



## Impact of Childhood Trauma and Stressors in Pain Disorders and Adult Health

by David M. Brady, ND, DC, CCN, DACBN

Traumatic experiences and stressors in childhood have historically been overlooked as predisposing factors in the development of various chronic pain disorders and psychiatric conditions, including fibromyalgia, irritable bowel syndrome, insomnia, depression, anxiety, post-traumatic stress disorder, and chronic fatigue syndrome. However, the tide is turning as research is revealing a significant correlation between childhood trauma and adult health. Childhood trauma can cause cumulative damage and foster the biological embedding of adversities (via epigenetics) during developmental stages - both of which have been proposed mechanisms for the development of various adult physical and mental conditions.<sup>1</sup>

### Stress Response Development

The central nervous system and related hormonal systems are rapidly developing during childhood and being conditioned to respond to various stimuli and stressors that are encountered in life. The sympathetic-adrenomedullary (SAM) system and the hypothalamic-pituitary-adrenocortical (HPA) system are the main players in the stress response system, interacting with neural circuits and genes when triggered by a stressor to produce an appropriate stress response. Adrenaline (produced by the SAM system) and cortisol (produced by the HPA system) mobilize energy stores, alter blood flow, activate the immune system, and enhance short-term memory in response to a variety of stimuli and stressors.<sup>2</sup>

The development of a healthy stress response system is vital for long-term health and is conditioned by regular exposure to moderate, yet short-lived, stressors such as overcoming basic fears, brief exposure to pathogens, and minor physical injuries. Even potentially traumatic stimuli, if short-lived and experienced in a supportive context, can encourage positive neuroplasticity. Stressful experiences should be balanced with adequate pleasurable experiences such as physical affection and security, which enhance neural circuitry to regions of the brain responsible for interpreting pleasure.

When strong, frequent, and/or prolonged stressful stimuli are encountered in childhood, sustained activation of the neurochemical and hormonal stress response systems conditions the body toward these responses, potentially leading to hyperarousal and dysregulation of the systems.<sup>3</sup> Prolonged, elevated cortisol levels suppress the immune system, alters neurotransmitter balance, increases nociception, and changes architecture of brain areas responsible for learning and memory, creating vulnerability toward behavioral and physical health conditions.<sup>2</sup> Prolonged, traumatic stimuli also impact epigenetics as studies have shown elevated cortisol influencing the regulation of the glucocorticoid receptor gene, neurotrophic receptor genes, myelin basic protein gene, and other regulatory genes to favor the stress response.<sup>2</sup> As the genetic code is altered, not only is hyperarousal frequent, but attempts to

calm the system and establish healing are more difficult resulting in prolonged hypervigilance and the disorders associated with it, including anxiety, irritable bowel syndrome (IBS), and fibromyalgia (FM), to name just a few.

As we age, neuroplasticity decreases, meaning it is more difficult to adjust our brain's responses to stimuli. Children are at a distinct advantage in possessing a high degree of neuroplasticity, highlighting the importance of delivering meaningful stimuli to the developing brain to ensure the development of positive neural circuits while also emphasizing the significance of evaluating childhood trauma as a causative factor in adult health.

### Impact of Childhood Support Systems

In the presence of a strong support system and normal, short-lived stressors, a child's stress responses are appropriately activated and buffered through supportive relationships. In this way, positive pathways are developing in the brain and training the nervous system how to appropriately respond to the normal stressors of life. As the brain encounters various stressors, a healthy resilience is built so that increasingly stressful circumstances are able to be experienced with normal biological responses.

In the absence of supportive relationships or in the presence of extreme and/or long-standing stressors, the stress response is inappropriately activated and may negatively impact the development of the brain and



# Impact of Childhood Trauma and Stressors

neurological system. As regions of the brain that are responsible for fear, anxiety, and impulsive responses are activated, neural pathways are developed to favor these regions of the brain. Subsequently, regions of the brain that are responsible for reasoning, planning, and behavioral control may lack appropriate pathways, leading to a propensity toward negative emotions such as fear, anxiety, panic attacks, depression, vague gastrointestinal symptoms, and often ultimately a hyper-perception to pain (hyperalgesia) or a perception of normally non-painful stimuli as pain (allodynia).

