

GUIDING QUESTIONS

How is trauma manifesting in the body?

Core Response Network

Nervous, Autonomic, Endocrine, Somatosensory, Motorsensory

Psychological vs physiological responses

Integrations and dualism in the embodiment of trauma in the brain and body

In what ways is childhood trauma unique?

Developmental trauma disorder, early life sensory/motor deficits can be the result of abuse, trauma, and brain injury experienced during childhood

The immature/underdeveloped body of the young athlete can sustain lasting structural damage fundamentally different from that sustained in a mature body

Children can also develop psychological disorders that stem from childhood trauma such as depression, anxiety, panic disorder, and complex PTSD

What is the relationship between trauma and injury in child athletes?

Trauma in child athletes may be:

- a. causally related to injury (and treatment)
- b. be the result of cultural, institutional, or familial pressures
- c. abuse/malpractice by coaches and mentors

Compound interest in developmental trauma/PTSD as well as disability as the result of childhood injury in child athletes may provide additional information as to how trauma manifests differently in the bodies of child athletes

(how might PTSD look different in a child with developmental deficits? How might symptoms be different if a child does not have properly developed social-emotional skills? E.g. not registering others' emotions due to an environment of hyper-professionalism and vigilance stifling wide ranges of emotional expression)

How is creative arts therapy a useful treatment method for people who have experienced trauma or injury?

Somatic experiencing (SE) and expressive arts therapy (ExAT) have been studied for autonomic regulation

Creative arts as a non-verbal expressive outlet for traumatic memory and emotion that engages other sensory faculties - this can be useful for potentially creating new neurological pathways in the sensory nervous system that can then be used to mitigate sensory experiences brought on by triggers

SOMATIC EXPERIENCING: USING INTEROCEPTION AND PROPRIOCEPTION AS CORE ELEMENTS OF TRAUMA THERAPY

Peter Payne, Peter A. Levine, and Mardi A. Crane-Godreau

“Somatic Experiencing is a novel therapy for the treatment of PTSD/trauma developed by Peter Levine. The major interventional strategy involves bottom-up processing by directing the client's attention to internal sensations, both visceral (interoception) and musculoskeletal (proprioception and kinesthesia), rather than primarily cognitive or emotional experiences.” This practice centers on “...theory of trauma and chronic stress as a functional dysregulation of the complex dynamical system formed by the subcortical autonomic, limbic, motor and arousal systems, which we term the core response network (CRN).”

“PROVIDING THE SUPPORT SO THAT THE BODY CAN ENGAGE THE BODY'S CAPACITY TO HEAL” - Dr. Peter Levine

In SE, verbal cues are used to point to and elicit non-verbal experiences of internal bodily sensation (interoception), sense of position and orientation (proprioception), sensations of movement (kinesthesia), and spatial sense. “These are mediated respectively by the insular and anterior cingulate gyrus (Critchley et al., 2003), the premotor cortex (Desmurget and Sirigu, 2009), the parietal cortex (Bartolomeo, 2006; Briscoe, 2009), as well as by the orbitofrontal cortex (Roy et al., 2012). All these areas have very rich and direct communication with the subcortical networks mentioned above, and SE views them as the basis for voluntary intervention on the dysregulated subcortical networks.”

Payne, P., Levine, P. A., & Crane-Godreau, M. A. (1AD, January 1). *Somatic experiencing: Using interoception and proprioception as core elements of trauma therapy*. Frontiers. Retrieved April 22, 2022, from <https://www.frontiersin.org/articles/10.3389/fpsyg.2015.00093/full>

SOMATIC EXPERIENCING AND EXPRESSIVE ARTS THERAPY TO SUPPORT AUTONOMIC REGULATION IN TRAUMA TREATMENT WITH ADULTS: A LITERATURE REVIEW

“Though there have been few studies on the effectiveness of SE on treating trauma and PTSD, there is a small body of evidence supporting its use, leading it to be listed as an intervention

with emerging evidence in the ISTSS's (2019) recommendations for PTSD treatment. Although several robust case studies exist on the use of SE and PTSD (Heller & Heller, 2004; Levit, 2018) at present, there are only a few statistically significant studies.”

