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Stressed Out and Stressed In: Regulating the Stress Response at an Endocrine Level through Dance/Movement Therapy

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Stressed Out and Stressed In:

Regulating the Stress Response at an Endocrine Level through Dance/Movement Therapy

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Sarah Lawrence College

Abstract

This thesis proposes dance/movement therapy as an approach to regulating the stress response from the perspective of the endocrine system. By examining the endocrine system's role specifically in the human stress response, one can gain clearer understanding of the hormonal components involved in the process of perceiving a stressor, reacting to it, and returning to homeostasis, as well as what happens when that process is interrupted, overworked, or dysfunctional. The impacts of these internal processes can manifest physically, mentally, emotionally, socially, and cognitively – making dance/movement therapy well-suited to thoroughly address them. This assertion was made following the investigation of the impacts of stress on the body, the endocrine system's involvement in the stress response, and existing embodied approaches to treatment. Through dance/movement therapy, regulation of the stress response can be addressed with a level of depth that holds the potential to create shifts on a hormonal level. To do this, it is proposed that approaches and interventions are centered around embodied preparation, processing, discharge, and connection with others.

Keywords: dance/movement therapy, endocrine system, stress, regulation

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The alarm goes off at 5:15 a.m., you somehow hit the snooze button three times. Suddenly it's 5:49 a.m. and you're running very late. The day has barely started, and you already feel behind. You frantically check the clock every few minutes as you rush through your morning routine and bolt out the door. You make it to the platform just as the train is pulling into the station and a sense of relief washes over you. You sink into the first available seat, take a deep breath, and slowly feel your heart rate return to normal.

In this situation, the body was able to call on its resources to respond to the demands of the circumstance and return to homeostasis after a stressful experience. Experiencing stress is an expected and necessary part of life. Humans have adapted to environments, overcome obstacles, and responded to threats by effectively and often unconsciously calling upon their body's resources to cope and survive. The human stress response is commonly understood as a cycle of preparation, activation, and return to homeostasis. However, the mechanisms that make up the stress response, inherited through evolutionary ancestors, may not have adapted at the same rate of change as modern-day stressors. In times of prolonged or excessive stress, those resources may not always be as functional or easily accessible. If we are consistently stuck in a state of preparing for a stressor or activating our resources, we avoid homeostasis and deplete our resources.

The causes of stress can be different for each person, with much of reported stress in adults revolving around economic, social, and/or political factors. The stress response is a universal human experience, but may manifest and be understood differently across cultures. This paper will focus on the experience of stress within the context of the United States. A 2022 poll found that Americans are currently most stressed about economic inflation, financial uncertainty, global issues, and current events (Crist, 2022). Additionally, 87% of the poll

respondents reported feeling fatigued and overwhelmed, citing what feels like a constant influx of crises over an extended period of time. It may be argued that increased access to global-scale input in real time could be harmful to today's humans. Exponential advances in globalized media, technology, increased exposure to lived and/or witnessed crises, the demands of economically-driven societies, and the pressure of functioning as individuals rather than within supportive communities could all be potential factors in the increased prevalence of chronic, continuous stress.

Humans are not built to take in so much information, especially stressful information, all the time. According to Schreier and Evans (2003), modern-day stressors induce greater demands than ancient stressors on the stress response of today's humans. In a study of 286 children, it was found that modern-day stressors invoked higher rates of HPA activation than ancient stressors (Schreier & Evans, 2003). It is believed that while modern-day stressors may cognitively appear to be more familiar to today's humans, the body has not yet had enough time to evolve an adaptive response to a quickly changing society (Schreier & Evans, 2003). Chronic exposure to actual and perceived stressors is undoubtedly having a negative impact on people all over the world.

The impacts of stress manifest differently in different people. Common physical symptoms of stress include headache, muscle tension, changes in heart rate, changes in sex drive, digestive issues, nausea, fatigue, skin problems, among others. Emotionally and mentally, people experience symptoms of anxiety, depression, lack of motivation, difficulty focusing, increased irritability, memory loss or impairment, restlessness, and feelings of overwhelm. Stress also has an impact on human behavior. People experiencing prolonged stress may withdraw socially, neglect obligations, engage in substance misuse, decrease exercise/become more sedentary,

change eating habits, and change sleeping habits. The symptoms of prolonged or chronic stress impact humans' overall health in physical, emotional, mental, cognitive, spiritual, and social functioning.

This thesis proposes dance/movement therapy as an approach to regulating the human stress response from the perspective of the endocrine system. Dance/movement therapy has the potential to reach a person in all of the realms where symptoms of stress manifest for so many people. By homing in on the endocrine system, we can begin to understand an additional layer of the deeply-connected nature of the human body within itself, within its environment, and with others. The endocrine system is an internal body system that has a bidirectional relationship with external stimuli; such as behavior, mood, and response to one's environment. This means that hormonal processes within the body can impact observable changes in the way a person behaves. At the same time, elements of one's behavior, mood, relationships, and environment can also lead to hormonal shifts as a response or adaptation. For example, a commonly referenced internal endocrine shift that leads to behavioral change is premenstrual syndrome. Premenstrual syndrome (PMS) refers to the symptoms that occur as a result of hormonal changes between ovulation and the beginning of menstruation. Around 48 percent of people within reproductive age experience PMS and often experience irritability, depressed mood, fatigue, tenderness, and food cravings at the beginning of their menstrual cycle (Higuera & Raypole, 2022). While this may seem like a common experience that 'just happens,' these symptoms are the external manifestation of the complex internal process of rising and falling levels of estrogen, progesterone, and serotonin.

There are also times when an external factor initiates an internal change or reaction. For example, when faced with an acute threat or stressor, one may notice their heart rate speeding up

and breathing becoming more shallow. This sensory observation and cognitive assessment trigger the adrenal medulla to release adrenaline to prepare the body for the fight-or-flight response. When adrenaline secretion is increased, the rest of the body receives signals to act. Shallow breathing occurs as the passages to the lungs are widened, creating more space to take in oxygen. Blood is redistributed to prioritize the muscles, leading to the heart working harder and consequently racing (Society for Endocrinology, 2018).

By examining the endocrine system's role specifically in the human stress response, one can gain clearer understanding of the hormonal components involved in the process of perceiving a stressor, adapting or reacting to it, and returning to homeostasis, as well as what happens when that process is interrupted, overworked, or dysfunctional. The impacts of these internal processes can manifest physically, mentally, emotionally, socially, and cognitively – making dance/movement therapy well-suited to address one's experience of stress through various interventions aimed toward processing and integration. Dance/movement therapy couples body movement with psychotherapeutic approaches that can offer a person the opportunity to connect their internal experiences with external expression for the purpose of an integrated self.

