Post-Traumatic Stress Disorder: The Effects and Treatments

Does it Give Insight on How to Treat Physical Illness?

Lindsay Cook

Sacred Heart University

Honors Capstone HN-300-C

Professors Rachel Bowman and Mark Jareb

May 5th, 2022

Introduction

Getting into a car for most people is probably such an unforgettable, routinely activity that most do not pay mind to it at all. For some people, getting into a car makes their hands clammy, they tense up, their face goes pale, and they might find it hard to breathe. They might have flashbacks of sirens, blood and shattered glass, the corners of their eyes might go dark, and a sudden urge of panic and anxiety swarms their body. Their body goes into fight or flight, making them irrational, irritable, or even dangerous, so much so that they act as if they are about to experience death. For some, this can be initiated by just the thought of having to ride in a car. This is an example of a "trigger," a specific event or situation that causes someone severe emotional distress. For someone to experience a trigger as taxing as this, they are typically diagnosed with a disorder called PTSD, post-traumatic stress disorder. PTSD is a psychiatric disorder that results after a person experiences trauma that causes serious negative neurological, biological, and physiological effects. Due to these effects, people with PTSD often seek help by going to many forms of therapy that dramatically resolve their symptoms, even more than pharmaceutical drugs. If the effects from PTSD were caused through traumatic events and can be cured through interactive therapies and treatments that involve mental and physical strengthening even without the help of pharmaceutical drugs, other physical ailments can be influenced by these treatments as well.

Post-Traumatic Stress Disorder

Although every person experiences trauma in their lifetime, PTSD is a disorder that develops due to many factors with just a few being physiological factors, growing up as one gender over another, or being because a person does not have the support or resources to cope with the experiences that are causing them to show symptoms. The National Center for PTSD

studied that about 7 or 8 out of every 100 people in the United States will experience PTSD at some point in their lifetime claiming that women are more likely to develop PTSD than men (Department of Health, 2019). It is important to note that PTSD is simply a diagnosable disorder that outlines the struggles of dealing with trauma, something everyone experiences in one way or another. Being that it is a stress disorder, it also yields similar physical and mental symptoms to those that are stressed in their everyday lives. Some experiences of trauma that might occur in one's life that result in the diagnosis of PTSD are, experiencing childhood trauma such as physical, mental or sexual abuse from a relative, parent or family friend, seeing another person or many people hurt, the loss of a loved one, job or any type of home, having no social support after a tragic event, dealing with extreme stress, living through any type of accident such as a car accident or a train wreck, living through a natural disaster, experiencing war and having any interactions with death in general (Department of Health, 2019). There are thousands more examples of trauma that might result in PTSD, but the events or situations all share the fact that they are very distressing, can cause extreme anxiety and are highly traumatic.

The Effects of PTSD

Not everyone who experiences traumatic events develops PTSD, although, the diagnosis of PTSD has helped psychiatrists and health experts understand the effects trauma has on the brain and body. Studies have shown that PTSD and trauma have both been known to cause the development of mental illnesses such as depression and anxiety disorders, as well as cause one to have suicidal feelings, feelings of guilt or blame, and chronic negative thoughts. One can develop maladaptive coping skills due to trauma and PTSD, which is a form of coping that causes further mental or physical harm. This includes avoiding going places or doing normal activities due to fear of being triggered, self-isolating, abusing substances, and blocking out

