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Lifelong Psychopathology Stemming from Childhood Maltreatment: A Review of Structural and Neurobehavioral Changes

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ABSTRACT

This review investigates the link between childhood maltreatment and structural changes in the brain as well as psychopathology later on in life. Childhood maltreatment was compared to the time of onset of psychopathology and the severity of symptoms. The relationship between the type of trauma and socioemotional cognition was also analyzed. Childhood maltreatment is a serious problem that can hinder a child's ability to develop into a healthy adult. Not only does it induce unhealthy amounts of stress on the child, but it also can negatively affect brain development. Many mental health problems can arise from childhood maltreatment, some minor, while others are debilitating. Those who experience severe or repeated trauma during childhood are more likely to experience life-long psychopathology (Gould et al., 2012). This psychopathology may include but is not limited to depression, anxiety disorders, substance abuse, conduct disorder, dementia, attention deficit hyperactivity disorder (ADHD), and post-traumatic stress disorder (PTSD) (Radford et al., 2017). This review showed that childhood maltreatment could be associated with changes in the volume of limbic system structures, the hippocampus and amygdala, along with alterations made to the connections between brain regions, such as the prefrontal cortex and the limbic system. Furthermore, maltreatment could also be associated with a diagnosis of many different psychopathologies later on in life.

INTRODUCTION

The human brain is the control center of the body and the brain controls every action of our body, such as how we communicate, move, breathe, and think. Brain development is a crucial period that, when disturbed, can have detrimental effects on an individual. Beginning in utero and continuing throughout childhood into young adulthood, development allows an individual to make sound choices, interact appropriately and effectively with others, and gain essential skills that will enable them to thrive in society. Brain development throughout early childhood is vital for shaping how the brain will continue to develop for years to come. Critical connections are made during the early childhood years as children experience new interactions and build relationships with family and peers. Without these connections, an individual would have a difficult time functioning and would be incapable of performing high-level tasks.

Brain development escalates postnatally throughout the preschool stage; the brain is increased four-fold in size. During this stage, brain connectivity levels are far superior to the connections in the adult brain (Stiles et al., 2010). Everyday experiences mold the connections and overall plasticity of the brain during the preschool stage. The development mirrors the type of input that children experience. This type of development continues as the child grows and allows new connections, memories, emotions, and neural systems to form. In adolescence, decision making becomes more prominent and can have severe effects on the well-being of the individual. Decisions are based on emotions (i.e., fear, excitement), memories (i.e., traumatic experiences in the past), and their environment. Adolescents are more likely than adults to take risks and participate in

impulsive behaviors and poor decision making due to the slow development of brain regions, such as the prefrontal cortex (PFC). The PFC develops quickly at first during the beginning of adolescence. However, PFC development slows dramatically but continues to develop into young adulthood. Risky behavior is phased out around mid-adolescence as the PFC matures, and an individual's judgment improves. (Blakemore et al., 2012). The limbic system, mainly the hippocampus, amygdala, and cingulate cortex, play a massive role in the formation and storage of memories and emotional cognition. Similar to the development of the PFC, the limbic system is believed to develop mostly in the infant and toddler years and then slowly stop developing around age four (Uematsu et al., 2012). The presynaptic connections and the development of the PFC and limbic system are essential to the health and functionality of the adolescent as they age into adulthood.

Communication is a vital aspect of a human's everyday life. The development of social skills begins in infancy and continues to develop throughout adolescence. A specific set of behaviors accompanies each stage of life. In childhood, fundamental relationships with peers begin to form, becoming more complex as adolescence begins (Kilford et al., 2016). The behaviors paired with each life stage influence relationships with peers and can lead to more advanced social skills in successive life stages (Nelson et al., 2016). An essential process derived from social cognition is executive functioning (EF). According to the Center on the Developing Child at Harvard University (2019), EF is the ability to plan, organize, and multi-task in an efficient manner. EF skills are controlled by the PFC in the frontal lobe.

Theory of Mind (ToM) is an essential social cognition skill that begins to develop in infancy and continues throughout adolescence. ToM is one's ability to recognize the

mental states of others, their beliefs, intentions, emotions, knowledge, and desires. The frontal lobe, ventromedial prefrontal cortex (vmPFC), to be exact, is known to house the components of cognitive functioning; the vmPFC functions to understand information about oneself and others (Mazza et al., 2015). Along with the vmPFC, the amygdala works to comprehend the emotional states of others in order to form a suitable reaction to the stimuli (Rubin et al., 2014). These skills are vital to helping individuals predict behaviors, try to figure out what one is thinking, and solve problems with others appropriately; all things that are vital to be a successful member of society.