Impact of Stress on the Body

Short-term stress can aid humans in building adaptive skills to deal with life's various challenges. Therefore, appropriately responding to stress can be a healthy survival mechanism. Stress lasting only minutes to hours is thought to enhance the immune system's capabilities for healing and protection (Dhabhar, 2014). However, chronic and/or misplaced stress responses can have harmful consequences on physical and mental health. According to Charmandari et al. (2005), "the human body and mind react to stress by activating a complex repertoire of

physiologic and behavioral central nervous system and peripheral adaptive responses, which, if inadequate or excessive and/or prolonged, may affect personality development and behavior, and may have adverse consequences on physiologic functions” (p. 259).

The impact of excessive or chronic stress can be felt in the entire body. In the musculoskeletal system, stress manifests mainly in the tension of muscles. Consistent muscle tension without release can lead to headaches, chronic pain, and muscular atrophy. Physical relaxation techniques aimed at relieving muscle tension also aid people in improving mood, daily functioning, and stress (APA, 2018). In the respiratory system, stress can disrupt the process of moving oxygen from the nose to the lungs and, eventually, into the bloodstream by constricting the pathways through which oxygen travels. This often presents as rapid breathing, hyperventilation, shortness of breath, asthma attacks, and even panic attacks. Intentional focus on deep breathing and relaxation can help people improve the flow of oxygen and return to a more regulated state (APA, 2018).

The cardiovascular system responds to stress by increasing heart rate, contracting the heart, dilating blood vessels to increase blood flow, and transporting hormones throughout the body via the bloodstream. This process allows humans to quickly respond to acute stressors without needing to stop and think of a solution. However, chronic stress or excessive exposure to acute stress can negatively impact the cardiovascular system. The risk of high blood pressure, heart attack, stroke, cholesterol levels, and heart disease are all heightened by unhealthy amounts of stress on an individual (APA, 2018).

Closely interacting with the cardiovascular system is the endocrine system. The endocrine system is responsible for producing hormones and initiating their use in response to different bodily processes. In the endocrine system’s stress response, cortisol is the major

hormone sent through the bloodstream to assist the body in reacting to a stressor and returning to homeostasis afterward. Homeostasis refers to the sense of stability within the body, which relies on the balance of the internal environment with external demands. Too much cortisol in the body over an extended period of time can lead to chronic health conditions impacting the immune system, metabolism, and mental health (APA, 2018).

The nervous system's role in responding to stress can negatively impact the rest of the body by being consistently or excessively activated. The central nervous system takes in information and interprets whether a threat is present or not. The autonomic nervous system then initiates physical reactions to stress that are carried out in the rest of the body. Therefore, if the nervous system is typically in a state of arousal, the rest of the body will follow and experience physical manifestations of that stress (APA, 2018).

By examining the differentiated parts of the body, one can reach a better understanding of how connected and interdependent they actually are in responding to an event or change. The body can be seen as a gestalt, in that no independent body system can function as a whole person on its own. They work together to create and sustain the functions of existence in a way that is present and flexible in order to meet the demands of the environment. The major systems responsible for bridging these necessary connections are the nervous and endocrine systems.

Nervous and Endocrine Systems

The nervous system and the endocrine system are closely intertwined and work together to maintain homeostasis in the body. The nervous system can be viewed as the body's command center. It receives sensory information, directs body movement, processes thoughts and memories, and controls automatic or unconscious bodily processes. The endocrine system produces, transports, and regulates hormones in the body to regulate growth, metabolism, mood,

sleep, reproductive function, and other bodily processes. The endocrine system works closely with the nervous system to send messages to the body about how to react to and store information. While the nervous system employs neurotransmitters to move information through the nerves, the endocrine system sends hormones through the bloodstream to communicate with the rest of the body at a slower speed and serves to achieve and regulate homeostasis more than immediately respond to a threat. Hormones secreted in response to stress can linger in the body even after the threat has passed (Hiller-Sturmhöfel & Bartke, 1998). These systems connect and communicate via the hypothalamus, a gland in the brain responsible for maintaining homeostasis in the body. The importance of the relationship between the hypothalamus and the pituitary gland cannot be understated. The hypothalamus controls the secretion of pituitary hormones and receives feedback from other endocrine glands in order to modulate levels of secretion and evaluate the body's needs.

This vital connection can be impacted by pathology in one or both systems. A hormonal imbalance in the endocrine system may be treated by augmenting hormone levels through medication or other medical intervention. However, many endocrine disorders are overlooked and, if left untreated, one may begin experiencing seemingly unexplained symptoms. Yu (2014) writes that endocrine disorders may have neurologic and physical manifestations. These include “headache, altered state of consciousness, abnormal muscle strength, muscle tone, muscle stiffness and cramps, movement disorders, and psychomotor retardation” (Yu, 2014, p.185). Yu (2014) recommends better understanding of the interaction between the endocrine and nervous systems in order to more efficiently identify and treat endocrine disorders and the neurologic symptoms that may accompany them.

The Nervous System

The nervous system is categorized into two main parts, the central nervous system and the peripheral nervous system. The central nervous system consists of the brain and spinal cord while the peripheral nervous system consists of the nerves that relay information between the central nervous system and the rest of the body (Regional Neurological Associates, 2020). Within the peripheral nervous system, there are two main categories: the somatic/voluntary nervous system and the autonomic nervous system. The somatic nervous system is responsible for voluntary body movements by providing motor impulses to the musculoskeletal system. The autonomic nervous system is a component of the peripheral nervous system that regulates involuntary or unconscious processes including heart rate, blood pressure, breathing, and digestion, among others. The autonomic nervous system is understood in two main parts: sympathetic and parasympathetic. The sympathetic nervous system is responsible for responding to threat or stress by aiding in the shutdown of the body's processes not immediately needed for survival. It prepares and activates the body. The parasympathetic nervous system, on the other hand, is responsible for conserving energy and returning to regulation after periods of activation. This allows previously suppressed systems, like the digestive and immune systems, to begin working at optimal levels again. (Regional Neurological Associates, 2020).