memories of the traumatic event (Department of Health, 2019). These effects can have major consequences on people's lives, causing them to lose relationships with family and friends, their jobs, and severely hinder their ability to live an enjoyable life. Along with the mental effects, many physical symptoms and ailments can result from trauma induced stress and PTSD ranging from physical manifestations of anxiety such as a racing heart, hot flashes, dissociation, heavy breathing or feeling out of breath that can result from triggers to more life-threatening symptoms such as heart disease (Depperman, 2014). Many people with PTSD develop hypertension, or high blood pressure due to these physical symptoms, putting them at risk for cardiovascular diseases (McFarlane, 2010). Chronic stress in particular can lead to adrenal-gland enlargement, atrophy of the thymus and lymph nodes, increased cardiovascular tone and immune-system suppression which in turn leads to the development of thyroid disorders and becoming chronically ill (Depperman, 2014). Chronic stress and PTSD both have been correlated to hyperlipidemia, obesity, metabolic disease, asthma, cancer, peripheral vascular disease, gastrointestinal problems and an overall feeling of pain including chronic headaches, sore joints, back pain, stiff neck and more (Williamson et al., 2015). All of these mental and physical conditions that resulted from trauma, manifested due to the changes in biology and ways the brain works that keep a person healthy. The neuroplasticity of the brain is highly impacted by the experiences one encounters in their life, which is why trauma that is untreated is so detrimental to one's health.

One might think the physical manifestations of PTSD are a result of one not properly taking care of their body due to the mental disorders or maladaptive coping mechanisms that one develops due to the traumatic events they endure; this is true. However, research has shown the neurological and biological changes that occur in the brain after trauma contribute to many more,

if not most of the detrimental effects. In the same way that cancer develops due to cells regenerating too quickly, one's experiences that cause physiological distress can cause harm to one's cells that ultimately affect the entire body. The human body is constantly changing and developing so much so that every 7 to 10 years the body completely regenerates every cell throughout its entire body. Many things can influence the constant regeneration of the body. One study describes how hormone levels and different areas of the brain change due to traumatic experiences. Through fMRIs, researchers have shown that people with PTSD have reduced prefrontal cortex activity when reminded of trauma, the prefrontal cortex controls one's reasoning and decision-making skills. They also found that they had higher amygdala activation, which is the part of the brain that controls the feeling of fear (Jowf et al., 2021). This means that traumatized people act irrational or impulsively as well as have a hard time controlling their responses to triggers, making them have outbursts of emotion such as crying, lash out in anger or more. It is interesting to note that people who are reminded of their trauma produce higher levels of dopamine. Dopamine is a neurotransmitter that plays a role in how people feel pleasure. Although seemingly contradictory, this relates to the pain-pleasure complex and how people will try to relive their trauma in attempt to make sense of it. Because they associate it with pleasure due to the momentary adrenaline and dopamine influx, the long-term effects of this cause many troubling effects in the brain (Kolk, 2015). This creates for a toxic cycle where one slowly contributes to negatively impacting their health and create the alarming symptoms.

People with PTSD usually fall into cycles where they find themselves in situations similar to their trauma; this exacerbates the effects of depression and anxiety which hinders their ability to do daily tasks. This is most likely due to the biological changes that occur in the brain. One example being, PTSD suffers have lower serotonin levels, which is a neurotransmitter, or

arguably a hormone that affects appetite, mood regulation, emotion, and digestion (Jowf et al., 2021). Abnormal serotonin is one of the main causes of depression, anxiety, and sleep disorders because it has been associated with the uncoupling between the central and peripheral autonomic fields. Some of the symptoms are irritability, hyperarousal, and insomnia. It is known that people with PTSD also have decreased GABA activity and norepinephrine deficiencies, which correlates to serotonin in the ways that it controls people's neurological functions in relation to sleep and appetite (Jowf et al., 2021). This can severely effect people by throwing off their circadian rhythm, an important part of human homeostasis. This is why family members or friends of a person who went through a traumatic event might see them sleeping at odd hours, becoming extremely agitated by small occurrences or just acting in ways they do not normally.

Unfortunately, there are even more effects on one's brain for those with PTSD. Researchers did a study on soldiers of the Special Forces that discovered Neuropeptide Y, NPY, which is a neuropeptide expressed in the forebrain, limbic system and brainstem that regulates emotional and stress behaviors. This is released in lesser amounts in people with PTSD, resulting in hyperarousal in the brainstem, alter stress activations in the HPA axis and initiate re-experiencing in the hippocampus (Jowf et al., 2021). This supports that PTSD and trauma causes people's development of hyperarousal activities such as impulsively wanting sex, addictive behaviors contributing to substance use disorder, and reduced stress resiliency causing their outburst of emotion (Jowf et al., 2021). Therefore, people with unresolved trauma might potentially be a danger to loved ones due to their inability to control their anger, hypersexuality, overall emotions or handle normal amounts of stress. Studies have also shown that people with PTSD have lower hippocampal volume, meaning they have deficits in visual and verbal memory performance which can cause memory loss later in life (Bremner, 2007). There was a study done

