UNIVERSITY OF PAVIA – IUSS SCHOOL FOR ADVANCED STUDIES PAVIA

Department of Brain and Behavioral Sciences (DBBS)
MSc in Psychology, Neuroscience and Human Sciences

The impact of childhood trauma on violent offender: from attachment and neurocognitive development to legal aspects

Supervisor:
Professor Gabriella Bottini

Co-supervisor:

Dr Gabriele De Maio

Thesis written by
Janne Hunt

Academic year 2023/2024

Acknowledgements

I would like to express my gratitude first to my supervisor, Dr. Gabriele De Maio, thanks to whose support I was able to complete this research on time. In addition, I would like to thank all my loved ones who supported my journey in Italy which I will forever hold in my heart.

Table of contents

Abstract

In this dissertation, I explore how early trauma experienced in childhood can affect future violence and its social, attachment and overall neurocognitive development. Childhood is portrayed as an enjoyable time for growth but this has not been the case for some people. This dissertation explores what impact does childhood trauma have on different brain processes like self-control, emotional regulation, decision-making and which regions are affected. Information is gathered and synthesized from reliable sources including current empirical studies and important theoretical work. According to the findings, the most common types of trauma experienced by offenders are emotional neglect and physical abuse, having also a significant negative impact on cognitive abilities, impulsivity and aggression. Differences were shown in areas like the amygdala, the prefrontal cortex and the HPA axis. The findings highlight early trauma effects on future acts of violence, providing complex insights across criminology, psychology and neuroscience. Ending the dissertation with descriptions of various treatment strategies to promote positive developmental outcomes, contributing to our understanding of how early adversity shapes people.

Keywords: childhood trauma; violence; neurobiology; forensic assessment

Introduction

Childhood is usually imagined as a time of exploration, playful adventures and learning; for some children, however, it has been the complete opposite, with their developmental years overshadowed by adversity and challenges that exceed the boundaries of a typical childhood experience. In other words, some children experience physical/mental trauma in childhood that can play a crucial role in a person's psychological and physiological well-being, disrupting normal developmental trajectories, which can lead to countless long-term consequences.

In this paper I plan to address how early life experiences shape the development of individuals, especially those caught in cycles of violence and crime. By exploring the lasting effects of childhood trauma on the brain's growth and functioning, I aim to shed light on factors that contribute to antisocial behavior and, ultimately, find pathways to support rehabilitation and positive change. The decision to focus on childhood trauma's impact on neurocognitive development comes from both personal and academic motivations. My deeper interest in children's development started from my bachelor's studies where I did an experimental dissertation about how genes, family and bullying influences children's development and potential development of attention-deficit/hyperactivity disorder (ADHD). Additionally, this paper was inspired by a personal

witnessing the cycle of violence in communities and understanding it better from a developmental perspective and by my own desire to delve into the forensic aspect of it. This takes me to the aims of the paper:

First to investigate the prevalence and types of childhood trauma experienced by individuals who have committed violent acts;

Then explore how childhood trauma affects brain functions like decision-making, emotions, and self-control;

Next to understand the factors that can influence how childhood trauma affects neurocognitive development, such as the environment, and coping strategies;

Then to dive into legal implications and forensic assessment in US and Estonia;

And finally to elaborate on some interventions for reducing the long-term effects of childhood trauma in people at risk of becoming violent offenders.

This dissertation uses the systematic review method, collecting and analyzing studies from reliable sources. Articles were selected according to their relevance and quality, using articles which mainly focused on the relationship between childhood trauma and violent behavior. Studies were collected from academic databases such as PubMed, PsycINFO and Google Scholar, as well as from a few books from the fields of psychology, psychiatry, and criminology, ensuring a wide range of high quality studies. I chose to include the studies if they investigated childhood trauma, its impact on social, attachment or neurocognitive development and its association with violent behavior. Most of the selected studies are recent, within the last two decades, to ensure that, while analyzing the results, most recent results and findings are included for their time relevance. However, to provide a strong theoretical base, I chose to include some older important theoretical works, such as Bandura's (1973) social learning theory and Miller and Dollard's (1941) imitation theory. As much as it was possible, preference was given

to studies with strong empirical evidence and methods, such as longitudinal studies, meta-analyses and large samples. Bigger focus was intended to be in the neurobiological mechanisms of childhood trauma and its role in social and attachment factors.