The Endocrine System

The endocrine system is made up of the body's different hormones and the glands that produce and secrete them and serve to regulate many bodily functions. Hormones are chemical messengers that travel through the bloodstream and impact many facets of the human body. Hormones are molecules that are produced by the endocrine glands. Hormones are released from the glands into the bloodstream in response to specific stimuli. Some hormones have only a few

specific target cells, while other hormones affect numerous cell types throughout the body (Hiller-Sturmhöfel and Bartke, 1998). There are over 50 hormones in the human body. They are secreted from various glands and assist the body in regulation, stress response, growth, development, reproduction, and metabolism. Hormones can also impact emotions, behavior, and relationships.

Various hormones are created by glands such as the hypothalamus, pineal body, pituitary, thyroid, adrenals, pancreas, and gonads (Johns Hopkins Medicine, n.d.). Johns Hopkins Medicine (n.d.) provides a simple outline of the glands that make up the endocrine system and their basic functions. The hypothalamus, located in the brain, serves as the link between the endocrine system and the nervous system. It produces both releasing and inhibiting hormones to assist in regulation of homeostasis and directs the pituitary gland to activate other glands in the endocrine system. The hypothalamus regulates hunger, thirst, and body temperature. The pituitary gland releases the hormones that regulate the other endocrine glands. The pituitary gland also produces hormones that promote growth and sexual development. The pineal gland, located in the brain, rhythmically secretes melatonin and regulates the body's sleep cycle. The adrenal glands, the medulla and the cortex, are located near the kidneys and help the body regulate glucose metabolism, stress response, blood pressure, and water and salt levels. The thyroid gland plays a role in development and is critical in regulating metabolism. The pancreas regulates blood sugar and aids in digestion. The gonads, ovaries and testes, regulate the behaviors and development of the reproductive system.

Endocrine System and Stress

The endocrine system's role in the stress response is primarily centered in the adrenal glands. The adrenal glands are triangular glands made up of a medulla and a surrounding cortex

located on top of the kidneys. The adrenal medulla is responsible for facilitating the fight-flight response by producing catecholamines (adrenaline/epinephrine and noradrenaline/norepinephrine). The adrenal cortex produces glucocorticoids (mainly cortisol). The adrenal glands work in connection with the hypothalamus and the pituitary gland, creating the hypothalamic-pituitary-adrenal axis (Johns Hopkins Medicine, n.d.).

The hypothalamic-pituitary-adrenal (HPA) axis is an important system in the response to stress and return to homeostasis. When the body perceives a stressor, the hypothalamus releases corticotropin-releasing factor (CRF) to the pituitary gland which then produces adrenocorticotropic hormone (ACTH). ACTH is then transported through the bloodstream to the adrenal glands. The adrenal cortex is then signaled to produce cortisol. Cortisol assists with the mobilization of glucose stored in the liver, which provides continuous energy for the body to manage the stressor. The HPA axis functions on a negative feedback loop, meaning that the hypothalamus and pituitary gland direct the production of cortisol and stop when the body has reached the levels necessary to deal with stress (Johns Hopkins Medicine, n.d.). The HPA axis is a crucial mechanism in helping the body meet the demands of the environment. However, repeated overactivation of the HPA axis can have adverse effects leading to health issues and decreased ability to manage stressors (Schreier & Evans, 2003). If the feedback loop is not completed or signaled to stop, the body will continue to produce and distribute stress hormones through the bloodstream.

The hormones primarily involved in the stress response are cortisol and adrenaline/epinephrine. Cortisol is a steroid hormone and is produced by the adrenal glands. Cortisol is responsible for helping regulate metabolism, regulating blood pressure, reducing inflammation, and forming memories. Cortisol is associated with the stress response and is present at higher

levels as a reaction to stressful or threatening stimuli. Exposure to too much cortisol for extended periods can cause hypertension, anxiety, sleep loss, and autoimmune problems. Too little cortisol is associated with low blood pressure, weakness, and fatigue (Society for Endocrinology, 2019).

Adrenaline (or epinephrine) is also known as a stress hormone. It is produced in the adrenal glands as well as in the central nervous system, making it a hormone as well as a neurotransmitter. As a neurotransmitter, adrenaline plays a role in communicating attention, panic, and excitement to peripheral nerve endings in the body (Cleveland Clinic, 2022).

Adrenaline has a much larger role in the acute stress response as a hormone. Adrenaline's major function is to prepare the body to respond to stressors. It helps with quick decision making in dangerous or stressful situations. Having too much adrenaline for extended periods can lead to high blood pressure, rapid heartbeat, anxiety, heart palpitations, irritability, and dizziness (Society for Endocrinology, 2018).

External Manifestations of Endocrine Shifts

Emotions and Mood

In a study of 44 patients between 2008 and 2013, Berent et al. (2014) found that some thyroid hormones are associated with depression severity and have an impact on treatment efficacy. Berent et al. (2014) report that while the relationship between thyroid hormones and depression is extensively studied, generalizable results remain inconclusive and contradictory. The participants of this study were diagnosed with Major Depressive Disorder (MDD) and had imbalances in thyroid hormones that were either high or low but not outside of normal range enough to constitute a diagnosis for a thyroid disorder. Berent et al. (2014) found that patients saw accelerated improvement in symptoms of MDD when treating the thyroid hormone imbalance along with antidepressant treatment. Although patients diagnosed with thyroid

disorders were excluded from the study, it was noted that depression is also a common occurrence among these patients. The researchers recommend augmenting thyroid hormone levels in order to increase the efficacy and efficiency of pharmacological treatment for MDD. The prevalence of depression in people with thyroid disorders as well as hormonal imbalances in people with MDD highlight the ways that hormones impact mental and emotional functioning and vice versa.

Although glucocorticoids have not been found to directly cause particular mood states, they are commonly associated with a negative affect in regard to the irritability or depressed mood that are often associated with high levels of stress. However, it was found that patients with Cushing's Syndrome (a diagnosis indicated by excessive levels of cortisol secretion) experienced relief from their depressed mood when their cortisol levels were treated, suggesting the existence of a correlational relationship between cortisol and mood (Wirth et al., 2011). Wirth et al. (2011) describe the relationship between cortisol and emotions as “complicated” (p.2) and suggest that other factors such as familiarity with an environment, health of the individual, and emotional material related to past memories also play a role in one’s potential affect changes as they relate to cortisol level changes. The conclusion drawn by Wirth et al. (2011) supports the idea that the relationship between hormones, mood, and behavior is multidimensional. Therefore, treatment requires a more holistic approach than simply adjusting hormone levels.