where researchers examined Vietnam veteran's hippocampal volumes and found that they averaged an 8% reduction in right hippocampal volume on MRIs whereas another group of patients with childhood abuse-related PTSD averaged a 12% reduction in left hippocampal function. They found that smaller hippocampal volumes were associated with reductions in N-acetyl aspartate or NAA. NAA is responsible for neuronal integrity which relates to how the brain interacts with the body. Because neurons are so important to neurological health, when neuronal integrity is severely compromised, it can influence how the brain interacts with every part of the human body. Several studies found NAA decreased gray matter density, where there are tons of nerve synapses that are the center of how almost all parts of the brain and body communicate with each other (Bremner, 2007). This is extremely important because it represents that PTSD and different types of traumas affect the regeneration of cells and interactions between the body and the brain, influencing organ health, one's ability to function and so much more.

PTSD and Pharmaceutical Drugs

Along with the importance of neurological health and how PTSD and trauma can hinder it, cell regeneration and genetics play a huge role in having high functional brain activity. It is known that RNA and DNA are associated with the regeneration of cells in the body, relating to genetics. When looking at how RNA and DNA is effected in people with PTSD, researchers found miRNA, a type of RNA that regulates 30-60% of all protein-coding genes (Jowf et al., 2021). miRNAs are involved in development, metabolism, growth and differentiation of cells and parts of the body. Development deals with how the body grows over time, with metabolism being how the body extracts nutrients from food, growth being how new cells are generated to repair old ones and differentiation being how each new cell created has a specific function for the

body. Abnormal expression of miRNA has been known to cause human diseases such as cancers, autoimmune diseases, inflammatory diseases as well as psychiatric disorders, therefore psychologists studied to see whether PTSD affected miRNA. Surprisingly, they found it was not. However, they did find that miRNA was affected in those that suffered from comorbid depressive/anxiety disorders with PTSD, but only when they were found to be taking SSRIs, selective serotonin reuptake inhibitors. This is most likely because miRNA "modulates the expression levels of the serotonin transporters" (Jowf et al., 2021). This gives evidence to support that pharmaceutical drugs, although helpful and beneficial when used in moderation or for short periods of time, have been known to hold deteriorating effects in the long term.

When looking further into the effects of pharmaceutical drugs that are used to treat PTSD and trauma symptoms, researchers found neurological mechanisms that better help PTSD symptoms than the pharmaceutical drugs that are known to be the leading treatment today. For instance, they found that histone acetyl transferases (HAT) when added to an acetyl group to the histone proteins causes chromatin to relax, allowing transcription to occur and causes the formation of memory (Jowf et al., 2021). Since HDAC removes the acetyl group important to transcription, HDAC inhibitors have been linked to neuroprotection and memory formation (Jowf et al., 2021). These inhibitors have extreme potential for the treatment of PTSD that can help steer people away from using pharmaceutical drugs. The HDAC inhibitors originally were known to be influential anti-cancer drugs, emphasizing how highly PTSD and trauma can affect the brain and in turn the physical body. It also shows how the body has many mechanisms within itself that can cure the effects of trauma, PTSD and ultimately physical disorders. Much more research still needs to be done to fully understand how the body can and should be treated

against illness, but with new information being researched every day, new or old, more natural treatments for PTSD and physical illness should not be ignored.