Daniel , P. J. (2021). *SOMATIC EXPERIENCING AND EXPRESSIVE ARTS THERAPY TO SUPPORT AUTONOMIC REGULATION IN TRAUMA TREATMENT WITH ADULTS: A LITERATURE REVIEW*. EXPRESSIVE THERAPIES CAPSTONE THESES. Retrieved 2022, from <https://hq892qzdgr1cn4n8hhv8d1f9-wpengine.netdna-ssl.com/wp-content/uploads/2021/05/Somatic-Experiencing-and-Expressive-Arts-Therapy-to-Support-Auton.pdf>

LISTENING TO THE BODY: PRAGMATIC CASE STUDIES OF BODY-CENTERED PSYCHOTHERAPY

“On the SBC, Terry demonstrated much less initial Body Awareness than Jan or Ray. This finding was confirmed in the case studies, as Jan and Ray already knew how to become mindful and track their sensations, yet Terry needed more education to attune to and remain with her bodily experience. Her improved ability to stay connected with her felt experience without shame was in fact one of the results of treatment that Terry reported helped her the most, which may have been reflected in her increased Body Awareness score, or potentially captured by her increase in Body Dissociation subscale.”

“On the SBC, Jan had much less initial body connectedness (low score on “Body Dissociation” Scale) than Terry or Ray. She also subsequently made the biggest improvement on decreasing her dissociation (1.0 rise, where higher scores indicate more connectedness), which also reflected her increased ability to remain connected to her bodily experience. This finding is consistent with her trend on other measures to start from most impaired and become most improved.”

“It is not clear to what extent Ray demonstrated change on the SBC. However, there was a shift in Ray’s response pattern. Pre-treatment, Ray responded with almost entirely “all” or “none” scores, suggesting a potentially more extreme approach than at posttreatment, in which he gave many more “some” or “a little” responses in his scoring. With further examination, such changes in response patterns could be a useful aspect of future studies.”

Kaplan, A. H. (2006). *Listening to the body: Pragmatic case studies of body-centered psychotherapy* (dissertation). RUTGERS THE STATE UNIVERSITY OF NEW JERSEY, New Brunswick , NJ.

<https://hq892qzdgr1cn4n8hhv8d1f9-wpengine.netdna-ssl.com/wp-content/uploads/2017/11/Listening-to-the-Body-Pragmatic-Case-Studies-of-Body-Centered-Psychotherapy.pdf>

NEUROBIOLOGY OF POSTTRAUMATIC STRESS DISORDER

In this article researchers approach PTSD with a more inclusive sample (not only war veterans but also first responders, children, and other people who have not seen combat) critiquing the current criterion for PTSD in the DSM3 and analyzing new research on the neuroanatomy of PTSD among different subsample groups.

Although it remains unclear which of the myriad of symptoms experienced by people with PTSD is a direct cause of the disorder itself or another related disorder or disease, “there is increasing evidence that the neurobiology of PTSD is truly distinct from other mental disorders.”

This study highlights the importance of inclusive PTSD studies in order to understand the complex and confusing nature of the disorder as well as its different impacts on various groups.

Newport, D. J., & Nemeroff, C. B. (2000, April 17). Neurobiology of posttraumatic stress disorder. *Current Opinion in Neurobiology*. Retrieved April 3, 2022, from https://www.sciencedirect.com/science/article/pii/S0959438800000805?casa_token=NeQOd6WZs4sAAAAA%3A-I_-rue4NzT7OYPjkUBepH1ny0KiIiMD1hHZ1pNezPWsvjk8ZdaDMY0ngbu-ZvXaqnRdqg

DEVELOPMENTAL TRAUMA DISORDER A NEW, RATIONAL DIAGNOSIS FOR CHILDREN WITH COMPLEX TRAUMA HISTORIES

“ ‘complex trauma’ to describe the experience of multiple, chronic and prolonged, developmentally adverse traumatic events, most often of an interpersonal nature (eg, sexual or physical abuse, war, community violence) and early-life onset.”(p.1)

“The ACE Study showed that adverse childhood experiences are vastly more common than recognized or acknowledged and that they have a powerful relationship to adult health a half-century later.”(p.1)

“Chronic trauma interferes with neurobiological development and the capacity to integrate sensory, emotional and cognitive information into a cohesive whole.”(p.2)