Although this paper does not present original ideas, it attempts to draw comprehensive conclusions by comparing and analyzing different articles and findings. While I may not introduce entirely new concepts, my goal is to present and examine information from multiple studies to provide a deeper understanding of the topics.

In summary, the purpose of this review is to deepen our understanding of violence as an important area of consideration, offering insights that can inform both theory and practical approaches to breaking cycles of violence and promoting rehabilitation.

Chapter 1

1.1 Trauma

Before talking about trauma in a specific situation, it is needed to clarify what exactly is considered as trauma. Psychological trauma is "a circumstance in which an event overwhelms or exceeds a person's capacity to protect his or her psychic wellbeing and integrity" (Cloitre et al., 2006). True, psychological trauma is not that simple to understand, it has multiple layers and is complex because it tends to involve the characteristics of events and the response which leads the individual. It is very well demonstrated and moved to Diagnostic and Statistical Manual of Mental Disorders (DSM-V) for post-traumatic stress disorder (PTSD) to explain further what is the complexity of psychological trauma (Koenen et al, 2010). Few examples how The *Diagnostic and Statistical Manual of Mental Disorders*, 5th edition, text revision (DSM-V; American Psychiatric Association, 2013, pp. 271–272) defines an event of "Posttraumatic Stress Disorder for Children 6 Years and Younger": exposure to actual or threatened death, serious injury, or sexual violence; directly experiencing the traumatic event(s); witnessing, in person, the event(s) as it occurred to others; learning that the traumatic event(s) occurred to a close family member or close friend; in cases of actual or threatened death of a family member or friend, the event(s) must have been violent or accidental; experiencing repeated or extreme exposure to aversive details of the traumatic event(s) (e.g., first responders collecting human remains; police officers repeatedly exposed to details of child abuse). Briere (2004) has discussed that even though DSM-V has set and structured the events which can cause trauma to a child, there can be more events where threatened death is not included or any serious injury or

other threats to individual physical completeness that can cause trauma but are not considered. Ross (2007) has pointed out that the actual deeper trauma is not the traumatic event itself but the absence of love, affection, care, attention and protection which will also be discussed later in the paper.

1.1.1 Childhood trauma and its prevalence

Childhood trauma can occur in many different settings, including in the family settings, at kindergarten or school, in the neighborhood or as a result of wider societal factors such as poverty, discrimination and violence. In addition, trauma can disproportionately affect certain populations, including children from low-income families, minority communities and individuals who have been involved in programs dealing with childhood abuse. Sachs-Ericsson (2010) pointed out that the impact of childhood trauma can be far-reaching and multifaceted, affecting different aspects of a child's development. Therefore it can lead to a wide range of physical health problems, including chronic diseases such as obesity, diabetes and cardiovascular disease. In addition, childhood trauma is strongly linked to mental health disorders, including depression, anxiety, post-traumatic stress disorder (PTSD) and substance abuse (Everett & Gallop, 2001). Considering previously mentioned consequences that traumatic events can have on a person, observing around in our environment we can notice how alarmingly high is the prevalence of childhood trauma with millions of children worldwide experiencing such adversity each year.

To give some examples, Xie (2018) found that 55.5% of people with depression reported having experienced at least one childhood trauma; similarly they showed that 61.8% of people with bipolar disorder reported having experienced childhood trauma,

while only 20.5% of people with bipolar disorder had no childhood trauma. As shown in Figure 1, Xie (2018) found that in the depression group, the two most reported trauma types were emotional neglect (n = 97, 42.4%) and physical neglect (n = 88, 38.4%). Physical neglect was the most reported trauma type in the bipolar disorder (n = 45, 44.1%) and schizophrenia (n = 84, 38.9%) groups. In the control group, physical abuse was the most reported trauma type (n = 15, 11.4%)(Xie, 2018).