## Identifying Traumatic Stressors

According to the National Child Traumatic Stress Network, the most common traumatic stressors affecting children include, accidents, physical trauma, abuse, neglect, and exposure to domestic and community violence.<sup>4</sup> Other impactful stressors include death of a family member, divorce, drug or alcohol abuse, and natural disasters. When encountered during childhood, these traumatic stressors precondition the neurochemical and hormonal stress response systems toward a hypervigilant state in response to normal stimuli. Hypervigilant neurological responses are often noted in chronic pain and functional somatic conditions such as fibromyalgia and irritable bowel syndrome. Normal stimuli such as wind blowing in the face or clothing rubbing against the skin can produce painful sensations in those with fibromyalgia, illustrating an exaggerated pain response. Normal stressors triggering the neurological system to inappropriately stimulate the muscles of the intestine, lead to hypermobility and alternating constipation and diarrhea. The pain response is also heightened in those with irritable bowel syndrome, evidenced by chronic abdominal pain.

## Altered Pain Response

Currently, specific causes of conditions associated with chronic pain and fatigue, such as fibromyalgia and

chronic fatigue syndrome, are unknown; however, nearly two decades of research have strongly pointed to early childhood stressors as significant risk factors for initiating these conditions.<sup>5</sup> The aforementioned negative conditioning of the SAM and HPA systems by traumatic stressors encountered in childhood are implied in chronic pain syndromes, as is inappropriate conditioning of the nociceptive system and ultimate dysfunction or failure of the descending nociceptive system (DANS).<sup>6</sup>

Children possess a high degree of plasticity of the nociceptive neural circuits from birth, and early insults can delay or inhibit appropriate maturation. Hyperalgesia is commonly found following exposure to childhood traumatic stressors and may be mediated by innervation of nociceptors, enhanced dorsal horn sensitization, altered descending inhibitory control systems, or altered SAM and HPA systems.<sup>6</sup> The interconnection between negatively conditioned SAM and HPA systems and pain modulation are complex and beg for further understanding; however, research does not deny the link between these systems and their core association within the context of early childhood trauma and chronic pain syndromes.

## A New Understanding of a Third Type of Pain

Concepts of nociceptive and neuropathic pain have existed for quite a long time but do not seem to explain all types of pain. Nociceptive pain is generally produced by a noxious stimulus that may, or may not, actually damage tissues and is detected at the molecular level by nociceptive pain receptors. Examples of this can be burns, inflammation, fractures, constriction, or pressure, etc. Conversely, neuropathic pain cannot be traced so easily from peripheral receptors through to the brain, and it is not the kind of pain that often resolves quickly when the initial insult is removed, like nociceptive pain. It may result from tissue traumas such as amputation of a limb, ischemia,

metabolic disease (i.e., diabetic neuralgia), infection (i.e., shingles), and drug treatments (i.e., chemotherapy). Neuropathic pain often persists long after any initial tissue insult and results in changes in central pain processing that causes the person to perceive continuing pain in the absence of tissue pathology. However, it is time to consider a third type of pain, that being “emotional” or “psychological” pain.<sup>7</sup> The International Association for the Study of Pain includes in its definition of pain the fact that the clinical complaint of pain does not necessarily imply that the person is experiencing the pain because of some tissue insult, trauma, or pathology.<sup>8</sup> However, most doctors and health care clinicians have been trained to think in the traditional concept of pain being caused mainly by inflammation, often as a result of trauma, and this leads many of us down rabbit holes and towards inappropriate treatments for many pain patients. For example, I still find today that the vast majority of doctors I meet and lecture to think that fibromyalgia is primarily an inflammatory or autoimmune disorder despite the clear evidence against this.<sup>9</sup>

There is emerging evidence showing that psychological factors can change nervous system function and that pain perception can vary widely between people and even within an individual depending on the psychological state of the person.<sup>10</sup> It is apparent that emotional states have a massive influence on pain, with negative emotions increasing pain while positive emotions lessen it.<sup>11</sup> Studies using functional magnetic resonance imaging (fMRI) have found that thoughts of being rejected, or being shown pictures of former partners that subjects have felt rejected them, resulted in areas of the brain that support the sensory components of physical pain (the secondary somatosensory cortex and the dorsal posterior insula) to become active.<sup>12</sup> As was emphasized earlier in this article, the age in which altered emotional states occur may also have a strong bearing on how they

# Impact of Childhood Trauma and Stressors

can alter nervous system function. Research has suggested that adverse childhood events and experiences, such as abuse and sexual assault, can lead to long-term changes within the nervous system, including areas of pain processing and may lead to a bias toward hyperactivation of emotional pain circuits.<sup>13</sup>

## Stress-Reducing Activities

Occasional stress is, quite simply, a part of human life and there are certainly occasions when stressors are heavier and threaten our health. However, incorporating basic stress-reducing activities into a daily routine can be helpful in balancing the stress response and increasing resiliency.