“These data suggest that most interpersonal trauma on children is perpetuated by victims who grow up to become perpetrators or repeat victims of violence. This tendency to repeat represents an integral aspect of the cycle of violence in our society.”(p.3)

“The results of the DSM-IV Field Trial suggested that trauma has its most pervasive impact during the first decade of life and becomes more circumscribed (ie, more like “pure” PTSD) with age.”(p.5)

“Treatment must focus on three primary areas: establishing safety and competence, dealing with traumatic re-enactments, and integration and master of the body and mind.” (p. 7)

Developmental Trauma, although not recognized by the DSM5, is an important diagnostic distinction for those suffering PTSD, CPTSD, Childhood Trauma, and much other mental illnesses and behavioral/learning/cognitive disorders because it attempts to diagnose a more holistic experience of chronic trauma and the effects of experiencing trauma during important periods of brain and body development.

van der Kolk, B. A. (2005). Developmental trauma disorder: Toward a rational diagnosis for children with complex trauma histories. *Psychiatric Annals*, 35(5), 401–408. Retrieved 2022 from <https://doi.org/10.3928/00485713-20050501-06>

Sensory Modulation Dysfunction in Child Victims of Trauma

“Children with early repeated experience of or exposure to trauma have been found to have associated neuroanatomical changes in the sensory cortex affecting visual and auditory cortices and the limbic system (Stein et al. 1997).”

“van der Kolk (2003) explained that continued experience or exposure to trauma which includes flight, fight or freeze responses, affects how a child integrates sensory information.”

Joseph, R. Y., Casteleijn, D., van der Linde, J., & Franzsen, D. (2021, January 26). *Sensory modulation dysfunction in child victims of trauma: A scoping review - journal of child & adolescent trauma*. SpringerLink. Retrieved April 22, 2022, from <https://link.springer.com/article/10.1007/s40653-020-00333-x>

Motor deficits in preschool children due to maltreatment/trauma

Wade, T. J., Bowden, J., & Jane Sites, H. (2017, August 11). *Child maltreatment and motor coordination deficits among preschool children - journal of child & adolescent trauma*.

SpringerLink. Retrieved April 22, 2022, from

<https://link.springer.com/article/10.1007/s40653-017-0186-4>

PERIPHERAL NERVE INJURIES IN THE ATHLETE

Feinberg JH, Nadler SF, Krivickas LS. Peripheral nerve injuries in the athlete. *Sports Med*. 1997 Dec;24(6):385-408. doi: 10.2165/00007256-199724060-00004. PMID: 9421863.

<https://pubmed.ncbi.nlm.nih.gov/9421863/>

RECOGNITION AND MANAGEMENT OF TRAUMATIC SPORTS INJURIES IN THE SKELETALLY IMMATURE ATHLETE

“The rise in participation has brought about an associated increase in both traumatic and overuse injuries in the youth athlete, which refers to both children and adolescents within a general age range of seven to 17. Exposure rates alone do not account for the increase in injuries. Societal pressures to perform at high levels affect both coaches and athletes and lead to inappropriate levels of training intensity, frequency, and duration. In this environment, high physiologic stresses are applied to the immature skeleton of the youth athlete causing injury.” (abstract)

Merkel, D. L., & Molony, J. T. (2012, December). *Recognition and management of traumatic sports injuries in the skeletally immature athlete*. *International journal of sports physical therapy*. Retrieved April 22, 2022, from

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3537461/>

PSYCHOLOGICAL TRAUMA: UNFORTUNATE EXPERIENCE IN ATHLETICS

“... it is important to note that psychological trauma may accompany physical trauma or exist independently of it.” (abstract)

“... psychological trauma should not be viewed as a single and acute event, similar to those commonly observed acute traumatic injuries in athletics. Psychological trauma is rather a psychological abnormality that gradually develops at different rates in different athletes,

influencing both the physical and mental status and the overall psychological well-being of an athlete.” (p.244)

(2008). Psychological Trauma: Unfortunate Experience in Athletics. In: Injuries in Athletics: Causes and Consequences. Springer, Boston, MA.

https://doi.org/10.1007/978-0-387-72577-2_11

PREVALENCE OF POSTTRAUMATIC STRESS DISORDER SYMPTOMS AMONG YOUNG ATHLETES AFTER ANTERIOR CRUCIATE LIGAMENT RUPTURE

“Conclusion: Following ACL rupture, young athletes experience significant emotional trauma, including symptoms of avoidance, intrusion, and hyperarousal.”