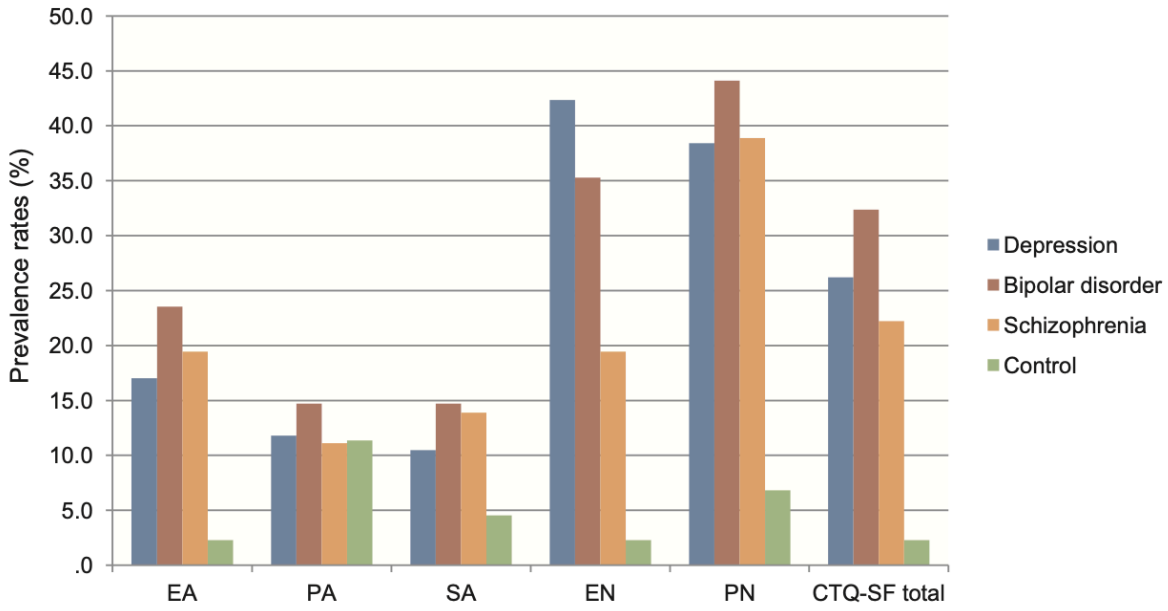

Figure 1. Prevalence of childhood trauma. CTQ-SF: Childhood Trauma Questionnaire- Short Form, EA: emotional abuse, PA: physical abuse, SA: sexual abuse, EN: emotional neglect, PN: physical neglect.

Some more findings that should be considered, including the findings of Souza (2016) and Jansen et al. (2016) where for an example Jansen et al. (2016) found, using the Childhood Trauma Questionnaire (CTQ) as a measurement, that 54.9% of young adults with a mood disorder had experienced at least one childhood trauma. Souza (2016) found that subtypes of childhood maltreatment enhanced the risk of suicide in depressed adults. Additionally, Zhang et al. (2020) conducted a comprehensive meta-analysis that

included global data to examine the prevalence of childhood emotional abuse (CEA), physical abuse (CPA), sexual abuse (CSA), physical neglect (CPN), and emotional neglect (CEN) in individuals with substance use disorders using the Childhood Trauma Questionnaire (CTQ). Their results showed high prevalence rates of multiple forms of experienced childhood trauma in these populations, with emotional abuse at 38%, physical abuse at 36%, sexual abuse at 31%, emotional neglect at 31%, and physical neglect at 32%. These results highlight the widespread impact of early life adversity on individuals' mental health and underscore the need for targeted interventions to address childhood trauma in people with substance use disorders.