One of the most basic behaviors that can help in reducing stress and improve health is to evaluate whether you are overcommitted. Life is full of opportunities, but the human body is limited in its capacity. Therefore, learning to focus on a few important commitments while simultaneously forgoing less important opportunities will help prevent stress associated with over-commitment. Establishing boundaries and fully committing to a few select obligations often produces a deeper sense of satisfaction and accomplishment.<sup>14-15</sup>

Regularly participating in some form of mind-focusing exercise is shown to have significantly positive impacts on stress levels and mental health. Meditation, prayer, and guided imagery are all excellent tools for focusing the mind. Meditation trains the brain to become aware of the moment and single-focused. Chronic stress often exerts itself as “mind-racing” and hypervigilance. Regular meditation can help bring thoughts into focus, improve attention, facilitate problem-solving, reduce stress biomarkers, improve cardiovascular risk factors, and reduces pain perception.<sup>16</sup> Likewise, prayer is a form of religious meditation that confers all the same benefits as other forms of meditation. Throughout

history, it has been noted that religious practices such as prayer are significantly beneficial for reducing anxiety and improving mood, mental outlook, pain tolerance, and general health.<sup>17</sup> Guided imagery is a powerful relaxation tool that encourages optimism and positive thoughts. It has also been proven to improve sleep, pain, anxiety, and depression.<sup>18</sup>

Chronic stress can result in tight, spasmodic muscles, provoking pain, fatigue, and weakness. Engaging in light physical activity through stretching, yoga, walks through nature, and enjoyable activities is useful for encouraging relaxation, loosening tight muscles, improving blood flow, and decreasing pain. Light physical activity coupled with a mind-focusing activity creates a perfect marriage for stress-reduction by targeting both physical and mental stress. Deep diaphragmatic breathing can serve as another important adjunct to both mental and physical activities intended to reduce stress.

Creating a calming environment through the use of music and light is a simple way to sustain a state of relaxation.<sup>19</sup> Like guided imagery, music therapy promotes positive emotions while reducing anxiety and stress. Classical music, particularly, has been shown to positively stimulate the parasympathetic nervous system to slow the heart rate and relax muscles. Colored light has the ability to affect brain hormones such as serotonin and melatonin, both of which are important for establishing a healthy wake/sleep cycle and contribute to positive moods.<sup>20</sup> Specific colors have been used to foster specific moods in the practice of chromotherapy. Most individuals can affirm the positive effects of warm sunlight versus the cold, fearful feelings provoked by dark, shadowy colors. Aromatherapy is yet another potential means of generating a calming environment, helpful for reducing stress.

## Stress-Reducing Botanicals/Nutrients

As alluded to earlier, chronic stress places substantial demands on various biological systems – most notably, the endocrine system, which is responsible for producing many of the hormones involved in the stress response. As stress-reduction is pursued, various botanicals may be helpful for supporting these biological systems and motivating quicker improvement.<sup>21</sup> *Panax ginseng*, *Eleutherococcus senticosus*, and *Rhodiola rosea*, are among the best known species of plants in a class of botanicals known as adaptogens. These botanicals support the adrenal glands and balance the production and enhance homeostatic control of stress hormones, particularly cortisol, thereby improving the body’s resiliency to stress. However, some of these classic adaptogens can be somewhat stimulating to the system and can make issues such as anxiety and hypervigilance issues worse. Therefore, this author prefers using more calming or neutral adaptogens such as *Withania somnifera* (Ashwagandha).

