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## Analysis Of The Cognitive Impacts Of PTSD

Post-traumatic stress disorder (PTSD) is a mental health disorder that will impact roughly 8% of the U.S. adult population at some point in their lives. This statistic does not represent the millions of individuals who experience trauma every year, and do not go on to develop PTSD symptoms. According to the U.S. Department of Veterans Affairs, National Center for PTSD, “15% to 43% of girls and 14% to 43% of boys go through at least one trauma. Of those children and teens who have experienced trauma, 3% to 15% of girls and 1% to 6% of boys develop PTSD”. PTSD develops after an individual experiences or witnesses a life threatening event such as a natural disaster, motor vehicle accident, combat, or physical and sexual assault. It is important to note that some traumatic experiences, such as sexual and physical assault, have the propensity to result in PTSD symptoms more than other traumatic events. PTSD is characterized by recurrent flashbacks of the traumatic event, hypervigilance, and avoidance of reminders of the traumatic event (American Psychiatric Association, 2013). Studies have shown that the intense emotional experiences associated with psychological trauma can have long term consequences on cognitive processes including memory, planning, problem solving, and attention. With such a large percentage of the population experiencing trauma and developing PTSD symptoms, the focus of this essay is to understand how PTSD impacts our cognitive processes, as well as what treatment methods have been found to be effective in attenuating the impact PTSD has on cognitive function.

Cognitive theories of stress and PTSD have been used extensively to understand stress and trauma injuries, and the interplay between emotion and cognition with symptoms of PTSD. Researcher Ronnie Janoff-Bulman, in her shattered assumptions theory, explored the impact trauma has on cognition and behavior. She posited that traumatic experiences damage three fundamental assumptions people hold about the world: the world is benevolent, the self is worthy, and the world is meaningful (1989). When these existing self and world schemas are shattered, individuals experience a cognitive dilemma to either integrate their traumatic or negative experience into their prior assumptions or revise their old assumptions (1989). Experiencing a violation that goes against one's beliefs leads to emotions such as shame, guilt, sadness, and anger, and can cause the individual to attribute false or inaccurate beliefs to the event such as “I am not safe anywhere” or “I'll never be able to relate to people again. These false beliefs can impact the way individuals perceive future experiences, as the lens they now view the world from is colored by insecurity, danger, self-questioning, and threat (Figley, 1985).

According to cognitive theories of stress and PTSD, prior experiences of trauma can have a significant influence on new experiences and cause a person to interpret situations more negatively. Research examining the impact of trauma on a person's assumptions about

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themselves and the world showed that individuals who experience trauma have significantly more negative basic assumptions and were significantly more depressed when compared to non-victims, even years after the traumatic experience occurred (Janoff-Bulman, 1989). Therefore, emotional stress can change the cognitive networks that help us process information about the meaning we apply to situations, our perception of our environment, and our responses to stimuli.

PTSD symptoms have been linked to dysfunction in the amygdala, hippocampus, and the prefrontal cortex. The amygdala is located in the middle of our temporal lobe. Its function is to help detect various threats in the environment and activate the sympathetic nervous system, our “fight or flight” response, to help us react to perceived threats in our environment. The hippocampus is a brain area involved in learning and long-term memory. The hippocampus is particularly vulnerable to stress. In addition, the amygdala helps us store new threat-related or emotional memories. The prefrontal cortex is located in the frontal lobe, right behind the forehead. Its function is to help regulate attention, awareness, and emotions, initiate conscious voluntary behavior, make decisions, determine the meaning and emotional significance of events, and inhibit or correct dysfunctional reactions. During situations that our brain perceives to be threatening, our amygdala activates our “fight or flight” response, releasing adrenaline, norepinephrine, and glucose to prepare our brain and body for action. If the threat continues, the amygdala will communicate with the hypothalamus and pituitary gland to release cortisol, while the middle part of the prefrontal cortex will assess the threat and decide to either heighten or decrease the “fight or flight” response. While this is a normal brain response to a threat, those with PTSD have been found to have a somewhat altered brain response to threatening situations.

PTSD impacts multiple brain and body functions. Those who have PTSD respond with a hyper reactive amygdala and a less activated medial prefrontal cortex in response to a threat. While the amygdala reacts excessively to a potential threat, the medial prefrontal cortex is blunted in its ability to accurately respond to the threatening stimuli. The over reactive amygdala, as a result, releases more norepinephrine in response to the threat, which is underregulated by the prefrontal cortex. Additionally, an increased amount of cortisol is released by those with PTSD in response to stressors. However, a decrease in cortisol levels has been found to be associated with chronic PTSD. As a result of these different functions, individuals with PTSD become over-reactive to fear cues and thus their neural networks regarding fear become highly saturated and accessible, responding in default to even minimally stressful events. This has implications for the way information is both encoded and retrieved.

Cognitive impairment (CI) has been found to be linked with PTSD symptoms. The exact mechanisms through which these two constructs are related still allude researchers. However, multiple studies examining those who have been exposed to traumatic events and subsequently

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developed PTSD have shown CI.

Researchers have described PTSD as a disorder of memory impairment. Intrusive memories, such as flashbacks, and impoverished memory functioning, such as trauma-related amnesia and fragmentation of memories, are two types of memory disturbances that have been linked to trauma survivors. Those with PTSD, compared to other trauma survivors without PTSD, have shown deficiencies in their general declarative memory for information not related to their trauma, and an enhanced memory for trauma-related information. Declarative memory, sometimes referred to as explicit memory, consists of information and events that can be consciously recalled. These findings suggest that trauma-related input interferes with our brains ability to properly encode and retrieve neutral information. Deficiencies in both short-term and delayed declarative memory have been found in veterans, rape victims with PTSD, adult survivors of child abuse, and among children and adolescents with PTSD. Additionally, literature suggests that verbal memory may be more greatly impacted than visual memory for those with PTSD. In a large meta-analysis examining verbal memory specifically, verbal memory was shown to be significantly correlated with PTSD in adults. These findings are important when considering areas of focus for PTSD treatment.

In congruence with cognitive theories of PTSD, researchers and clinicians have agreed that PTSD impacts an individual's cognitive functioning in that attention becomes involuntarily biased toward environmental cues that are reminders of a traumatic event. PTSD, when compared to other emotion related disorders, was found to have the greatest degree of attentional bias associated with it. Among crime victims with acute PTSD, a significant attentional bias towards threat-related words was found when participants completed the Stroop task. Similar results have been found for OEF/OIF war veterans, and children and adolescents with PTSD. Additionally, trauma-related Stroop interference has been shown to be positively correlated with PTSD symptom severity. These results suggest that for someone with PTSD, their attention is more captivated by trauma-related material, and it is more difficult for them to disengage from perceived trauma-related stimuli.

PTSD has also been shown to negatively influence an individual's problem-solving ability. Specifically, higher PTSD scores have been found to predict poorer problem-solving skills. One hypothesis for why PTSD results in declines in problem solving skills is due to the fact that those with PTSD have an overgeneralized autobiographical memory, which leads individuals to have less experiences to call upon when trying to effectively solve a problem. More research is needed to understand the mechanisms that facilitate this association, however, it is an important deficit to understand when working clinically with PTSD.

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