1.2 Definition of violent offenders and their characteristics

Violent offenders are explained to have a type of criminal behavior that can vary broadly in severity from smaller assaults to an extreme as mass murder and terrorist attacks (Polaschek, 2019). It can vary as widely as for some violent perpetrators may have experienced childhood trauma, some adverse family environments or other environmental stressors that contribute to their violent behavior as was found by Spatz-Widom (2014). In Spatz-Widom (2014) study violent offenders were categorized into four different characteristics identified to understand the characteristics more better. Firstly, the "Violent Only Offenders" emerged as a subset without a documented history of child abuse and neglect (CAN), sharing similarities with individuals who do not have such a background. In particular, they showed no significant differences in age at first offense, IQ, education level or employment status compared to the group of non-offenders. However, they did show a higher likelihood of parental welfare dependency and of alcohol and drug abuse diagnoses, along with antisocial personality

traits. In contrast, "CAN →Violence Offenders" included individuals with a CAN background but without PTSD. This group showed early onset criminal behavior and arrests frequently, especially for violent crimes. Interestingly, they reported a lower incidence of sexual assault and homelessness compared to other CAN subgroups. In contrast, the subgroup "CAN → PTSD → Violence", named "PTSD experienced first", showed the most traumatic events, including physical assaults, domestic homicides and victimization experiences. Nonetheless, they showed elevated rates of internal disturbance and homelessness, and minimal involvement in violent behavior. Finally, the subgroup "CAN → Violence → PTSD", named "Violence experienced First", showed an early onset of problem behaviors, including violent arrests and substance abuse. In particular, they experienced long-term violence, including sexual assaults, and had high-risk characteristics such as educational failure and family involvement in criminal activity, along with reduced prospects of employment and increased likelihood of homelessness. Khoshnood & Fritz (2017) provides an insightful look into the characteristics of those found guilty of violent, serious crimes. The majority of these 23 male criminals, who are between the ages of 21 and 30, indicate that violent crime is more common among younger people in this situation. It was interesting to see that a majority of these people were unmarried, which could indicate that social isolation contributed to their violent inclinations. The study's mental health data presented a complex picture, meaning that the majority of criminals did not have a psychiatric diagnosis, but a noteworthy minority did have mental health conditions serious enough to require forensic mental health treatment. This variation shows that although mental illnesses do exist, they may not always be associated with violent criminals. The criminals showed largely low educational backgrounds, with the majority having

completed only obligatory schooling and none of them having a university degree of any kind. This pattern may imply that a tendency towards violence may be correlated with a lack of educational options as well. Most criminals showed to have shared a common criminal past, showing a trend of more serious criminal behavior. Their profiles were further complicated by the prevalence of substance misuse difficulties, which may have increased their aggressive tendencies. The majority's economic situation was one of unemployment or reliance on social benefits, highlighting the importance of economic instability in their life. In understanding violent behavior, it is crucial to understand that not all perpetrators are the same. Future studies should examine how violent behaviors evolve over time, evaluate the effectiveness of early treatments, and investigate the ways in which social and economic policies can deter violent crime.

1.3 Social learning theory

In understanding the offenders characteristics and reasons better, a lot of researchers have discussed social learning theory and its importance from developmental view (Agnew, 1992; Abbasi, 2018; Nicholson & Higgins, 2017; etc.) and how it acts out in real life examples. In societal contexts, behaviors like aggression and violence are commonly understood to be learned responses, with some theorists attributing their development to various learning models (Nye, 1996; Bandura, 1973; Miller & Doddard, 1941). Bandura (1973) asserts that most of the responses are obtained either unintentionally or intentionally through observation, which is crucial to understanding how people engage in aggressive behavior. Burger (2000) discussed that Bandura's theory is particularly influential in explaining the idea of vicarious learning, or