Still other botanicals can help reduce anxiety, promote relaxation, and improve sleep by supporting the production of calming neurotransmitters in the brain, and/or by interacting with their receptors (i.e., gamma-aminobutyric acid or GABA receptors). These botanicals include valerian, chamomile, lemon balm, *Bacopa*, passionflower, and hops. Natural brain hormones such as melatonin and 5-HTP are temporarily helpful when disrupted sleep patterns and increased pain perception prevent recovery from stress.<sup>22</sup> Similarly, amino acids such as L-theanine, L-tyrosine, and L-tryptophan can be useful in boosting natural hormone production since these amino acids are precursors in the production of many brain hormones and neurotransmitters. However, the latter two can also provide an unwanted stimulatory effect in some circumstances and should be used under the guidance of a health care professional skilled in the nuances of managing the stress response with nutritional and botanical agents.<sup>23</sup>



# Impact of Childhood Trauma and Stressors

As conditions such as fibromyalgia, chronic fatigue syndrome, and irritable bowel syndrome continue to surge, it is imperative to remove any roadblocks to healing. Stress is a foremost concern in many health conditions and may not only be a roadblock but also a root cause of poor health and healing. Stress-reduction often clears the muddy waters of poor health and allows for a better representation of any genuine health concerns, making it an essential lifestyle modification.

## Summary

While not every child who has been exposed to traumatic stressors will experience emotional and physical health calamities during childhood, adolescence, or adulthood, research shows that children exposed to traumatic events or long-standing stressors are 2.7 times more likely to experience functional somatic conditions such as fibromyalgia, chronic fatigue syndrome, chronic pain, irritable bowel syndrome, and others.<sup>3</sup> Additionally, these conditions commonly coexist with psychiatric conditions such as anxiety and depression.

Considering the increasing prevalence of functional somatic conditions and emotional and psychiatric

problems, it is important to consider the influence of childhood experiences in the development of these conditions. Dwelling upon past trauma is not always helpful in supporting health and healing and may actually be counterproductive; however, understanding its influence upon health is helpful in being able to appropriately identify elusive health conditions such as fibromyalgia. It is also important to understand for the purpose of protecting future generations from the debilitating effects of childhood trauma and stressors. Finally, it serves as a good illustration of the success of a naturopathic and functional medicine approach, which relies on a thorough health and lifestyle history to put together the “story” of an individual’s health and gain insight into the root causes of health problems and emphasizes the incorporation of some basic daily stress-reducing relaxation practices, movement, botanical/herbal therapies, counselling, and life re-prioritization as part of the maintenance of wellness and the prevention of complex chronic disease, particularly in those individuals who may have experienced childhood adverse life events and significant early life and ongoing stress.

