning with a moment that is safe enough. Using orienting practices that support foundational stability of the body, practice, and space are themes borrowed from the creators of Trauma-Sensitive Yoga and Trauma-Sensitive Mindfulness (Emerson et al., 2009; Treleaven, 2018). Self-care practices are incorporated that mirror mammalian caregiving using gentle touch, stroking, light pressure and holding, soft vocalizations, gentle movement, nonverbal gestures, and compassion, which helps participants to meet the needs of the moment (Carozza & Leong, 2021; Feldman, 2016; Gilbert, 2010; Neff & Germer, 2018; Porges, 2017b).

Integration is at the core of embodiment and the heart of whole-person wellbeing. Cultivating a feeling of wellbeing requires the integration and balance of complex processes and systems. A combination of top-down and bottom-up processes effectively integrates the body, mind, emotions, and experiences. For example, stimulating the cranial nerves naturally occurs during these contemplative practices (Loizzo, 2018; Porges, 2017b). Porges (2017b) pointed out some processes are passive, though we can actively affect the nervous system through breath, movement, touch, vocalizations, and listening. The following Table lists practices used in the PIEM program to increase vagal toning and autonomic flexibility during contemplative practice sessions (see Appendix A).

Structure of the Program

Polyvagal Informed Embodied Mindfulness is a multidisciplinary approach using systems integration. The Mindfulness Based Interventions: Teaching Assessment Criteria (MBI: TAC) offers standardized instructions for mindfulness teachers. The MBI: TAC guide instructs participants to focus attention on posture, breath, body sensations, sounds, thoughts and emotions, and the full range of experiences (Crane et al., 2012, p. 34), though it does not explicitly mention noticing the physiological state. Polyvagal Informed Embodied Mindfulness asks participants first to notice what their physiological state is. Where one is on the autonomic hierarchy-ventral vagal-feeling safe or in a mode of defense-offers valuable information about one's nervous system state and how to proceed. For example, a stressed system may need to stretch or move before settling into a seated practice. A system experiencing defensive strategies may find themselves unable to participate in prosocial behaviors when the body is busy trying to create homeostatic balance in the system. Polyvagal principles embedded into practice may provide the additional steps needed before sitting down and *seeing things as they are* (see Appendix B for the PIEM program overview).

Conclusion

This investigation reveals gaps in the research, revealing a limited view of embodied mindfulness practices and the scope of MBPs that are mostly relegated to the body scan and attention to breathing. Awareness practices that are body-oriented offer a more comprehensive view of the body as a resource that provides information and opportunities for regulation. This paper aims to expand the mindfulness toolkit to include awareness of the physiological state through a Polyvagal lens. Moving from simple attention practices that notice the breath to an integrative awareness that incorporates the mind, body, and heart initiates ventral vagal

regulation through vagal toning. This is a total immersion in bodily experiences, from feeling the breath to knowing the physiological state, and it offers profound insight into cognition, emotion, and behavior.

Embodied Mindfulness practices tone the vagal pathways through active and passive measures to help regulate the ANS. Vagal toning practices used in the PIEM program—including controlled breathing, listening, movement, touch, generative, chanting, visualizations, and vocalizations—have been shown to increase feelings of safety, embodiment, and wellbeing. Attention to the physiological state offers an integrated understanding of present moment experiences through a polyvagal lens. The PIEM program may benefit individuals who suffer from adverse reactions in meditation, stress, or traumatic stress. Increasing vagal tone may potentially increase autonomic flexibility, affecting the ability to dampen dysregulation and increase the capacity to restore the safety needed to co-regulate, an integral part of mammalian heritage in addition to enabling a commitment to regular self-care and mindfulness practice.

