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Mini Review

Impact of Trauma on Neurodevelopment and Learning

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Abstract

This article reviews related literature and research on trauma. It highlights the impact of trauma on the student's psychology and how learning is impaired by the adverse effect of trauma on childhood development of the student. The implication for teaching and learning was also discussed. It concluded by asserting that trauma may impact the development of the brain functions related to emotion, learning ability, self-control and neurodevelopment can affect how we respond to trauma thus trauma informed models of teaching and learning can be enhanced by entrenching positive education into the classroom, this will assist students curtail the long-term influence of complex trauma.

Keywords: Trauma; Neurodevelopment; learning

Introduction

Trauma is any intensely upsetting experience that can be emotionally, mentally or physically overwhelming for a person. Trauma has been described as an overwhelming experience that can forever alter one's belief that the world is good and safe [1]. Students and children because of their ages are vulnerable and as such are exposed to various undesirable experiences some of which are traumatic. These traumatic experiences if not checked and managed could affect the childhood psychological development and impact learning and efficient wellbeing of the student. This makes it necessary for teachers and caregivers to pay attention and understand the impact of trauma on their students.

Educators can devote substantial amounts of their time and work into establishing relationships to support these students, only to have them disrupt this in ways that can leave educators and caregivers feeling hurt, unsuccessful, and confused. Behaviour management schemes and strategies that work with most students tend to fall flat with traumatised students, this tends to increase frustration and increases workload of seeking alternative solutions; which may include punishments thus worsening the harm done the traumatized student. Thus, it's imperative that teachers and caregivers should know the signs to look out for amongst their students, as early dictation of students suffering from trauma will help save them from developing a disorder such as post-traumatic stress disorder amongst others [2].

Types of Trauma

Trauma can be simple (type1) or complex (type 2). Simple traumas are those traumas that occur within a time frame, usually eventful, awful and involving intense emotional suffering. A simple trauma can be defined as a short occurrence or one-time event that threatens bodily injury or serious harm [1]. Sad events like lose/death of family or friends, parental divorce or separation and or environmental hazards such as accidents (automobile or domestic. Complex trauma involves repeated exposure to traumatic experiences. It is a person to person trauma, this means that the source of a child's trauma is a person who nurtures, cares for, or protects the child who now turns to become a terror or dangerous to the child thus it is an interpersonal trauma. Continuing stress, such as living in an unsafe vicinity or being the victim of bullying, can be traumatic, even if it just feels like day-to-day life to an adult. Succinctly put, nearly any event can be considered traumatic to a child if: It happened unexpectedly, it happened repeatedly, someone was intentionally cruel, and the child was unprepared for it.

Trauma to a child doesn't have to take place directly to the child; for instance, watching a loved one suffer can be awfully traumatic as well. Exposure to violent media can also traumatize children [2,3].

Trauma can also be categorized into eight. This according to Wilson, et al. [4] are;

- Threat to life or limb.
- Severe physical harm or injury, including sexual assault.
- Receipt of intentional injury or harm.
- Exposure to the grotesque.
- Violent, sudden loss of a loved one.
- Witnessing or learning of violence to a loved one.
- Learning of exposure to a noxious agent.
- Causing death or severe harm to another

For young children and students, traumatic stress can harshly impact a student's capability to learn, function effectively in the society, control their feelings and behaviours. Becoming a trauma-informed teacher or caregiver means becoming more intensely aware of how trauma changes the lens through which its sufferers see their world and developing practices that credits that reality.

Impact of Trauma

There is substantial evidence of the links between childhood trauma and adult health. Occasionally people who have suffered childhood trauma expect to overgrow it when they are adults. But these childhood trauma affects brain development and consequently can exert effects later in life. The conception that early trauma may be associated with psychological and behavioural difficulties in adult life is gaining credibility as recent work has cultured this notion in many ways. Research findings have proven quite compellingly that early trauma is a major predictor-and causal agent-not only of neurotic spectrum problems such as depression, anxiety, and relationship matters, but also of physical health aftermaths (Felitti, 2002).

Furthermore, At the level of the brain, evidence is accruing that early trauma may exact its damage in a child by dangerously affecting the size and functionality of brain structures such as the hippocampus and the corpus calosum, as well as changing neurobiological mechanisms involved in mediating the accompanied stress response. These early variations constitute structural susceptibilities for emerging psychological disorders and physical health challenges in adulthood. Stress emerging from trauma can effects the developing brains of males and females differently [5]. Research in neurology has found that variations in the insula following trauma influences the development of PTSD, and also its maintenance. Similarly, it was found that women who experience trauma are more likely to develop PTSD than man [3], the insula which is a region buried deep within the cerebral cortex that plays a key role in interceptive processing (how much or how little attention one pays to sensory information within the body), emotional regulation and self-awareness is proven to vary in the size and surface area between males and females who have gone through traumatic stress versus those who have not, in a study involving youths with symptoms of post-traumatic stress [6].

Trauma can be an issue in the learning and education. In the event of a stressful or traumatising event, the sympathetic nervous system initiates the fight-or-flight response. The stress hormone cortisol is released. Typically, when the stressor goes away, the parasympathetic nervous system responds and returns the body to normal. Nonetheless, in a traumatic event, which is caused by abnormally large measures of stress, excess cortisol is released in the body. That large amount of cortisol has undesirable effects on the brain, damaging the CA3 neurons in the hippocampus [7].