Relationships

Josef et al. (2019) explored the impact of oxytocin on relationships. Oxytocin can help relieve stress, lower blood pressure, lower cortisol levels, promote prosocial interactions, and aid in healing. The researchers had friends dance in pairs after receiving intranasal administration of

oxytocin or a placebo. They measured synchrony between the partners by using computerized motion tracking and comparing velocity of their movements. The hypothesis that the oxytocin group would see an increase in synchrony between partners was supported. Kinesthetic empathy was observed at higher levels when the partners had heightened levels of oxytocin compared to the placebo group. Josef et al.'s (2019) findings offer support for the idea that hormones not only affect the individual, but can also impact relationships.

Stress

Romero and Butler (2007) outline two categories of hormones that form the endocrine response to stress. These are the catecholamines (epinephrine/adrenaline and norepinephrine/noradrenaline) and the glucocorticoids (cortisol and corticosterone). Catecholamines are part of the “fight-or-flight” response. Epinephrine and norepinephrine are released from both the adrenals and the sympathetic nervous system to provide an immediate response to threat. Epinephrine and norepinephrine are involved with increasing focus, heart rate, blood flow, and efficiency in the lungs. They also aid in halting digestion, breaking down glycogen, induce the lowering of blood pressure, and induce piloerection (Romero & Butler, 2007). Essentially, epinephrine and norepinephrine help the body turn off unnecessary processes that take energy away from the energy needed for survival of the stressor.

Romero and Butler (2007) outline the necessary functions of catecholamines and glucocorticoids in the body's response to acute stress. Glucocorticoids are released more slowly than catecholamines and have various roles when responding to stress. Glucocorticoids are hypothesized to influence memory formation, hiding and waiting strategies, fleeing strategies, and migratory patterns in some species. They can also inhibit growth, reproduction, and immune system function in times of stress as a way of conserving the body's energy and resources

(Romero & Butler, 2007). Glucocorticoids are also believed to have an impact on behavior. However, that impact is still currently being studied and not always predictable in natural settings. Romero and Butler (2007) assert that long-term and chronic exposure to these hormones can have negative impacts on health that include cardiovascular, reproductive, immune, mental, and hormonal illness or dysfunction.

The “fight-or-flight” or acute stress response, first proposed by physiologist Walter Cannon, is the automatic and unconscious physiological process of responding to a threat by evaluating one’s options for survival (Tonhajzerova & Mestanik, 2017). According to Cannon’s findings, one assesses a threat and determines whether they can fight it or need to flee for survival. Subsequent theories propose more expansive frameworks for the human stress response. In addition to fight or flight, ‘fawn’ and ‘freeze’ responses are commonly referenced responses to more modern stressors. The ‘freeze’ response is the act of halting movement and increasing alertness observed in many prey animals as a tactic to avoid being noticed by a predator from a distance. In close contact with a predator, the ‘freeze’ response manifests in tonic immobility, or “playing dead” (Bracha, 2004, p.680). In humans, the ‘freeze’ response also employs hypervigilance, indecisiveness, and tonic immobility to increase chances of survival. Freezing is an adaptive response to stressors when it is assessed that there is little to no chance of successfully fighting or fleeing (Bracha, 2004). The ‘fawn’ response involves conflict avoidance through the use of flattery, people-pleasing, and aligning with the threat/predator for safety or escape from punishment (Gaba, 2020).

In 2000, Dr. Shelley Taylor proposed another theoretical model for responding to and regulating stress called “tend-and-befriend”. Taylor et al. (2000) found that while females and males both have fight-or-flight response capabilities, the female stress response is more

characterized by prioritizing the care of offspring, reducing vulnerability by joining social groups, and contributing to those social groups by exchanging responsibilities. This pattern is attributed to neuroendocrine aspects of the female body including levels of oxytocin and estrogen, among others. However, Taylor et al. (2000) suggests that while females are physiologically more prone to affiliative responses, social and cultural factors play a role in this stress response as well. By examining sex differences, social factors, and evolutionary influences, research on the stress response now supports more range in the known ways humans have adapted over time.

The Adaptive Calibration Model (ACM) views the various possibilities for responding to stress as an individual and adaptive process (Tonhajzerova & Mestanik, 2017). The ACM incorporates multiple theories about the physiological response to stress with the idea that individual differences and environmental adaptations as well as genetic predispositions and risk factors play an important role in determining how a person will respond (Tonhajzerova & Mestanik, 2017). In addition to various individual differences, it is important to acknowledge that the human stress response is also inclusive of memories and past experiences, conscious or unconscious, that interject an additional layer to one's in-the-moment appraisal of a stressor. For example, Payne et al. (2015), provide a case study in which a client was participating in Somatic Experiencing (SE) to process his traumatic experience of a car accident. The client was physically safe and having difficulty understanding his emotional response after the accident as it did not match his physical experience. The client eventually remembered a childhood memory of his father pressuring him to hold in his tears and try again after falling off of a bicycle. This memory played a role in the patterns the client formed for dealing with traumatic stress and was held in his body. Through SE, he was able to allow it into his consciousness and integrate it in an

embodied and more complete way (Payne et al., 2015). The way a person responds to a stressor is not always fixed and can depend on present circumstances, past experiences, societal patterning, and individual differences.

Endocrinology

The field of endocrinology is already incorporating observations of behavior and environmental factors into its approach. Endocrinology is also expanding its reach into other fields of science and medicine to gain a broader view of the impact the endocrine system has on the entire body. Behavioral endocrinology is the study of the interactions between behavior and hormones. According to Nelson (2010), the relationship between behavior and hormones is bidirectional, meaning that they influence each other. Observation of and evidence for the relationship between behavior and hormones is collected through various techniques such as ablation, pharmacological techniques, brain imaging, gene manipulation, and gene arrays, among others (Nelson, 2010).

In studies of primates, researchers have shifted more toward non-invasive methods of data collection and long-term observation in order to remove unnatural changes or disturbances that come with capturing, darting, and sedating animals. For example, glucocorticoid levels tend to rise when primates are captured in response to stress, thus impacting the data collected. There are also ethical implications of repeatedly distressing wild animals. However, the knowledge that hormone concentrations changed in response to an event in the primates' environment is useful to researchers. Researchers now examine urine, feces, saliva, and hair rather than relying solely on blood samples in order to observe hormonal aspects of reproductive patterns, environmental impacts on population, aggression, stress, nutrition balance, and social rank as they occur in natural habitats (Behringer & Deschner, 2017). This shift in methods for data collection, alone,

supports the knowledge that endocrinological states and changes have whole-body manifestations and far-reaching implications.