modeling, whereby people adopt behavior without directly experiencing it. Bandura (1973) further stresses that the actions of others have the strongest and most overwhelming influence in shaping people's behavior acquisition processes. Aggressive behaviors are frequently exposed, either directly or indirectly, to violent acts and attitudes that support them in a social learning context. To meet their own requirements, people in these settings may interpret, modify, or exaggerate these behaviors and signs. This can include situations in which there is a regular occurrence of threats, physical hostility, or the use of weapons (Bandura, 1977; Huesmann & Kirwil, 2007). Future violence in children can be largely explained by the social learning theory. For example, a child may learn that using violence to get what they want—like control or emotional release—if they witness their parents using physical abuse as a coping mechanism when they are under stress (Anderson & Bushman, 2002). Throughout a long period of time, taking into consideration that a child is in its vulnerable position during development and can be flexible in values which can mean that they learn during that time that aggressive behavior might get them what they desire. This idea may be emphasized all through childhood. According to Bandura's (1973) social learning theory, this child has likely been exposed to violent models and has therefore picked up aggressive reactions to stressful situations. While Bandura's suggestions are reasonable (Bandura, 1973) it's still necessary to consider genetic factors, particularly psychiatric disorders, that may contribute to antisocial, maladaptive, or aggressive behavior in children and adolescents, in contrast to the influence of social learning. Beardslee et al. (1996) in their study began to explore the family history of depression and therefore formed it as a significant predictor of emotional and behavioral challenges in children, a conclusion further reinforced by Thompson's (2006) findings on the hereditary nature of depression

within families, leading to negative and maladaptive outcomes. In order to explain criminal behavior, Fox (2017) investigated how biological and social learning theories could be combined. According to the social learning theory, criminal behavior is acquired through imitation of those who are respected, categorizing behaviors as proper or bad, and joining groups with others. The study highlights that whereas social learning theory has proved effective in predicting criminal behavior, biological variables are not taken into account. Fox argues in favor of an integrated paradigm that combines social learning theory with biosocial criminology, which recognises the important influence of biological elements on behavior, including genetics and neurobiological features. According to this integrated approach, an individual's biological predispositions may have an impact on how they interact with their surroundings and pick up behaviors, which may ultimately result in criminal action. In order to develop a more thorough knowledge of criminal behavior, the study emphasizes the significance of taking into account both social and biological aspects. It also recommends that this integrated theoretical framework be tested in future research. In the end, while social learning theory helps us understand how violent behaviors are learned, fully grasping the impact of childhood trauma on brain development requires looking at both social influences and biological factors together.

Chapter 2

2.1 Neurocognitive Development in Violent Offenders

Violence remains a pressing societal issue with profound implications for public safety and well-being. At the heart of this complex phenomenon lies a fundamental question: What drives individuals to commit acts of violence? The exploration of the relationship between neurocognitive development and violent behavior has been a subject of extensive research (Séguin, 2007; Jusyte & Schönenberg, 2017; Golden). One approach that has been particularly insightful is the neuropsychological approach, which examines cognitive deficits associated with violent behavior, as discussed by Séguin (2007). Séguin (2007) suggests that violent behavior may not be a simple matter of choice or circumstance, but rather a manifestation of underlying cognitive deficits. As mentioned by Séguin (2007), neuropsychological function refers to the performance of the brain in areas such as memory, attention, perception, coordination, and language. By assessing these functions, Séguin (2007) pointed out that researchers can identify potential deficits that may contribute to violent behavior. For instance, an individual with impaired impulse control, a function regulated by the brain, may be more prone to engage in violent behavior. In addition to assessing neuropsychological function, this approach also involves examining clinical syndromes associated with violence, including delinquency and criminality (Séguin, 2007). Delinquency refers to minor crimes, especially those committed by young people, while criminality refers to the fact or quality of being criminal (Séguin, 2007). By studying these syndromes, Séguin