Maltreatment in Childhood

According to the Centers for Disease Control and Prevention (2019), nearly one in seven children are abused or neglected each year. Childhood maltreatment has been shown to have a severe impact on development and mental health later on in life. Childhood maltreatment encompasses physical abuse, emotional abuse, sexual abuse, physical neglect, and emotional neglect. Teicher et al. (2016) note that "brain alterations resulting from maltreatment are highly specific, depend on the type and timing of exposure, and probably were once phenotypic adaptations that enhanced species survival and reproductive success but are now associated with substantial medical and psychiatric disadvantages." The effects that come from maltreatment can be as severe as structural changes in the brain that change connectivity and affect emotions, sensory processing, and arousal systems. The changes depend on the severity and duration of the maltreatment. Some believe that the structural changes were once adaptations to help individuals evolve and survive. Though, what once helped individuals survive can now be associated with mental health conditions. Evolutionarily, the adaptations that were

produced generations and centuries ago may have helped the individual steer away from the threat by reducing development and connectivity in different areas of the brain that would typically make them curious, adventurous, or pleasure-seeking. The effects that come from maltreatment can be as severe as structural changes in the brain that change connectivity and affect emotions, sensory processing, social cognition, and arousal systems.

Structural and Systematic Brain Deficits

The prefrontal cortex is involved in planning, complex behaviors, social cognition, and decision making. During adolescence, brain development is fragile and malleable. Researchers have been studying the structural deficits that the brain takes on when exposed to childhood traumatic stress and maltreatment — specifically, the fear circuitry of adolescents and adults who have experienced childhood trauma. Herringa et al. (2013) note that in the adolescent brain, in both males and females exposed to childhood maltreatment, there was less resting-state connectivity between the hippocampus and subgenual cingulate cortex. Furthermore, in the female adolescent brain, there was also less resting state connectivity between the amygdala and subgenual cingulate cortex. These findings are consistent with the findings that females more often than males internalized the symptoms they experienced. Therefore, childhood maltreatment can alter brain connectivity pathways involving fear and memory formation and possibly trigger the internalization of severe symptoms relating to psychopathologies.

Maltreatment can cause structural deficits in the brain that can increase the chances of developing psychopathologies later on in life. Keding and Herringa (2015) studied the abnormal structural brain changes that can occur in the presence of intense

stress and trauma in patients with post-traumatic stress disorder (PTSD). They found that there is a negative relationship between age and hippocampal volume in adolescents with PTSD. The most extensive PTSD neuroimaging study to date by Logue et al. (2018) also found reduced hippocampal volumes in individuals with PTSD. They noted that the amygdala volume did decrease, but it was insignificant. The influence of childhood maltreatment on brain structure can help explain the suppression and internalization of emotions and the sporadic behaviors that are associated with PTSD.

The PFC is a sensitive region of the brain that requires appropriate development for an individual to thrive and become a successful and healthy member of society. When exposed to childhood maltreatment, there is a decrease in cortical thickness in the vmPFC and parahippocampal gyrus (PHG), part of the limbic system that surrounds the hippocampus. Furthermore, reduced cortical thickness of the PHG was associated with elevated externalization of psychopathological symptoms (Gold et al., 2016). Therefore, this study shows that deficits in the limbic system can lead to an exacerbated negative effect on the functioning of these individuals.

One of the most commonly seen effects of childhood maltreatment is the heightened response to stress or trauma that occurs following the maltreatment. Responses to stress are regulated by the endocrine system. Within the endocrine system is the hypothalamic-pituitary-adrenal axis (HPA axis) that releases glucocorticoids such as cortisol, a hormone that functions in controlling the stress response. Kuhlman et al. (2015) studied the stress response of individuals who experienced non-intentional trauma and maltreatment or abuse in childhood. They found that individuals who experienced childhood physical abuse had an increased and enhanced activation of their HPA axis in

response to stress. Therefore, experiencing physical abuse could lead to decreased sensitivity of the HPA axis. Meanwhile, those who experienced childhood emotional abuse had higher cortisol levels while recovering from the stress. Emotional abuse, therefore, can have the ability to alter the day to day homeostatic function of the body.