Padaki, A. S., Noticewala, M. S., Levine, W. N., Ahmad, C. S., Popkin, M. K., & Popkin, C. A. (2018, July 26). *Prevalence of posttraumatic stress disorder symptoms among young athletes after Anterior Cruciate Ligament Rupture*. Orthopaedic journal of sports medicine. Retrieved April 22, 2022, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6083780/>

ART THERAPY AND CLINICAL NEUROSCIENCE

“The interplay of experiences, emotion, behavior and physical health characterize the study of mind-body connection”

“Chronic stress experiences shift the person away from integrated feelings and thoughts associated with the function of the frontal lobes towards a limbic-based survival reaction (Henry and Wang 1999)”

“Art therapy is recognized as an intervention to facilitate mind-body connectivity through remediation of acute and chronic stress”

Google. (n.d.). *Art therapy and clinical neuroscience*. Google Books. Retrieved April 22, 2022, from

<https://books.google.com/books?hl=en&lr=&id=yqkvg72HmyAC&oi=fnd&pg=PP1&dq=somatosensory%2Bcreative%2Barts%2Btherapy%2Bptsd&ots=ToHStXsjSN&sig=DQK0ndd4raKhuP6Rvg30jq1vPNQ#v=onepage&q&f=false>

ARTS & HEALING: CREATIVE, ARTISTIC, AND EXPRESSIVE THERAPIES FOR PTSD

“Although these alternative therapies differ in their exact execution, they share an underlying set of assumptions. Each of these approaches allows individuals with PTSD to experience and/or

express their thoughts and feelings without necessarily having to verbalize the trauma, share this verbalizing with others, or directly confront the trauma if they are not ready”

Smyth, J. (n.d.). *Arts & Healing Creative, Artistic, and Expressive Therapies for PTSD*. Retrieved April 22, 2022, from https://www.artandhealing.org/wp-content/uploads/2015/07/PTSD-White_Paper_0323121.pdf

TRAUMA AND EXPRESSIVE ARTS THERAPY: BRAIN, BODY, AND IMAGINATION IN THE HEALING PROCESS

“The nature of trauma is to impact the mind and body in unpredictable and multidimensional ways”

Accounts from a creative arts therapist: case studies and results

Malchiodi, C. A. (2020, March 27). *Trauma and expressive arts therapy*. Google Books. Retrieved April 22, 2022, from https://books.google.com/books?hl=en&lr=&id=PvNPDwAAQBAJ&oi=fnd&pg=PP1&dq=somatosensory%2Bcreative%2Barts%2Btherapy%2Bptsd&ots=OqZcFzZCJx&sig=xBC_Iq6_wy0i-plBnxmxR5woTk#v=onepage&q&f=false

THE EFFECT OF MEDITATION ON BRAIN STRUCTURE

Meditation is one of the oldest forms of documented ways for humans to initiate communication with the body. Meditation in this study is shown to increase the cortical thickness (important for neuroplasticity and nerve signaling speed), inconsistent practitioners, compared to novice meditators. This is important for understanding the wide range of benefits of increased body awareness and strong mind-body relationship/communication.

Do-Hyung Kang, Hang Joon Jo, Wi Hoon Jung, Sun Hyung Kim, Ye-Ha Jung, Chi-Hoon Choi, Ul Soon Lee, Seung Chan An, Joon Hwan Jang, Jun Soo Kwon, The effect of meditation on brain structure: cortical thickness mapping and diffusion tensor imaging, *Social Cognitive and Affective Neuroscience*, Volume 8, Issue 1, January 2013, Pages 27-33, <https://doi.org/10.1093/scan/nss056>

EXTRA

CONCENT IN BALLET

Cappelle, L. (2022, April 13). *Bringing consent to ballet, one intimacy workshop at a time*. The New York Times. Retrieved April 22, 2022, from

<https://www.nytimes.com/2022/04/13/arts/dance/intimacy-directors-ballet.html?login=smartlock&auth=login-smartlock>