(2007) also pointed out that researchers can gain insights into the behavioral patterns associated with violent behavior and how they may be linked to certain cognitive deficits. Speaking of neuropsychological approach, it additionally provides an overview of developmental issues affecting brain maturation and behavioral regulation (Séguin, 2007). These developmental factors can influence the neuropsychological processes associated with violent behavior, providing a link between neurocognitive development and violence. This perspective challenges the traditional view of violent behavior as a purely social issue (Jacquin, 2024) and introduces the possibility that interventions targeting these cognitive deficits could be effective in reducing violence (Séguin, 2007). However, it can be argued that this neuropsychological approach oversimplifies the complex nature of violent behavior by focusing primarily on cognitive deficits. Golden (2017) in their study provides a fascinating insight into the neurobiological causes of aggression. The study's emphasis on the role of the frontal lobes in controlling our emotions and higher cognitive processes is particularly intriguing while suggesting that impairments in these areas could potentially lead to violent behavior. Notably, it was explained by Golden (2017) that individuals who have suffered brain injuries, primarily observed among younger demographics in forensic investigations, exhibit impairments in frontal lobe function. However, while this presented study may be scientifically fair, it may end up being controversial for people who have frontal lobe problems who may think they are unfairly labeled. Lishak et al. (2019) study focuses on the variations in neurocognitive functioning between males who have a history of domestic violence and those who do not. It was discovered that, in contrast to nonviolent men, men with criminal records who had engaged in domestic violence showed notable variations in their neurocognitive functioning. Using exercises

including response inhibition, working memory, and nonverbal reasoning, the study assessed cognitive and executive performance. Interestingly, the domestic violence + crime group performed better than the other groups on tests of speed and accuracy in cognitive tasks, indicating that these people may have intact or even greater impulse control. All of these researches highlight the complex nature of neurocognitive development in violent offenders, indicating that those with broader criminal involvement may have distinct neurocognitive profiles compared to those without such histories.

2.2 Social-Cognitive Mechanisms

In addition to cognitive deficits, social-cognitive processes also play a crucial role in violent behavior (Chester et al., 2018; Heleniak & McLauglin, 2020; Bradshaw, 2009). Moreover, understanding how people think and react socially is really important when we're talking about violence. Some of the earlier studies according to Heleniak & McLauglin (2020) demonstrate how exposure to interpersonal violence in childhood can cause behavioral problems that persist into adulthood (Spatz-Widom, 1989; Dodge et al., 1990; McCloskey & Lichter, 2003; Bingenheimer, 2005;) which is often linked to deficits in social information processing (Dodge et al., 1990). However, few seem to have explored how this all relates to social cognition, like theory of mind. Also, it’s unclear if these issues are due to violence exposure or other adversities like emotional neglect and poverty (Cicchetti et al., 2003). The study by Heleniak & McLaughlin (2020) aims to fill these gaps by investigating how interpersonal violence affects cognitive and emotional aspects of theory of mind, which may contribute to behavioral problems in children and adolescents exposed to high levels of interpersonal violence.

This perspective highlights the importance of early intervention and prevention strategies and concludes that exposure to interpersonal violence in children and adolescents is associated with deficits in both cognitive and affective theory of mind (ToM) (Heleniak & McLaughlin, 2020). In cognitive theory of mind, Heleniak & McLaughlin (2020) found that accuracy was lower among children who had experienced sexual or physical abuse and emotional abuse than children who had never experienced any of these forms of violence and having frequent exposure to any of these violence types because those who had were also associated with worse performance on cognitive theory of mind (Figure 2.) (Heleniak & McLaughlin, 2020).