Social Cognitive Development and Attention Deficit Hyperactivity Disorder

Researchers believe that brain development can be accelerated if an individual is introduced to unfavorable experiences (Gee et al., 2013). Therefore, social skill development could be rushed and not completely developed before moving into the next life-stage. The PFC is the area of the brain that controls decision making, personality, and executive functioning. As this region of the brain develops during childhood and adolescence, stress and exposure to trauma could cause changes in neuronal connections that are forming. Ultimately, creating changes in the behaviors, emotional responses, and EF skills of the individual (Li et al., 2019). A large part of communication with others is emotional presence and responsiveness. Without emotional recognition and response skills, holding a conversation, comprehending, and being interpreted correctly would be challenging. The neuronal connections made during childhood and adolescence are essential for social cognition skills and can be detrimentally damaged by the introduction of stress or trauma.

Social cognition is an essential function of life that can be detrimentally affected if not adequately developed from childhood to adulthood. Geoffroy et al. (2016) studied the relationship between childhood maltreatment and social-cognitive development from childhood to adulthood. Cognition deficits were analyzed in those who experienced neglect throughout their childhood. The studies neglect specifiers include

undernourishment, dirty, parents rarely engage with the child, and self-report neglect during adulthood. After completing an age-appropriate cognition assessment, researchers noted that childhood neglect, but not other forms of childhood maltreatment, has a strong correlation with decreased social cognition.

Attention deficit hyperactivity disorder (ADHD) has been widely researched in order to find the etiology. Many of these studies have looked into the link between childhood maltreatment and ADHD in adulthood. Sanderud et al. (2016) found that childhood maltreatment leads to an increased risk of ADHD symptoms in adulthood. They found that adults who experienced more than one type of maltreatment in childhood had a higher risk of experiencing ADHD symptoms. Furthermore, males had increased associations with ADHD symptoms than females; this is to be expected as males are more commonly diagnosed with ADHD than females in general. The researchers noted that ADHD and post-traumatic stress disorder (PTSD) have very similar symptoms and that some of the symptoms could be attributed to PTSD. However, ADHD also encompasses the inability to sit still, and this symptom was often present in the adults that were studied.

Individuals with ADHD are known to have difficulties regulating their state of being. Specifically, they have a hard time managing themselves while interacting with others. Saeedi et al. (2014) note that individuals with ADHD often experience social cognitive deficits. The researchers studied the association between ADHD and social cognition. It was found that those with ADHD had trouble with various ToM tests, such as identifying facial expressions in the reading the mind in the eye task and understanding other's perspectives in the Sally-Anne test. This is partly due to deficits in the frontal

cortex of the brain. One of the areas of the brain that is known to be affected by childhood maltreatment is the vmPFC in the frontal cortex of the brain. Housed in this area of the brain is the concept of ToM. Without ToM, individuals cannot appropriately interact with others. Their emotional intelligence remains at a low level as their social awareness fails to pick up on important social cues. Their relationships will be hindered and possibly demolished. Therefore, children that experience maltreatment early on in life may end up with ToM deficits, ADHD, and many other psychopathologies that stem from the improper development or structural changes that occur in the frontal cortex during that time.

Impulsivity and Conduct Disorder

Adolescence is a period known for risk-taking and unruly behavior. The PFC is still developing and has yet to mature into its final form, leaving children to make sometimes poor and irrational decisions. For some children, this period can be even more challenging when traumatic stress and maltreatment are added on top. Childhood maltreatment is associated with risky behavior later on in life. Unfortunately, these individuals may not be able to prevent the continuance of the behaviors. These behaviors can include reckless driving, substance abuse, eating disorders, and unsafe sex. Tull et al. (2014) propose that risky behavior is most likely due to deficits in the emotion regulation pathway between the hippocampus and the amygdala, two of the primary brain structures that are altered when exposed to maltreatment. Additionally, risky behaviors and impulsivity have the potential to extenuate the symptoms and hinder treatment programs.

Risky and impulsive behavior throughout adolescence and young adulthood can lead to a spiral effect of worsening symptoms. The life-long implications of the traumatic

experience and poor decision-making skills can be harmful to their future health. Moffitt et al. (2013) note that the average IQ of an adult exposed to a traumatic event in childhood is ten points lower than adults in control groups. This directly correlates to success in the workplace and their contribution as a functioning member of society. In addition to a diminished IQ, childhood maltreatment is associated with decreased hippocampal volume — the hippocampus functions with memory formation and storage. Therefore, along with a natural decreased cognitive performance with age, a decreased hippocampal volume can have significant effects on memory and cognition (Burri et al., 2013). The loss of cognition and memory can be associated with many psychopathologies such as dementia.