Because the brain and body are so highly affected by trauma, and drugs that are useful in protecting against cancer also help hinder the development of PTSD, it is plausible to assume that therapy that helps heal untreated trauma can also prevent and help the development of physical diseases such as cancer, heart disease, and so much more. Although pharmaceutical drugs have been shown to be effective in treating physical and mental ailments, they seem to be a short-term cure for a long-term problem. Research has been done that show how pharmaceutical drugs resolve the symptoms of all kinds of diseases, but do not do anything to heal the underlying causes of the illness (Heal, 2017). Biological experts state that very few diseases are organic, meaning there are genetic and biochemical factors that cause the disease, and are everything to do with lifestyle and "the consequences of dealing with stress" (Heal, 2017). This relates to how stress and stress disorders like PTSD have shown to cause so many biological problems and in turn physical illness. It is stated that 10% of acute illnesses can be treated by a holistic approach, and the other 90% of acute illnesses would benefit from pharmaceutical drugs, however, 100% of chronic illnesses, more common in society, would benefit by taking a holistic healing approach. A holistic approach means changing or looking into how to better take care of one's mind, body in the sense of nutrition and exercise, emotions and look into energy healing and meditation (Heal, 2017).

Therapies and Treatments

Like how trauma can cause detrimental biological effects, holistic healing has shown to greatly benefit the body and its symptoms of illness. A researcher of Integrative Oncology analyzed over 1500 cases of people who went into radical remission after being diagnosed with

cancer, typically at stages 3 or 4 and did 250 in-depth interviews with them. She found that all of them used nine different types of healing, with only two of them being physical. They included "radically changing your diet, taking control of your health, following your intuition, using herbs and supplements, releasing suppressed emotions, increasing positive emotions, embracing social support, deepening your spiritual connection, and having a strong reason for living" (Heal, 2017). Although these types of healing are vague, research has shown that more specific types of healing within those categories have greatly benefited one's health on a biological level. For instance, meditation has shown to cause increased blood levels of endorphins and reduced levels of adrenocorticotrophic hormone ACTH, and cortisol (Venditti et al., 2020). These effects have a positive impact on the HPA axis, which regulates the body's stress, immune system and metabolism. Along with meditation, yoga has been known to improve the redox state of the body by reducing ROS levels which are known to cause inflammation and accelerated aging (Venditti et al., 2020). ROS levels are oxidative stress that refers to "elevated intracellular levels of reactive oxygen species (ROS), that cause damage to lipids, proteins and DNA" which have been linked to the pathophysiology of cancer (Schieber et al., 2014). This emphasizes again the ways experiences impact the body, but also how treatments such as these can greatly protect the body and bring overall health. Yoga has shown to reduce serum cortisol via the HPA axis and counteract neurodegenerative processes triggered by stress by reducing cellular aging and preserving neuroplasticity (Venditti et al., 2020). There was even a study done where 120 people underwent four and a half days of meditation training and they found drastic changes in Immunoglobulin A and cortisol levels (Heal, 2017). People's cortisol levels decreased by a lot, and Immunoglobulin A levels skyrocketed in this study, being the body's highest defense against

bacteria and viruses for the immune system (Heal, 2017). All of these are examples of how one's biology can be changed and preserved through healthy acts of physical and mental care.

Although activities like meditation and yoga are great at reducing stress and boosting one's immune system, types of cognitive therapy are also beneficial in curing mental illnesses associated with chronic disease and physical symptoms such as PTSD. One form of therapy that has been associated with relieving these symptoms and other mental illnesses is cognitive behavioral therapy, a type of therapy where one reworks the way they think. It helps one unpack trauma and let go of negative thought patterns. In a study regarding cognitive therapy and anti-depressive medication, researchers found that over 8 weeks, patients getting anti-depressive medication had a 50% reduction of symptoms while patients receiving cognitive behavioral therapy had 43% reduction of symptoms (DeRubeis, 2008). This relates to how pharmaceutical drugs are a temporary solution because when studying the patient's symptoms in 16 weeks they found cognitive therapy was more efficient than the anti-depressive medication (DeRubeis et al., 2008). They found that patients that underwent cognitive behavior therapy had less of a chance of relapsing in depression than those who took the anti-depressive medication. Compared to cognitive behavioral therapy, another therapy called EMDR, or eye movement desensitization and reprocessing therapy has had great success at healing patients with PTSD and all kinds of trauma. Many doctors have studied how incredible EMDR therapy is at treating trauma patients. There is one study where psychologists and psychiatrists took eighty-eight subjects and studied thirty who were given EMDR therapy, twenty-eight who were given Prozac and the rest put on placebo (Kolk, 2015). They found that although at first the placebo and Prozac patients were improving steadily together, towards the end of the experiment they found that 60% of the patients that underwent EMDR therapy were completely cured (Kolk, 2015). This just shows the

impact different types of therapy can have on mental symptoms which have shown to bring so much physical benefit to the body.