Psychoneuroendocrinology (PNE) is an interdisciplinary field that, as the name suggests, examines the intersections of psychology, neurology, and endocrinology. PNE specialists and researchers seek to understand the relationship between symptoms in particular body systems when the primary issue is rooted elsewhere. They also look at the association between life events, genetic predispositions, and developmental factors as they correlate with psychoneuroendocrinological health concerns (Plotsky et al., 1998). The field of PNE is rooted in the idea that health and illness are influenced by the body's internal interactions between systems as well as one's environment and life experiences. This holistic approach to endocrinology exemplifies how deeply-rooted the endocrine system is in a person's internal and external wellbeing.

Endocrine disorders typically are a result of overproduction of a hormone, underproduction of a hormone, or a disruption in the endocrine system's ability to function due to a tumor or lesion. When hormone levels are imbalanced, it is often due to a problem with the feedback system between the gland and the hypothalamus (Miller, 2021). Treatment for many endocrine disorders involves hormone therapy/medication to supplement or restore the body's hormone levels or surgical removal of tumors (Miller, 2021). Many patients with endocrine disorders also benefit from engaging in regular exercise including cardio, strength training, interval training, and yoga, among others (Basile, 2020). Physical activity is crucial for maintaining endocrine health, especially in today's technology-driven and more sedentary world. Not only does exercise help people feel good and maintain a general sense of wellness, it aids the endocrine system in keeping hormones flowing at consistent levels throughout the body. For

example, when engaging in high-intensity interval training (HIIT), the body experiences short periods of intense exercise followed by short periods of rest. This raises cortisol and human growth hormone (HGH) levels (Basile, 2020). Through this type of exercise, the body activates to meet the demands of an acute stressor through the release of cortisol. HGH then supports the return to homeostasis and future adaptability by promoting muscle recovery as well as increasing strength, muscle growth, and metabolic function (Basile, 2020).

Including movement and body-based approaches to treatment in physical and mental healthcare highlight the inseparability of mind and body. The benefit of movement, like exercise, has been shown to aid in the prevention and improvement of endocrine disorders for many patients. Movement is also highly recommended for stress reduction. When considering the endocrine aspects of stress, it appears that people would benefit from an additional level of intentionality toward psychological perspectives in order to more fully integrate the totality of their experiences.

Embodied Approaches in Current Treatment Options

Yoga

Pal et al. (2017) report that a risk assessment for diabetes mellitus (DM) found that people in India with more sedentary lifestyles had three times the risk of developing DM than people who were more physically active. DM is a hormonal and metabolic condition that is characterized by insufficient levels of or the inability to use insulin secreted by the pancreas. Obesity, determined by body mass index (BMI), was also correlated with a higher risk of developing DM in another study presented by Pal et al. (2017). Other risk factors for DM include composition of diet, physical activity levels, adaptation to stress, circadian rhythm, and environmental factors. Yoga is recommended as an affordable lifestyle and treatment

intervention in India because it combines physical, mental, emotional, and spiritual aspects with the intent of overall well-being. Pal et al. (2017) report that specific asanas have shown evidence that they are beneficial for the abdominal area and cause regeneration of the pancreas by activating enzymes in liver and adipose tissues. This promotes glucose metabolism, making yoga particularly beneficial for DM patients. Other studies presented by Pal et al. (2017) found that yoga increased the presence of anti-inflammatory markers, decreased levels of obesity, reduction in blood pressure, decreased anxiety and depression, reduced cholesterol, reduced stress, and improved cardiac function.

Kosuri and Sridhar (2009) conducted a study that involved a 40-day yoga practice for people in India diagnosed with Type 2 DM, a pancreatic disease that occurs when the body does not make enough insulin or struggles to use it properly. This leads to high blood sugar levels and the inability to convert glucose into usable energy for the body. The study consisted of 35 participants who learned multiple asanas from trained yoga instructors. The asanas focused on stretching, breath awareness, and posture awareness. The participants were evaluated for psychological changes regarding depression, anxiety, and general well-being as it related to their diagnosis of Type 2 DM. The researchers found that there was a significant decrease in BMI among participants as well as reduced levels of anxiety and an improved sense of well-being. According to Kosuri & Sridhar (2009), yoga is an ancient Indian practice that promotes stress reduction by facilitating techniques such as meditation, imagery, and breathwork in various postures and movements. They propose that in India, yoga is a culturally appropriate and cost-effective way to improve quality of life and manage physical and psychological aspects of DM. Kosuri and Sridhar (2009), also note that previous studies found that yoga improved pulmonary function, nerve conduction, and glycemic control in people with DM.

Somatic Experiencing

Somatic Experiencing (SE) is a trauma therapy approach that encourages bringing one's attention to interoception and proprioception for the purpose of reducing symptoms held in the body. Interoception is the capacity to sense one's inner landscape, allowing the sensations of pain, thirst, and hunger, as well as different emotions, to come into awareness and be experienced on a body level. Proprioception is the awareness of one's body in space and in proximity to the environment. SE views symptoms of chronic stress and trauma as a multifaceted, dynamic response system rather than a single stimuli-response process. These symptoms are addressed through a bottom-up approach to processing, which means attention is paid to internal sensation, proprioception, and kinesthetic awareness rather than relying solely on cognition (Payne et al., 2015). Symptoms of chronic and traumatic stress are resolved "through the completion of thwarted, biologically based, self-protective and defensive responses, and the discharge and regulation of excess autonomic arousal" (p.1). According to Payne et al. (2015), when the body's reaction to stress or trauma is suppressed, the emotions and responses become stored in the body. The nervous system then functions as if the stressful situation is still present. Over time, otherwise neutral stimuli become subject to heightened sensitivity as the previously stored material keeps one from returning to baseline functioning. During SE treatments, clients are safely and sensitively guided through the kinesthetic and interoceptive elements of their traumatic experience in order to discharge the excess autonomic arousal and reestablish baseline functioning (Payne et al., 2015).

Biofeedback

Biofeedback is the process of gaining greater awareness of one's own bodily functions with the assistance of interactive devices for the purpose of learning to control them.