In some cases, risky and impulsive behaviors can be linked to conduct disorder (CD). CD is defined as recurring patterns of behavior in which the child continually acts in violent and aggressive tendencies. These children or adolescents often display deceptive or destructive characteristics. They also tend to engage in unlawful activities and present aggressively towards people and animals (The American Academy of Child and Adolescent Psychiatry, 2018). Children with CD are defiant and can put themselves in dangerous positions, increasing their risk of exposure to trauma. Not only can CD cause repeated exposure to trauma and increase the risk of comorbid psychopathologies, but some researchers believe that CD can be caused by traumatic childhood exposure.

The American Academy of Child and Adolescent Psychiatry (2018) noted that experiencing childhood abuse or neglect can be a factor in the development of CD in children and adolescents. CD is often comorbid with many other psychological conditions, especially those that can be linked to childhood maltreatment. These include

post-traumatic stress disorder, depression, anxiety, and ADHD. Children suspected to have CD should be evaluated for treatment as soon as possible to limit the constant spiraling of behaviors and increase their likelihood of sustaining their role as a functioning member of society later on in adulthood. In cases where comorbidities exist, treatment can be directed to each condition to try and reduce the severity of CD behaviors.

Socioeconomic Status

The idea of nature versus nurture has been around for over one century. So, it is not a new idea that the environment that someone grows up in can have an impact on their life. Many studies have looked into the relationship between economic status and childhood maltreatment; most evaluate the association between poverty and child maltreatment. Lefebvre et al. (2017) found positive correlations between low socioeconomic status and levels of childhood maltreatment, more often neglect. These children have an increased risk of encountering developmental setbacks and comorbid psychopathologies as they age. Nevertheless, childhood maltreatment does not discriminate between socioeconomic status.

Maltreatment affects children in all classes of society, above and below the poverty line. However, those in the upper and middle class have a better chance of treating the effects due to their access to health care. Those below the poverty line are often left to their own devices and are unable to seek treatment. This only exacerbates the effects of maltreatment. Schuck and Widom (2019) evaluated the impact that community stressors in the environment surrounding the maltreated child have on the development of post-traumatic stress disorder (PTSD) symptoms. Maltreated children in middle- and

upper-class communities are less likely to experience severe PTSD as they have more access to healthcare and support. Furthermore, the control group from upper-class communities also experience reduced PTSD symptoms compared to lower-class communities. Thus, with more treatment options available, the risk of lifelong psychopathologies is significantly reduced. Similar to the upper-class, maltreated lower-class children are not more at risk of developing more PTSD symptoms due to their community. While living in lower-class communities can lead to trauma exposure, impoverished communities do not exert significant effects compared to abuse or neglect. Therefore, a child living in affluent or nonaffluent neighborhoods does not increase the risk of lifelong psychopathologies, whereas maltreatment, in general, does increase the risk.

Post-Traumatic Stress Disorder

Post-traumatic stress disorder (PTSD) is a mental health problem that comes on after experiencing or witnessing a life-altering event. Two types of trauma can attribute to PTSD. Type I trauma is brief and does not repeat. Type II trauma is repetitive and often occurs throughout childhood and adolescence. Type II trauma can lead to life-long psychopathology (Terr, 1991). These types of trauma can lead to different severities of PTSD if it develops. PTSD can develop at any age. However, it is frequently undiagnosed in childhood, potentially causing more harm to the individual by prolonging the onset of treatment. Many factors influence whether or not an individual develops PTSD. These factors include stress, age, gender, familial or friendly support, and repeated exposure to trauma ("National Center for PTSD," 2018). PTSD is more likely to develop after repeated exposure to trauma, and as the severity of the trauma increases.

Most individuals witness or experience at least one traumatic event in their lifetime. Though, only 8.3% of individuals will be diagnosed with PTSD (Lancaster et al., 2016). In order for PTSD to develop, the individual must have experienced trauma and face specific symptoms that identify with PTSD.