## References:

1. Shonkoff JP, Boyce WT, McEwen BS. (2009). Neuroscience, molecular biology, and the childhood roots of health disparities: building a new framework for health promotion and disease prevention. *JAMA*, 301(21), 2252-9.
2. National Scientific Council on the Developing Child. (2005/2014). *Excessive Stress Disrupts the Architecture of the Developing Brain: Working Paper 3*. Updated Edition. <http://www.developingchild.harvard.edu>
3. Afari N, Ahumada SM, Wright LJ, et al. (2014). Psychological Trauma and Functional Somatic Syndromes: A Systematic Review and Meta-Analysis. *Psychosomatic Medicine*, 76(1), 2-11.
4. The National Child Traumatic Stress Network (2010.) Early Childhood Trauma. Retrieved from <http://www.nctsn.org/content/scope-problem>
5. Burke NN, Finn DP, McGuire BE, Roche M. (2016). Psychological stress in early life as a predisposing factor for the development of chronic pain: Clinical and preclinical evidence and neurobiological mechanisms. *Journal of Neuroscience Research*. doi: 10.1002/jnr.23802.
6. Zoukir I, Bartholomeusz MD, Hodgson DM. (2016). Early life programming of pain: focus on neuroimmune to endocrine communication. *Journal of Translational Medicine*, 14, 123.
7. David B, Vanderah TW. (2016). A new paradigm for pain? *The Journal of Family Practice*, Vol. 65, No. 9, 598-605.
8. International Association for the Study of Pain Web site. ISAP Taxonomy. Available at <http://www.iasp-pain.org/Taxonomy>. Accessed October 3, 2016.
9. Dababhyo D, Clauw DJ. (2006). Fibromyalgia: Different type of pain needing a different type of treatment. *Nature Clinical Practice Rheumatology*, 2(7); 364-372.
10. Bushnell MC, Ceko M, Low LA. (2013). Cognitive and emotional control of pain and its disruption of chronic pain. *Nat Rev Neurosci*, 14:502-511.
11. Villemure C, Bushnell MC. (2002). Cognitive modulation of pain: How do attention and emotion influence pain processing? *Pain*, 95:195-199.
12. Kross E, Berman MG, Mischel W, et al. (2011). Social rejection shares somatosensory representations with physical pain. *Proc Natl Acad Sci*, 108:6270-6275.
13. Felitti VJ, Anda RF. (2010). The relationship of adverse childhood experiences to adult medical disease, psychiatric disorders, and sexual behavior: implications for healthcare. In: Lanius R, Vermetten E, eds. *The Hidden Epidemic: The Impact of Early Life Trauma on Health and Disease*. Cambridge University Press. Available at: <http://www.unnatura.ca/causes.org/assets/uploads/file/ACE%20Study-Lanius.pdf>. Accessed October 3, 2016.
14. Schneiderman N, Ironson G, Siegel SD. (2005). STRESS AND HEALTH: Psychological, Behavioral, and Biological Determinants. *Annual Review of Clinical Psychology*, 1, 607-628.
15. Salleh MR. (2008). Life Event, Stress and Illness. *The Malaysian Journal of Medical Sciences: MJMS*, 15(4), 9-18.
16. Wimmer L, Bellingrath S, von Stockhausen L. (2016). Cognitive Effects of Mindfulness Training: Results of a Pilot Study Based on a Theory Driven Approach. *Frontiers in Psychology*, 7, 1037.
17. Andrade C, Radhakrishnan R. (2009). Prayer and healing: A medical and scientific perspective on randomized controlled trials. *Indian Journal of Psychiatry*, 51(4), 247-253.
18. Chen S-F, Wang H-H, Yang H-Y, Chung U-L. (2015). Effect of Relaxation With Guided Imagery on The Physical and Psychological Symptoms of Breast Cancer Patients Undergoing Chemotherapy. *Iranian Red Crescent Medical Journal*, 17(11), e31277.
19. Lee KS, Jeong HC, Yim JE, Jeon MY. (2016). Effects of Music Therapy on the Cardiovascular and Autonomic Nervous System in Stress-Induced University Students: A Randomized Controlled Trial. *Journal of Alternative and Complementary Medicine*, 22(1), 59-65.
20. Radeljak S, Zarković-Palijan T, Kovacević D, Kovac M. (2008). Chromotherapy in the regulation of neurohormonal balance in human brain – complementary application in modern psychiatric treatment. *Collegium Anthropologicum*, 32, Suppl 2, 185-8.
21. Head KA, Kelly GS. (2009). Nutrients and botanicals for treatment of stress: adrenal fatigue, neurotransmitter imbalance, anxiety, and restless sleep. *Alternative Medicine Review*, 14(2), 114-40.
22. Sarzi Puttini P, Caruso I. Primary fibromyalgia syndrome and 5-hydroxy-l-tryptophan: a 90-day open study. *J Int Med Res*. 1992;20:182189.
23. Van Praag HM. Studies in the mechanism of action of serotonin precursors in depression. *Psychopharmacol Bull*, 1984; 20, 599-602.



Dr. David Brady is the vice president for Health Sciences, director of the Human Nutrition Institute, and associate professor of clinical sciences at the University of Bridgeport (Connecticut-USA), chief medical officer of Designs for Health, Inc and Diagnostic Solutions Laboratory, LLC, and is in clinical practice at Whole Body Medicine in Fairfield, Connecticut (USA). Dr. Brady is also the author of the Amazon Bestselling new book, *The Fibro Fix*, which provides a wealth of information on how to navigate your way toward getting the proper diagnosis and the proper treatment for symptoms of widespread pain and fatigue. Learn more at [FibroFix.com](http://FibroFix.com). Also, learn more about **The Fibro Fix Summit** where Dr. Brady interviews 30+ experts on FM at [FibroFixSummit.com](http://FibroFixSummit.com). For additional

resources and educational content, please visit Dr. Brady’s main website at [DrDavidBrady.com](http://DrDavidBrady.com) and follow him on Facebook at [DrDavidBrady](http://DrDavidBrady).