Further Research

When looking at how interactive therapies influence one's mental health ultimately changing one's physical health for the better, it could be interesting to see how even just reworking one's thoughts might influence the body. Since meditation and cognitive therapies are centered around creating and bettering thoughts and outlooks on life, it could be interesting to do further research on how thoughts effect one's health. The placebo effect is a great example of something to do more research on. It is known that to get drugs approved to move on in the next stages of their trials, researchers and scientists not only must find improvement in their patients using the drug, but they have to find those patients surpassing those on the placebo. Researchers struggle to get their drugs to surpass the statistics of those on the placebo and some drug trials are even discontinued due to them not having great enough statistical improvement over those with the placebo. This shows how influential the brain body connection is because the placebo is a mental façade, tricking the brain into thinking it is getting treatment when it is not. Another example that could show the potential of how reworking thoughts and ideas benefits health, comes from EMT training. EMTs are told to put oxygen masks over people having panic attacks because it will relieve their symptoms although they are told not to put any oxygen through. This is so the person thinks they are being supported in being able to breathe when they are not. Interestingly enough, it does work.

Conclusion

Overall, the human body is incredibly resilient, and it is shown that people can overcome disorders such as PTSD even without the use of pharmaceutical drugs. Although there needs to be more research, the mental and physical connection of the brain and body has such an impact on one's health. Those suffering from PTSD, unhealed trauma, cancer, heart disease, depression disorders, anxiety disorders or any illness should not lose hope. Even just waking up each day and taking the steps to go to therapy or go for walk can do wonders for one's health. There are so many more natural physical and mental treatments that can cure one's illnesses that have yet to be further researched on. Although modern medicine should not be disregarded, it is important not to dismiss the power of therapy, physical exercise and the medicine that comes from within.

Annotated Bibliography

Al Jowf, G. I., Snijders, C., Rutten, B. P. F., de Nijs, L., & Eijssen, L. M. T. (2021, October 4). *The molecular biology of susceptibility to post-traumatic stress disorder: Highlights of epigenetics and Epigenomics*. International journal of molecular sciences. Retrieved March 15, 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8509551/

This article is about how PTSD manifests differently in people who experience trauma due to their genetic makeup, referring to one's susceptibility rate of developing PTSD and other mental disorders, ones symptoms and how one should go about therapy, based on individual epigenetics.

Bremner, J. D. (2007, November). *Neuroimaging in posttraumatic stress disorder and other stress-related disorders*. Neuroimaging clinics of North America. Retrieved March 15, 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2729089/

Dr. Douglas Bremner's research shows that brain dysregulation can occur in patients with PTSD, finding abnormalities on brain scans of the prefrontal cortex, amygdala and hippocampus. Particularly looking at sexual assault and domestic abuse patients, he found that these patients had decreased blood flow to important parts of their brain when doing certain tests, such as the Stroop test, with words like "rape" and pictures of men and women.

Deppermann, S., Storchak, H., Fallgatter, A. J., & Ehlis, A.-C. (2014, September 1). *Stress-induced neuroplasticity: (mal)adaptation to adverse life events in patients with PTSD – A*

critical overview. Neuroscience. Retrieved April 9, 2022, from https://www.sciencedirect.com/science/article/pii/S0306452214007143

This passage talks about the compromised neuroplasticity of PTSD patients due to the maladaptive coping mechanisms they develop due to the disorder. It goes into how the HPA or hypothalamic-pituitary-adrenocortical axis changes due to the trauma resulting in PTSD as well as amygdala, BDNP regulation, and hippocampal changes.