PTSD symptoms can be debilitating to an individual. Most individuals see their symptoms reside over their own time. However, for those that experience a continuance of symptoms that do not follow the average recovery period, they might be experiencing PTSD (Lancaster et al., 2016). In order to be diagnosed with PTSD, several criteria must be met. These include exposure to actual or threatened death, injury, or sexual violence, the presence of intrusive symptoms, avoidance of objects or places associated with the event, negative mood changes, and altered reactivity. Also, the symptoms must be present for at least one month before a diagnosis can be confirmed. In order to receive a PTSD diagnosis, these symptoms cannot stem from medications, substance abuse, or a medical condition such as depression or anxiety (Lancaster et al., 2016). Children under the age of 6 typically present with slightly different symptoms. They may be seen reenacting the traumatic event during playtime. They may also have frequent nightmares that may not have anything to do with the event ("Diagnosis and Treatment," 2018). These symptoms often go unseen, meaning that children are less likely to be diagnosed with PTSD. The development of PTSD isn't immediate for some of those who experience maltreatment in childhood. Breslau et al. (2014) note that for some, childhood trauma is just a steppingstone on their way to a diagnosis. They found that multiple incidents of early childhood maltreatment are associated with an increased risk of developing PTSD following exposure to a severe stress or trauma in adulthood. One theory behind this

finding is that prior exposure to stress and trauma increases the sensitivity and responsiveness of the body to stress. Therefore, repeated traumatizing or stressful events can trigger the onset of PTSD symptoms either directly after the incident or many years into the future.

Anxiety, Depression, and Suicidal Ideations

Abuse and neglect in any form can place an unhealthy amount of stress on a child, adolescent, or adult. However, when a child faces intense and traumatic stress, neurological development can be hindered. Childhood maltreatment is associated with a wide range of psychopathological disorders, including anxiety and depression. Bruce et al. (2012) found a relationship between maltreated children and emotional dysfunction. Moreover, children that experienced neglect and emotional abuse, not physical or sexual abuse, had a higher risk of developing social anxiety disorder (SAD). Emotional abuse was found to be the best predictor for whether or not an individual would develop SAD later on in life. SAD is an internalizing disorder that can cause a paralyzing fear of social situations in individuals. It is believed that SAD arises in these individuals from a reduced cortisol secretion caused by childhood maltreatment.

Depression, also an internalizing disorder, can be detrimental and crippling to a typical lifestyle. Similar to anxiety, depression onset is likely due to an individual's inability to regulate their emotions appropriately. Emotional dysregulation paired with childhood maltreatment increases the risk for major depressive disorder (MDD). A study performed by Bodenschatz et al. (2019) found that individuals with MDD and a history of childhood maltreatment can enter into a cycle that can lead to the regeneration of negative thoughts and feelings. Those with MDD are more likely to have an attentional

bias directed towards negative stimuli, whereas healthy individuals tend to focus on positive and reassuring stimuli. Furthermore, those with MDD compared to healthy individuals are not as likely to exhibit a protective bias; they continue to have negative thoughts and feelings about themselves entering into a cycle that is difficult to break. Nanni et al. (2012) found that individuals who endured childhood maltreatment had a two-fold chance of developing depressive episodes. These individuals were also less likely to benefit from treatment when compared to those with depressive episodes that did not encounter childhood maltreatment.

Without effective treatment, depressive episodes and anxiety can quickly become overwhelming and hijack the entire limbic system. In some cases, suicidal ideations can arise. For individuals who were maltreated as children, suicidal thoughts can be facilitated by anxiety; specifically, those who were physically or emotionally abused have a higher risk of developing suicidal ideations. The presence of anxiety symptoms increases the risk of suicidal ideations. Nonetheless, children that were sexually abused frequently experience suicidal ideations without a facilitator. Researchers hypothesize that sexual abuse and suicidal ideations are directly associated due to the detrimental and frightening effects that the abuse has on the person (Bahk et al., 2017). Sexual abuse, compared to physical and emotional, is associated with a higher risk of suicidal ideation. Nonetheless, maltreatment of any kind can increase the risk of suicidal ideations. There is also research that suggests that various types of maltreatment can have additive effects towards suicidal ideation (Miller et al., 2013). Therefore, children that experienced emotional and physical abuse and neglect are at a significant risk for suicidal ideations, especially if treatment and support are not readily available.