Biofeedback is widely applicable and commonly used for patients experiencing stress, ADHD symptoms, high blood pressure, incontinence, and chronic pain, among others. It is noninvasive and particularly attractive to patients looking to reduce reliance on medication, supplement the benefits of medication, and/or feel more in control of their own health (Mayo Foundation for Medical Education and Research, 2021). Davis' (1986) study of psychological interventions in the stress response of newly-diagnosed cancer patients found that the treatment group receiving biofeedback therapy and cognitive therapy saw significantly reduced cortisol levels than the control group. Additionally, the control group was found to have significantly elevated cortisol levels during their follow-up compared to their initial test, implying that biofeedback therapy and cognitive therapy could be implemented as preventative measures as well as treatment for stressed cancer patients (Davis, 1986).

Dance/Movement Therapy

Common themes that can be discerned from the above research include emphasis on movement, relationships, self-awareness, agency, regulation, multidimensional healing, and the holistic connection of body and mind at the center of health. Dance/movement therapy provides the opportunity to incorporate these themes, among others, within the practice. Dance/movement therapy is practiced all over the world. The concepts that serve as the foundation of the field are based in ancient societies, religious and cultural influences, art, and science (Chaiklin, 2016). According to Chaiklin (2016), dance is "naturally therapeutic due to its physical, emotional, and spiritual components" (p.5). While definitions vary around the globe, dance/movement therapy is generally considered a nonverbal approach to therapy that employs movement as a means for healing, self-understanding and integration, and well-being. The American Dance Therapy Association defines dance/movement therapy as "the psychotherapeutic use of movement to

promote emotional, social, cognitive, and physical integration of the individual, for the purpose of improving health and well-being (adta.org). Similarly, the Indian Association of Dance Movement Therapy defines dance/movement therapy as “a psychotherapeutic method that uses movement and creative expression to further socio-emotional, cognitive and somatic integration” (iadmt.org).

Chaiklin (2016) also highlights the importance of relationship along with movement by acknowledging the sense of community often felt while dancing with others. Dance/movement therapy enlists movement as a means for nonverbal expression, communication, and social interaction. Within the therapeutic relationship, clients can gain awareness of their own patterns and actions, make meaning of them, and understand how they relate to others. The ways in which an individual has come to experience and understand their world is nonjudgmentally revealed through movement and connection.

In Nigeria, a group of 24,000 people make up a politically autonomous group called the Ubakala. Members of the Ubakala engage in dance-plays that can serve as a form of group psychotherapy to prevent or help heal dysfunction in communication, self-actualization, and demoralization (Hanna, 1978). Some goals of the dance-plays are anticipatory psychic management, catharsis, conflict mediation, and group unification. According to Hanna (1978), the use of repetition in movement can aid a person in integrating and managing past experiences of stress or trauma. Repetition also provides an outlet for managing the anticipation of future events, by rehearsing the expectations of a threatening experience until the stress becomes manageable. For example, the Ubakala will often enact the stressors of adulthood through dance-plays in order to gain an embodied sense of preparation for events, like childbirth, leaving the family home, and death (Hanna, 1978). Through movement, the Ubakala relieve psychic tension

and increase their ability to manage stress and change. The dance-plays engage the whole body in anticipation, preparation, and reaction rather than just the mind, while also communicating and concretizing community beliefs and values around the topic.

After noting the benefits of aerobic exercise for the regulation of the HPA axis in older adults, Vranceanu et al. (2019) conducted a study on the use of dance/movement therapy, described as “dance/movement training”, that includes gross motor activities, socialization, body awareness, and emotional expression. The purpose of the study was to differentiate between aerobic exercise and dance/movement training and to examine whether the change in cortisol levels was related to the change in physical fitness or the psychological components of dance/movement training. The dance/movement groups met with a dance/movement therapist three times per week for one hour and contained four to eight participants. They explored themes of “body awareness, relaxation, balance, self-care, socialization, rhythm, and enjoyment” (Vranceanu et al., 2019, p. 689). The aerobic exercise groups also met three times per week for one hour. Both groups were compared to a control group. At the end of the three month study, the dance/movement group showed significantly lower concentrations of cortisol than the aerobic exercise group and the control group. The aerobic exercise group did not see a significant change in cortisol concentration levels, which implies that improving cardiorespiratory health alone did not help the participants in this study to regulate stress. Vranceanu et al. (2019) also report that none of the groups showed significant differences in any psychological factors. This finding implies that dance/movement can impact stress regulation on a hormonal level independent from psychological elements.

Creative arts therapies are considered an effective complement to pharmaceutical and medical treatments for people with chronic pain and chronic illnesses (Theorell & Anderberg,

2003). Creative arts therapies, including dance/movement therapy, provide interventions and approaches that are intended to relieve stress, strain, and pain in some medical settings.

According to Theorell and Anderberg (2003), dance/movement therapy is particularly effective for patients with fibromyalgia due to the “physical, emotional, cognitive, and cultural nature” (p.256) of the approach. Fibromyalgia impacts various facets of a person’s life and many patients experience anxiety, stress, and a sense of hopelessness about the unknown and the future in addition to the physical pain. In a 2003 study, Theorell and Anderberg measured stress hormone levels of patients with fibromyalgia in relation to the effect of dance/movement therapy. The researchers sought to determine if changes in stress hormone levels corresponded with movement patterns after dance/movement therapy treatment for 14 months. Compared to a control group, the treatment group reported higher levels of stress hormones at the end of the study. However, the treatment group also reported decreased levels of pain, increased mobility, and increased energy. Theorell and Anderberg (2003) hypothesize that the increase in levels of stress hormones in the treatment group could be related to the tendency of dance/movement therapy treatment to bring up unconscious processes that take time to work through and recommend that future studies facilitate a longer treatment plan in order to gain a more robust understanding of how dance/movement therapy can interact with stress hormones.

In another study, Ho et al. (2016) found that women undergoing radiotherapy treatment for breast cancer reported lower levels of stress, pain severity, and pain interference when also participating in dance/movement therapy treatment than a control group. The participants engaged in two one-and-a-half hour dance/movement therapy sessions per week for three weeks. Ho et al. (2016) specifically credits the use of group rhythmic action and spontaneous movement for the participants’ ability to release “psychological tension” (p.829). They also note that group

dance/movement therapy sessions especially aid in the reduction of stress by helping participants overcome isolation and feel social support. Of the three areas of interest to the researchers (stress, pain severity, and pain interference), stress levels saw the most significant decrease over the three week period.