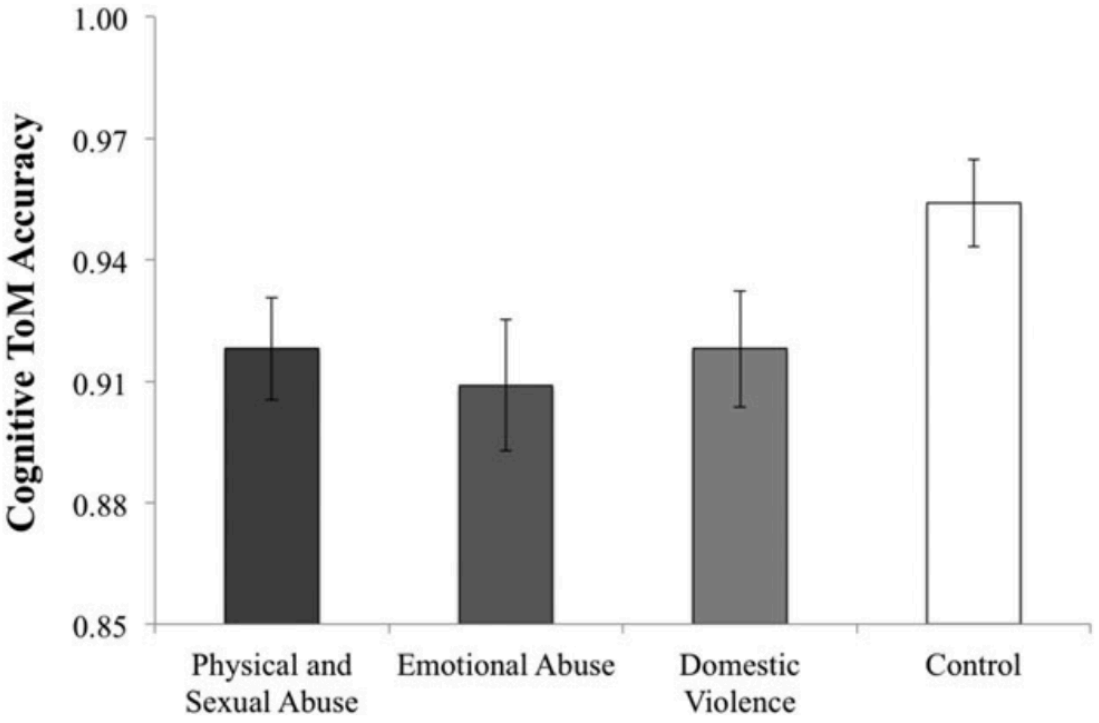

Figure 2. Mean cognitive theory of mind accuracy by type of violence exposure.

It was pointed out by Heleniak & McLaughlin (2020) that this direction is important because ToM, the ability to understand the mental states of others, is an essential

component of social cognition that underlies many aspects of social information processing. This study found that exposure to violence causes deficits in the world of thought in children and adolescents, which remain even after other negative circumstances are taken into account. These deficits are related to external behaviors such as aggression. Their results suggest that violence disrupts social-cognitive development, highlighting the need for early intervention to improve ToM and potentially break the cycle of violence. However, authors pointed out that more research is needed to fully understand these mechanisms and develop effective interventions. It is also worth noting that while this research provides valuable insights into the impact of violence exposure on children's social cognitive abilities, it does not fully address the potential neuropsychological and neurobiological factors that may also contribute to violent behavior. An interesting study by Vaskinn et al. (2023) examining the neurocognitive development and social cognition in violent offenders, specifically comparing those with schizophrenia to those without. In their study they evaluated two domains of social cognition: ToM and body emotion perception. It was found that people with a history of violence and schizophrenia exhibit widespread, clinically meaningful deficits in social cognition, particularly in ToM. On the other hand, violent criminals who did not suffer from psychosis display certain deficiencies, mostly in ToM. This demonstrates that violent offenders with schizophrenia exhibit more acute deficiencies in higher-order social cognitive functions, such as perceiving the mental states of others.

2.3 Impulse control, emotion regulation, and social cognition in violent offending

2.3.1 Impulse control

The concept of impulsivity covers a wide range of "actions that are poorly conceived, prematurely expressed, unduly risky, or inappropriate to the situation and that often result in undesirable outcomes" (Evenden, 1999). Evenden (1999) explains in their study how it is significant in typical behavior and also in various mental health issues like mania, personality disorders, substance abuse disorders, and attention deficit/hyperactivity disorder when it presents in a problematic manner. It doesn't take a professional to understand that impulse control is a key factor in violent crime when we are surrounded by media broadcasting of crime actions, descriptions of criminals, books and court hearings. There is considerable evidence supporting a connection between poor impulse control (impulsivity) and violent crime (Butler et al, 2021) with also a plenty of evidence showing that poor impulse control and a lack of focus on the future play a big part in risky behavior, particularly behaviors that are most common during adolescence, like delinquency (Cauffman, 2000; Krueger, 2002; Monahan et al., 2009). Furthermore it has been noted that impulsivity and aggression have been associated with lowered levels of serotonergic activity in the brain (Butler et al, 2021). This suggests a possible neurobiological mechanism underlying these behaviors (Butler et al., 2021), but it's clear that more research is needed to fully understand this relationship. Another study by Monahan et al. (2015) found that interestingly, when teenagers experience an increase in violence compared to what they are used to, their impulse control worsens in the following year. However, this did not show to be the case for young adults, suggesting that teenagers are more sensitive to changes in exposure to violence (Monahan et al., 2015).