Cognitive Deficits

The limbic system is one of the primary brain structures affected by childhood maltreatment. Within the limbic system is where memories are formed, stored, and retrieved. Visual memory is an important cognitive function that originates from the limbic system, specifically from the hippocampus. Gould et al. (2012) found that abuse and neglect in childhood can lead to visual memory deficits that effect everyday life. For example, these individuals will have trouble keeping track of personal items and may have trouble remembering how to get to everyday locations. They believe this is due to the increase in glucocorticoids that are released in response to stress. The hippocampus is home to a large number of glucocorticoid receptors and this area can be affected and desensitized when activation is prolonged. It is likely that childhood maltreatment could lead to an increased risk in the development of some memory disorders, directly and indirectly. Many cognitive and memory disorders fall under the term dementia; Alzheimer's, frontotemporal dementia, vascular dementia, and Lewy body dementia, to name a few.

One of the landmark signs of PTSD is a change in cognitive functioning. A few studies have examined the relationship between PTSD and cognitive change leading to dementia. However, a solid link has yet to be found. Burri et al. (2013) found that individuals who suffered childhood maltreatment and were diagnosed with PTSD demonstrated a decrease in cognitive functioning. This is a common finding among various child maltreatment studies. The Holocaust was undoubtedly one of the world's largest epicenters for child maltreatment. Sperling et al. (2011) found that Holocaust survivors diagnosed with PTSD, who were children at the time, showed decreased

explicit memory performance. They also showed decreased cognitive ability on an accelerated scale compared to healthy individuals in their age group. 68% of survivors with dementia were diagnosed with vascular dementia; Alzheimer's was the second most common, with 23% of individuals diagnosed. Based on the study, a PTSD diagnosis can be a main contributing factor to the development of dementia later on in life. One other study noted that the presence of PTSD and the young age that trauma was experienced is the reason why these Holocaust survivors developed dementia. In their study, they analyzed late adolescents and young adults. These individuals would not be affected by the stress and trauma in the same way as children since their brain's development is at a more advanced stage (Ravona-Springer et al., 2011). Therefore, PTSD that stems from maltreatment can hinder an individual's life beginning at the first exposure and ultimately lead to a severe cognitive decline. The stress that was endured during the Holocaust placed an unbearable amount of pressure on the HPA axis to release cortisol and help regulate the body.

Telomeres, the protective cap located at the end of DNA strands, are easily influenced and altered by internal and environmental stimuli. In the case of childhood maltreatment, severe stress is placed on the body, and the sympathetic nervous system activates to counteract the stimuli. Cortisol is one of the main stress hormones released from the body in stressful situations. Tyrka et al. (2010) note that chronic activation of the sympathetic nervous system and release of cortisol can result in the shortening of telomeres and cause premature biological aging. It is well known that telomere length is a biological marker for many progressive and degenerative diseases. Dementia, general cognitive decline, and even death can all be predicted by comparing telomere length to

median values. Although, some individuals with shortened telomeres may not experience any cognitive or memory deficits

Treatment and Intervention

Early intervention is key when it comes to addressing child maltreatment. The sooner treatment and support can be utilized, the lower the risk of severe psychopathologies. It is important to identify maltreatment early on in childhood in order to find a comfortable and welcoming atmosphere for them to develop in. Pursuing treatment is secondary to making sure the child has a safe place to call home. Recognizing childhood maltreatment can be difficult as it is not always apparent; there are a few key signs to look for. Signs of physical abuse include visible bruises, cuts, or scrapes. Signs of emotional abuse include suicide attempts, severed familial attachment, and inappropriate actions for their age. Signs of sexual abuse include wetting the bed, advanced sexual knowledge for their age, or pain when being active. Signs of neglect include the child not getting proper medical care, not being fed a sufficient amount, or being left alone. It is also important to analyze the caregiver's body language and responses when questioned about the child's well-being; it is important to look for parents who cannot explain the bruises or cuts, parents who talk negatively about their child, or parents that lack concern (Intermountain Healthcare, 2018). Once, the maltreatment has been confirmed, treatment and support can be sought out.

There are various treatment options that ultimately depend on the type of maltreatment, severity of symptoms, and the presence of comorbid disorders. One of the main types of treatment that is pursued is psychotherapy. Cognitive behavioral therapy (CBT) is a common therapy that helps the child understand and redirect their thoughts.