Dance/movement therapists have begun integrating concepts in neuroscience into their approach to treatment. Homann (2010) conceptualizes embodied interventions aimed toward arousal and rest, implicit and explicit memory, emotion regulation, right and left brain hemisphere integration, and the mirror neuron system. Neurobiologists support the idea that emotions are physiologically involved and subjectively embodied from person to person. Movement engages the brain in a way that activates and supports the development of processing skills (Homann, 2010). Dieterich-Hartwell (2017) proposes a clinical application of dance/movement therapy for survivors of trauma that focuses on safety, hyperarousal regulation, and interoception. Interoception is the “noting of sensations, cues, discomforts, pain, tension, and pleasures” (Dieterich-Hartwell, 2017, p. 38) within one’s own body. Dieterich-Hartwell (2017) notes that persons with post-traumatic stress disorder (PTSD) often experience a disconnection or dissociation from their bodies. Interoception is based on the idea that emotions originate in the body. Similarly, dance/movement therapy is facilitated with the intention that body movement reflects emotional states and that the body and mind are inseparable parts of one’s whole self. By focusing on interoception and regaining awareness of one’s inner cues, there is opportunity for bridging the connection back to the body through this application of dance/movement therapy.

Koch and Fischman (2011) conceptualize dance/movement therapy from an embodied enactive perspective, meaning that humans make sense of the world by ‘doing’ and perceiving meaning from that ‘doing’. They describe humans as “living systems characterized by plasticity

and permeability (moment-to-moment adaptations within the self and toward the environment), autonomy, sense-making, emergence, experience, and striving for balance” (Koch & Fischman, 2011, p. 57). These various definitions assert that dance/movement therapy impacts a person on physical, mental, emotional, social, and cognitive levels and holistically assists in facing challenges that may appear isolated but are actually interconnected.

As a parallel to the embodied enactive approach, the endocrine system could also be characterized by its communication and interaction with other body systems, its adaptations to internal and external stimuli, and its striving for balance. According to Hiller-Sturmhöfel and Bartke (1998), the various systems of the body must communicate with each other in order to function properly and balance internal and external environments. For example, when someone is experiencing stress, they may experience irritability, tension, sweating, shortness of breath, rapid heartbeat, excessive worry, and trouble focusing. These sensations are physical, mental, emotional, cognitive, and can even be social. The body is engaging its many systems to evaluate a situation, appropriately respond, and return to a regulated state.

Discussion

The human stress response is understood as a process of preparation, activation, and return to homeostasis. During the preparation phase, the various body systems work and communicate together to appraise stimuli for threat level and determine a response. Determining a response is often an unconscious process that is informed by individual and cultural factors, present circumstances, and past experiences. During activation, the body enacts its response by limiting unnecessary processes and prioritizing meeting the demands of the present stressor. Returning to homeostasis requires the body’s systems to assess the situation and determine that it is safe enough to return to normal functioning. The endocrine system is an integral part of this

response as it produces and transports the hormones that help facilitate communication throughout the body and influence behavior.

When this complex and interconnected system is subjected to chronic stress, the impacts are evident. Given the severity of the health implications that arise when chronic stress is present, it is imperative that clinicians of any discipline are aware of the role stress plays in one's experience toward healing. Stress may be present and significant throughout the process of illness, treatment, and recovery whether it is the primary clinical concern or not. As discussed, stress impacts overall health on its own and is especially detrimental when coupled with additional health concerns.

In order to holistically address stress in a meaningful and effective way, the methods aimed at doing so require a commitment to the integration of mind and body. Whether stress is caused by seemingly trivial work-related concerns or physically fighting for one's survival; the process for managing it is enacted on a body level that can be observed in external manifestations as well as internal, unconscious ones. Dance/movement therapy is not the first clinical practice to include the body in matters commonly thought to reside in the mind. However, dance/movement therapy has the unique potential to harness the benefits of many disciplines at once in order to address the unconscious processes that accompany what is more clearly observable through cognition and physicality. To address stress and one's individual mechanisms for responding and adapting, we must be aware of the individual, the environment, past memories and experiences, cultural factors, chronicity, and resources available to someone. Through dance/movement therapy, regulation of the stress response can be addressed with a level of depth that holds the potential to create shifts in the endocrine system. To do this, it is proposed in this thesis that approaches and interventions are centered around preparation,

processing, discharge, and connection with others. These four pillars serve as a theoretical guide for clinical application and were discerned from themes found in the literature review. One or more of each of these elements (preparation, process, discharge, and connection) occurred in exercise, yoga, Somatic Experiencing, biofeedback, dance plays, and other applications of dance/movement therapy around many different topics including life changes, medical diagnoses, mental health challenges, relationships, and trauma – all common causes of stress.

Preparation

The idea of preparation in this approach can be applied to how one anticipates a specific stressor as well as preparing one's embodied resources to manage future stress in a healthy way. Preparation for stress or change through movement takes anticipatory anxiety out of a mental space and introduces it into the body, allowing for a more integrated sense of readiness. As found in the Ubakala's use of dance-plays, role-playing and repetition may provide a sense of mastery or readiness, thus limiting the potential for acute stress to become unmanageable. Additionally, during high-intensity interval training, the body is introduced to short-term cycles of stress and recovery through repetition of intense strength training and rest. This process was found to increase the hormones that promote muscle recovery, cardiovascular health, and strength building. This implies that by introducing the body to short periods of stress and consistently practicing recovery, there is an embodied sense of improving one's readiness to manage future stress.

In dance/movement therapy, preparation can be addressed by exploring concepts of exertion and recuperation to embody the process of stress and return to homeostasis. Preparation can also be accessed through the use of breath, grounding, rhythm, imagery, and repetition. Becoming attuned to one's own breath can aid a person in reading their embodied signals to

assess when stress is approaching heightened levels. Breathing also helps with relaxation and stress reduction. Breath can be a calming, centering resource that the body always has access to if one is aware of it.

Grounding can be approached through weight sensing, the act of bringing awareness to one's own solidity by feeling the body's weight on the ground. Grounding can also be introduced through the use of rhythm in movement, music, or bringing attention to one's own heartbeat to invoke a sense of presence and awareness in the moment. Imagery can serve as a form of preparation by imagining and enacting the expectations of a stressful situation, similar to dance-plays. Repetition builds on the feeling of preparedness by encouraging a sense of confidence, consistency, and mastery in one's abilities.

Process

Processing stress on a body level allows one to experience the full range and complexity of an experience. Dance/movement therapy as an approach to regulating the stress response does not seek to only relieve stress but to understand its triggers, causes, and impacts as well. In client-centered care, it is not enough to assess stress by looking at only one's hormones, only in-the-moment responses, or only illnesses. To understand why someone responds to stress the way they do and how to help, clinicians must approach wellness holistically by considering environment, memories, individual difference, cultural implications, and access to modeled examples of different responses.