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Appendix A

Toning the Vagus Nerve through Contemplative Practices

Contemplative Practice Aspects	Vagal Toning Practices	Cranial Nerves Active
Voluntary Breathwork	Diaphragm Release, Diaphragmatic, Victorious, Lion's Breath, Waterfall-(Long Exhale), Straw Breath	IX, X, XI
Posture / Movement	Body-Oriented Practices, Yoga, Stretching, Rotation, Flexion, Extension, Bi-lateral Integration	V, VI, VII, VIII, X, XI, XII
Vocalization, Prosody, Tone	Speaking, Humming, Mantra, Toning, Laughing	II, VIII, IX, X, XII
Acoustic Features	Listening, Making, Music, Sounds	VII, VIII, IX, X
Tactile / Touch	Grounding, Nonverbal Gestures, Acupressure, Self-Massage, Stroking, Tapotement, Push, Pull, Tapping, EFT, Holding	V, X, XI
Gustatory / Ingestion Behaviors	Swallowing, Suck, Movement of Tongue	VII, V, IX, X, XII
Visual / Visualization	Orienting, Eye Movement, Eye Gaze, Mirroring, Visualize, Attunement	II, III, IV, V, VI, X
Social Engagement / Co-Regulation	Cooperation, Reciprocity, Generative Practices: LKM, Compassion, Sympathetic Joy, Self-Compassion	V, VII, IX, X, XI

Note. Cranial nerves are stimulated as a result of active and passive aspects of contemplative practices. (Adapted from Kuppasamy et al., 2020; Porges, 2017b; Shapiro, 2018).

Appendix B

The PIEM program, is delivered online using a 31-step protocol, each 45-minute class in the 8-week program using the following structure:

- **Guidelines:** Each class, the guidelines are reviewed to set the community agreements, including attending to group safety, boundaries, and confidentiality, adapted from the Mindfulness-Based Interventions: Teaching Assessment Criteria (Crane et al., 2012, pp. 43-44). Additional guidelines were adopted from Trauma Sensitive Yoga, Trauma Sensitive Mindfulness, and Interoceptive Yoga to make the learning environment more trauma-informed (Diodato & Mahler, 2020; Emerson et al., 2009; Geller & Porges, 2014; Treleaven, 2018).
- **Tracking:** Participants do a Health Tracker survey that investigates levels of embodiment concerning wellbeing at the beginning of class and before the end. The survey is done online during class through the Qualtrics survey platform.
- **Check-In:** Each participant then shares a word as a brief check-in. For example, "I feel stressed!"
- **Opening Sequence:** at each session includes Orienting and Grounding practices that acknowledge the physiological state and bodily awareness. Practicing mindfulness through this polyvagal lens informs us of feelings of safety or threats that may be below conscious awareness. It refers to what's happening internally, externally, and in the outer world.
- **Breathwork:** Diaphragm Release (Iyengar, 1965; Kuppusamy et al., 2020).

- **Vagal Toning:** Activation of cranial nerves through voluntary breathing practices, eye movement, gentle body movement, self-massage (Loizzo, 2018; Lucas et al., 2018; Porges 2017b; Sullivan et al., 2018).
- **Body Tracking & Movement:** Movement Themes, Planes of Movement, Rotation, Flexion, Extension, Lateral Flexion, Rocking, Eye movement (Emerson et al., 2009; Ogden & Minton, 2000; Shapiro, 2012).
- **Muscle Activation:** Release, Self-Massage, Acupressure, Tapping, Tapotement (Dreisoerner et al., 2021; Maratos, 2017).
- **Chakra Energy Themes:** Focusing on area of the body, Imagery, Sounds, Intention, Words, Gestures, Area of the body (Johari, 2000).
- **Embodied Mindfulness Practices:** Focused Attention, Self-Compassion, Gratitude, Loving-Kindness Meditation, Heart of Joy (Hutcherson et al., 2008; Kabat-Zinn, 1982; Neff & Germer, 2013; Sirotina & Shchebetenko, 2020; Stellar et al., 2017; Treleaven, 2018; Zeng et al., 2019).
- **Somatic Resourcing:** Mammalian Care Giving, Generative Gestures (Feldman, 2016; Gard et al., 2014; Kaparo, 2012; Schmaltzl et al., 2014).
- **Integration:** Bi-Lateral, Sensory, and Body Systems, Movement Integration (Diodato & Mahler, 2021; Loizzo, 2018; Mahler et al., 2020; Tarsha et al., 2020; Taylor et al., 2010).
- **Closing Sequence:** Letting go, reframe any nervous system arousal to acknowledge the NS works for your survival and service. Post Health Tracker Survey, Check-in with a word about how participants feel after PIEM. Debrief anything that needs to be discussed regarding any challenges or what went well.