DeRubeis, R. J., Siegle, G. J., & Hollon, S. D. (2008, October). *Cognitive therapy versus medication for depression: Treatment outcomes and neural mechanisms*. Nature reviews. Neuroscience. Retrieved April 15, 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2748674/

This article compares therapies such as cognitive therapy to medications used for disorders such as depression and anxiety, involving PTSD. It explains many studies that support the use of cognitive and behavioral therapy over medications or together with medications for best results in healing.

Heal. (2017). *Heal Documentary*. Retrieved 2022, from https://www.healdocumentary.com/.

This documentary goes into detail about how the human body can heal itself through developing a consistent positive mindset, as well as releasing the mental core problems that cause physical illness. The documentary interviews many people with different severe physical illnesses or aliments and goes through how they healed themselves physically through the power of movement, therapy, and modern-day eastern medicine.

McFarlane, A. C. (2010, February). *The long-term costs of traumatic stress: Intertwined physical and psychological consequences*. World psychiatry: official journal of the World Psychiatric Association (WPA). Retrieved March 15, 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2816923/

This article covers how many people "cope" with the stress of a traumatic incident in the moment of it happening, but have detrimental effects later in life because of it, including psychosomatic syndromes, hypertension, hyperlipidemia, obesity, heart disease and more.

Schieber, M., & Chandel, N. S. (2014, May 19). *Ros function in redox signaling and oxidative stress*. Current biology : CB. Retrieved April 15, 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4055301/#:~:text=Oxidative%20stress%20refers%20to%20elevated,biology%20that%20maintain%20physiological%20functions.

This article explains the effects of ROS or oxidative stress and how it excess levels of it in the body can cause damages to important cellular parts in the body such as lipids, proteins and DNA. It talks about disorders such as PTSD can cause high levels of ROS and how therapies and activities can be done to lower ROS

SW;, W. J. B. P. E. C. L. D. G. P. (2015). *Maladaptive autonomic regulation in PTSD accelerates physiological aging*. Frontiers in psychology. Retrieved March 15, 2022, from https://pubmed.ncbi.nlm.nih.gov/25653631/

This article covers in depth the physiological and psychological impacts trauma, particularly PTSD has on the body, covering the parasympathetic and sympathetic nervous systems, the

impact trauma has on brain waves and the ultimate degenerative effects untreated trauma can have on cognition, leading to a shorter lifespan.

U.S. Department of Health and Human Services. (2019). *Post-traumatic stress disorder*. National Institute of Mental Health. Retrieved April 8, 2022, from https://www.nimh.nih.gov/health/topics/post-traumatic-stress-disorder-ptsd#:~:text=According%20to%20the%20National%20Center,been%20through%20a%20dangerous%20event

This article gives in depth information about what PTSD is, what the symptoms are and lists some of the risk factors of those suffering from the disorder. It brings up some of the helpful therapies that can treat PTSD symptoms and provide relief to those suffering.

Van Der Kolk, B. (2015). *The body keeps the score: Brain, mind, and body in the healing of trauma by bessel van der kolk, Md* . IDreamBooks Inc.

Bessel Van der Kolk's book, *The Body Keeps the Score*, dives into the reality of how trauma ranging from war veterans with PTSD to children with troubled upbringings, stays in the body until it is released through different types of movement or touch, relaying all the ways one can do so through therapy and other forms of healing.

Bessel Van der Kolk worked as a psychiatrist, researcher, and therapist, which is what makes his work so valuable. His diverse way of seeing the world from each of these perspectives led him to coming across so many clients, patients and general people which all influenced the importance and validity of his work.

Venditti, S., Verdone, L., Reale, A., Vetriani, V., Caserta, M., & Zampieri, M. (2020, August 11). *Molecules of silence: Effects of meditation on gene expression and epigenetics*. Frontiers in psychology. Retrieved April 11, 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7431950/

This article explains studies done that show the effects of meditation on gene expression and epigenetics. It goes into the importance of meditating and how it can regenerate cells making for a healthier mind and body.