To process stress on a body level, a dance/movement therapist may form treatment goals around interoception, the awareness of one's internal sensations informed by emotions, memories, and bodily needs. Another point of focus for processing may be exploring body action, the movement patterns and preferences of the individual. Body action is considered to be

reflective of one's inner psychological layers. Similar to the goals of biofeedback, dance/movement therapy aims to support clients in bringing awareness to their own body, interpreting its messages, gaining control, and making choices for change. Making meaning of one's own movement patterns allows space for processing previously suppressed or ignored embodied signals with agency and empowerment. By making shifts in the body through posture, tension, breath, and anatomical awareness, a person can experience more integrated levels of self-understanding and create changes when they are ready to (Chace et al., 1993).

Discharge

Discharge of held emotions, impulses, defenses, and memories is particularly important to address through movement as the things held in the body may not always be conscious or readily available for recall. Just as Somatic Experiencing aims to discharge excess arousal from the autonomic nervous system, one could envision a similar process in the endocrine system for the excess or lingering hormones that lead to incomplete feedback loops, keeping one from returning to homeostasis. When someone is experiencing chronic stress, the symptoms that arise are typically a product of excess cortisol and other stress-related hormones being released through the bloodstream due to a dysfunction in the HPA axis. The body has not yet deescalated from a point of stress, even if the threat has been neutralized, and therefore becomes stuck in a cycle of engaging as if the stressor were still present.

In dance/movement therapy, when a client appears stuck in a pattern, it may be beneficial to introduce and explore different polarities through movement such as light and heavy, big and small, expansion and contraction. According to early dance/movement therapist Trudi Schoop, a person's wholeness is found in dualities. She explains, "Another patient in my group has forgotten his softness, and lives only a harsh and staccato existence. We can see endless

examples of such extremes: people who are *only* depressed, *only* angry, *only* excited, *only* loving, *only* still. I try, very gradually, to bring them back to their totality—their fullness—by tapping into the forgotten sides which still exist somewhere within them (Schoop, 2000, p.95). By introducing polarities in movement, a person can gain awareness of places they may be stuck in the rest of their life and seek to expand or change them. When access to a broader repertoire of movement is achieved, either through restoration or for the first time, a person can begin to make more choices around how they want to move. With the expansion of options, discharge of stressful stored material can become more easily accessible on a body level.

Awareness of the endocrine system and internal processes in regard to stress is significant to consider because one may not always know why stress is present or think there is ‘nothing wrong’ but continue experiencing symptoms. This may be indicative of the lingering remnants of excess cortisol or incomplete/overworking feedback loops. Awareness that more is going on in our bodies than we always know helps to trust our own interoception and take care of ourselves. The use of symbolism in movement can assist in the discharge of lingering material in the endocrine system by beginning with movement and then making one’s own meaning of it. Symbolism allows a person to “recall, reenact, and reexperience” (Chace et al., 1993, p.79). Dance/movement therapists join in the symbolic meaning created by the client, which allows them to build on the symbolic representations and work through things while feeling understood and supported.

Connection

Connection with others can be highlighted and facilitated through movement as well. As noted in Josef et al. 's (2019) study, kinesthetic empathy increases as oxytocin increases between pairs of friends dancing. Dance/movement therapy prioritizes the importance of safety, trust, and

reciprocity in the therapeutic relationship. Marian Chace, an early dance/movement therapist, placed community and connection at the center of her work by highlighting unifying elements such as the use of a circle, shared rhythm, and empathic relationships through movement. The circle can symbolically represent totality and wholeness. It can provide opportunity to see and be seen, make physical contact, facilitate mirroring in a group format, and provide safety and/or containment for the group (Karampoula & Panhofer, 2018). Group rhythmic activity includes simple, everyday movements brought to awareness through repetition and group participation. Group rhythmic activity is supported by the observation that rhythm can be a solidifying element of a group that is initiated by individual action and turned into something bigger and cohesive, thus leading to a sense of strength and security (Chace et al., 1993). Marian Chace's ideas around the therapeutic movement relationship involve the therapist's sensitivity to the emotional content that is present in movement and behavior. Dance/movement therapists join clients in their movement by moving similarly or complementary to them as a way of meeting them where they are. The dance/movement therapist may also complete or expand on a client's movement to show that they were understood and convey other possibilities. Through this therapeutic movement relationship, trust can be established, the relationship can deepen, the client can see their movement from another perspective. This can allow the client to reflect and make choices about how to complete or change movement patterns that are coming up. The group space must be appraised as safe in order to be invested in the relationship and working through challenges of therapy as a group, similar to the function of the tend-and-befriend (Taylor et al., 2000) response that involves joining groups for safety and care while sharing responsibilities and resources when faced with stress.

Conclusion

In order for change to occur on a hormonal level, the body must be actively involved in the processes aimed at making those changes. As a parallel, when changes occur in the endocrine system they are likely to manifest in various embodied ways. Awareness of this bidirectional relationship can provide otherwise overlooked insight into the significance of the connection between body systems. By understanding the endocrine system's involvement in the stress response, we can begin to understand just how deeply-rooted the body is in all experiences, both internal and external. Bringing awareness to the links between what is observable and what is not, through dance/movement therapy, provides the opportunity to address the needs of an individual in a holistic, thorough way. Dance/movement therapy intentionally includes elements of physicality, emotion, cognition, and relationship in order to help people integrate all parts of themselves with the self, with others, and with their environment. As evidenced by the above research, movement and the body are heavily involved in the stress response and have a significant role in creating both internal and external opportunity for relief of symptoms as well as enhanced ability to process and regulate. The externally observable and felt experiences of stress such as headaches, difficulty focusing, and sleep disturbances do not 'just happen'. They are in relationship with internal shifts in the endocrine system, the nervous system, and throughout the whole body. The symptoms of chronic and excessive stress take an increasingly severe toll on humans as we evolve and adapt to new experiences of stress. These symptoms will not truly subside through mentally-based methods like distracting oneself, working harder, or trying to simply 'snap out of it'. As the world becomes increasingly demanding and decreasingly embodied, it is of utmost importance to prioritize the integration of mind and body in treatment approaches to stress, among all other health concerns. Dance/movement therapy uniquely

provides support for this integration by facilitating treatment at the intersection of science, creativity, and connection.

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