It is important to note that the brains improves sequentially, from the lower survival functions of the brainstem through to the highly complex functioning of the prefrontal cortex. The cortex contains a number of multifaceted layers forming the exterior of the brain. It remains quite variable or malleable in response to human experience and learning during a life time. The damage to the hippocampus weakens the patient's ability to form new memories, thus affecting her capacity to learn. Verbal learning can be affected, in which the patient has difficulty retaining information gathered from verbal sources, compared to visual. Another factor that upsets learning after trauma is attention. Trauma can affect sustained and focused attention, though selective attention, which is used when processing sensory memories into short-term memories, is not affected [8]. The mixture of the emotional problems from the trauma and the physiological damage can negatively affect the child's performance in school. The development of the limbic system can be impaired in Students who have suffered complex trauma during their early years, and this can impact their capacities to relate, ability to control emotions and to appreciate and respond adaptively to the experiences and situations of other people.

As the amygdala and hippocampus interact with each other, the ability for memory to evoke an emotional response is not surprizing for anyone. However, for students who have survived complex trauma, some memories are awfully unpleasant, frightening or startling - and the emotional reactions that they can evoke can be quite disturbing. They can even lead to an overwhelming stress response and quite concerning conducts.

Implication for Teaching and Learning

To be able to help a traumatised student, a good understanding of the concept of trauma and the events that triggered these trauma can help a teacher be of better assistance to the student. Complex trauma includes the comprehensive and continuing impact of traumatic experience [9]. This longer-term impact often turns out to be evident during the school years, making working with these children and adolescents quite demanding and challenging. Students suffering from trauma may not graduate with a passing grade, go on to further study, find and keep a good job, have a supportive and safe network of close friends, engage in a safe and caring intimate relationship nor parent in a safe and adaptive manner. It is therefore necessary that structures and approaches to guarantee that the practices, policies and culture of an establishment, and its workforce, understand, identify and respond to the effects of trauma on client wellbeing and behaviour" (Quadara and Hunter, 2016) thus schools, educators and care givers should adopt trauma informed approaches to help students under their care. Brunzell,

Waters and Stokes [5] asserts thus ''We believe that schools can be healing institutions—in addition to academic institutions— for the 40% of the student population who are adversely affected by trauma''.

Students who have experienced complex trauma may display different types of behaviour. The behavioural responses that can occur can vary but generally fall into two main categories. Hyperarousal – when the student's fight or flight response is active and you can see attack or escape behaviours in response. And Hypoarousal – when the student's freeze response is active and you can see avoidance and even dissociative responses such as very anxious and struggles to engage with learning activities, excessively emotional, argumentative, or verbally or physically violent, Distraught and runs out of the classroom or school to find a place to escape, Detached and hard-to-reach. These experiences are very real, physiological event that needs a careful and informed response for the adults around them [10].

Neurobiological studies of those who have experienced complex trauma have shown quite severe over activity in the brainstem during times of significant stress. Certainly, the brainstem and the prefrontal cortex cannot be highly active at the same time. The activity in one of these areas inclines to balance out activity in the other [11]. For students who have experienced complex trauma, their brains become used to being on alert. This suggests that for most hours of most days they have an intense brainstem that limits prefrontal cortical activity [12].

With a sluggish prefrontal cortex, these students will experience much difficulty engaging with learning activities. For some of them, despite the many school activities for which they have been physically present, they may just have been cognitively absent. This explains the numbers of these students who have gaps in their learning or who experience ongoing learning difficulties. Thus reducing mental work load for such students will be necessary.

In addition, when neural activity in the brainstem is on overload and activity from the prefrontal cortex is inhibited, the student's capacity to apply logic, to problem solve, or to settle their feelings and behavioural responses, is quite limited [13]. Clearly, this implies that work must be done in schools to help our students who have experienced complex trauma feel safe and supported, this will calm overactive brainstem activity and encourage prefrontal cortical activity. By giving apple time for quite low stimulus activities.

Conclusion

Novel research in Neuroscience is suggesting that behaviours of students who have experienced trauma are not simply learnt or purposefully chosen by students, but rather can be due to disorganised or maladaptive development of synaptic connections and neural pathways during serious periods of neural growth. As such, they are not behaviours and responses that would be easily remediated by behaviourist approaches using a punish/reward approach to management. Indeed, if neuroscience is providing an evidence-based explanation for these behaviours, it makes sense to draw from neuroscience to develop systems which the school system will adopt to render support and intervention to trauma victims. Trauma-informed prototypes of teaching and learning have been employed to connect and engage students in the classroom. By focusing on the two broad domains of improving self-regulation and building relational capacities, this model of teaching supports struggling students to reinforce their capacity to learn. It is therefore obvious that Trauma may impact neurodevelopment and neurodevelopment may impact how we respond to trauma. This awareness will improve students' capacities to relate and emotionally adjust to learn at school [14]. Improvement in this area can also lead to improvement in the capacity for adaptive future adult relationships and parenting behaviours, which is a vital consideration for our schools as they consider the next generation of young students and the prevention of cross-generational trauma. Studies in Neuroscience is clarifying the difficulties faced by trauma victims at school, thus a prospect for schools to cultivate inclusive practices that are far more likely to remediate accompanying challenging behaviours and enhance education and life outcomes for these susceptible children and young people [15-20]. By adding positive education practices to trauma-informed teaching methods, teachers offer students who are trauma victims with the chance for both healing in areas of deficit and increasing areas of strength. Thus With proper supports, students can improve their stamina through self-regulation within an interactive context to find levels of safety and belonging in the classroom that are essential to take learning risks. It is therefore believed that trauma informed models of teaching and learning can be enhanced by entrenching positive education into the classroom [1,21,22].

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Conflict of Interest

No conflict of interest

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