Intrapersonal therapy allows the child to reflect on their social skills and interactions with others to show them how to maintain or improve those relationships to reduce their stress and anxiety. More invasive and medicinal treatment options can be utilized if the child develops comorbid disorders or if the current therapeutic methods are not working.

For those seeking treatment in adulthood for the first time, the treatment is often sought out because of a comorbid disorder that stems from the childhood maltreatment. These treatments may be for MDD, anxiety, PTSD, or a variety of other conditions. According to Mayo Clinic (2018), like those who seek treatment in childhood, psychotherapy is one of the common treatment options. According to Mayo Clinic (2018), like those seeking treatment in childhood, psychotherapy is one of the most common treatment options. For those with MDD, psychotherapy can help individuals identify and understand their thoughts and supply them with more effective ways to manage their feelings. Medications such as selective serotonin reuptake inhibitors (SSRIs), serotonin-norepinephrine reuptake inhibitors (SNRIs), atypical antidepressants, and tricyclic antidepressants may be prescribed when needed. SSRIs are the most common medicinal treatment option for MDD due to its safety and lack of severe side effects. When SSRIs don't work, they then move down the list and continue issuing other classes of drugs. As for medications, antidepressants are the first option for treatment. If antidepressants are not working, buspirone, an anti-anxiety medication, can be prescribed. If buspirone is not effective, benzodiazepines can be utilized. However, this class of drugs are habit-forming and can have severe side effects. Like anxiety, those enduring PTSD can also be treated with psychotherapy, antidepressants, and anti-anxiety medications. Psychotherapy is useful in helping reduce amygdala hijacking and increase

the individual's emotional control. However, prazosin is also a medicinal treatment option if antidepressants and anti-anxiety medications do not provide relief.

Children and adults who seek treatment and support will ultimately have a better chance of becoming productive and functioning members of society. The outlook on life can be dependent on the type, severity, and duration of the maltreatment. Individuals who endured childhood maltreatment have been linked to socioeconomic and educational deficits when compared to non-maltreated individuals (Jeffee et al., 2018). Maltreatment increases the chance of psychopathologies and, therefore, decreases the chances for success in school and life two-fold. However, with familial support and timely treatment, the chances of having better outcomes increases.

RECOMMENDATIONS FOR FUTURE STUDIES

Future research should dive deeper into the socioeconomics surrounding stress and traumatic experience in childhood. Specifically, the upper-class and the idea of helicopter parents should be studied more to analyze the stress placed on children in these environments. Stress may come from different places for upper-class children compared to lower-class children. For example, children and adolescents may feel pressured to perform at high levels to please the parents and get into ivy league colleges. Anxiety and depression levels of upper-class children should be evaluated in these studies.

Additionally, more research should be conducted to examine and identify the connection between early childhood maltreatment, PTSD, and dementia. While there has been an association found between them, there has yet to be a causal relationship discovered that shows how the structural changes of childhood maltreatment account for some of the different psychopathologies. So far, only a few theories exist. With a clear

relationship discovered, more preventative measures can be taken to reduce the risk of cognitive decline. Also, more effective treatment methods can be developed to help better the outcome and possibly reduce further cognitive decline of those who endured maltreatment throughout childhood.

CONCLUSION

The lifelong psychopathologies that arise from child maltreatment are an important area of study as children are the future of the world as we know it. Childhood maltreatment causes a wide range of effects that differ in severity. The effects of the maltreatment depend on the severity, duration, and type. Childhood maltreatment and traumatic exposure is a pressing issue in today's society. Research has shown that maltreatment negatively affects brain development throughout adolescence, all while hindering the future well-being of the individual. The PFC, limbic system, and frontal lobe are some of the main structural areas of the brain that are affected. Critical areas for memory and fear in the brain are reduced, and neural connections are also diminished.

Adolescents with a history of maltreatment can potentially get involved in risky behaviors due to their impulsiveness. Individuals who experienced less severe maltreatment can see their symptoms reside after a few brief treatments over time. Those who endured severe trauma or stress may have comorbidities that do not allow the symptoms to pass with treatment. Instead, the symptoms may linger and worsen. Some comorbidities are treatable and go away with time. Treatment methods for cognitive disorders such as depression, anxiety, and PTSD vary significantly, and all have different benefits depending on the severity of the symptoms. All of these cognitive disorders can

be debilitating conditions if left untreated. However, with treatment and familial and friendly support, recovery is possible, and living a healthy, functioning, and symptom-free life is attainable.

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