2.3.2 Emotion regulation

One may think that emotions themselves are the answer to how we react but the way we regulate our emotions carries much more complex implications. Garofalo (2022) explained that emotion is first a “relatively brief, event-specific, affective reaction”; secondly saying that it is functional and adaptive (that does not mean it is inherently good or bad); and thirdly involves multiple components such as an internal or external trigger, cognitive appraisal, physiological activation, an action tendency, distinctive behavioral expression, and a conscious (subjective) experience (often termed feeling). Since emotion regulation is another neurocognitive process (Tonnaer, 2017), it has shown consistent associations with offending and aggression, moreover, negative emotionality and emotion dysregulation can interact, reinforcing their individual contribution to offending and aggression (Tonnaer, 2017). Studies have shown that when people feel, experience negative emotions and struggle to control those feelings, they're more likely to act aggressively, but if they're better at managing their emotions, it might help reduce how much those bad feelings lead to aggression (Baglivio, 2016; Garofalo & Velotti, 2017). Agnew (1992; 2001) presented a general strain theory, first in 1992 and later expanded upon in 2001, proposing that experiencing negative situations, such as personal failures or losses, can lead to feelings of anger or frustration. These negative emotions can lead people to engage in unconventional behavior as a coping mechanism. Agnew categorizes stress into three main types: failure to achieve one's goals, loss of something or someone valued, and exposure to negative circumstances. As it was said by Agnew, a variety of factors may influence an individual's response to these stresses, including social support and coping strategies. General strain theory emphasizes the relationship between stress, emotional responses,

and deviant behavior while pointing out the importance of addressing these underlying tensions as a preventive measure for criminal behavior (Agnew 1992; 2001). A very important aspect in emotional regulation is an individual's ability to regulate empathy in order to function in society. It was explained by Saladino et al. (2021) that empathy is not an automatic or guaranteed response. It is influenced by various factors such as the context, the empathizer's beliefs and goals, and the emotions of others. For example, the suffering of strangers might not elicit much empathy if there is no personal motivation to engage with their feelings but witnessing the suffering of friends or family can trigger a stronger empathetic response. Given the various brain regions involved in the empathy process, it is crucial to account for numerous disorders that can arise from brain injuries or abnormal development (Saladino et al., 2021), like pointed out by the studies on cognitive and affective aspects of empathy that some conditions, such as psychopathy, narcissistic personality disorder, schizophrenia and depersonalisation are associated with affective empathy problems but not cognitive empathy problems (Saladino et al., 2021; Nascivera et al., 2019). For an example, Hurlemann et al. (2010) found in their study that bilateral damage to the amygdala can have a damaged affective empathy, more explained by Saladino et al. (2021) that "the amygdala, together with the hypothalamus, hippocampus, and OFC, are fundamental for affective arousal and automatic discrimination of a stimulus and the reciprocal interaction between the amygdala, OFC, and STS leads to the processing of affective signals". Meanwhile Shamay-Tsoory et al. (2003) found that damage to the mPFC, which is linked to emotion awareness, may make cognitive empathy less reliable (Saladino et al., 2021). To talk about brain regions and their injuries, a study by Shamay-Tsoory et al. (2003) showed that patients with damage to the prefrontal cortex, especially the ventromedial

area, showed significant empathy deficits compared to those individuals who had lesions in posterior brain area or healthy individuals. For individuals with posterior lesions, those with right hemisphere damage were shown to be less empathetic, while those with left hemisphere lesions had empathy levels similar to healthy controls. To be specific, it was shown that seven out of nine patients with the most severe empathy impairments had right ventromedial lesions (Figure 3.)

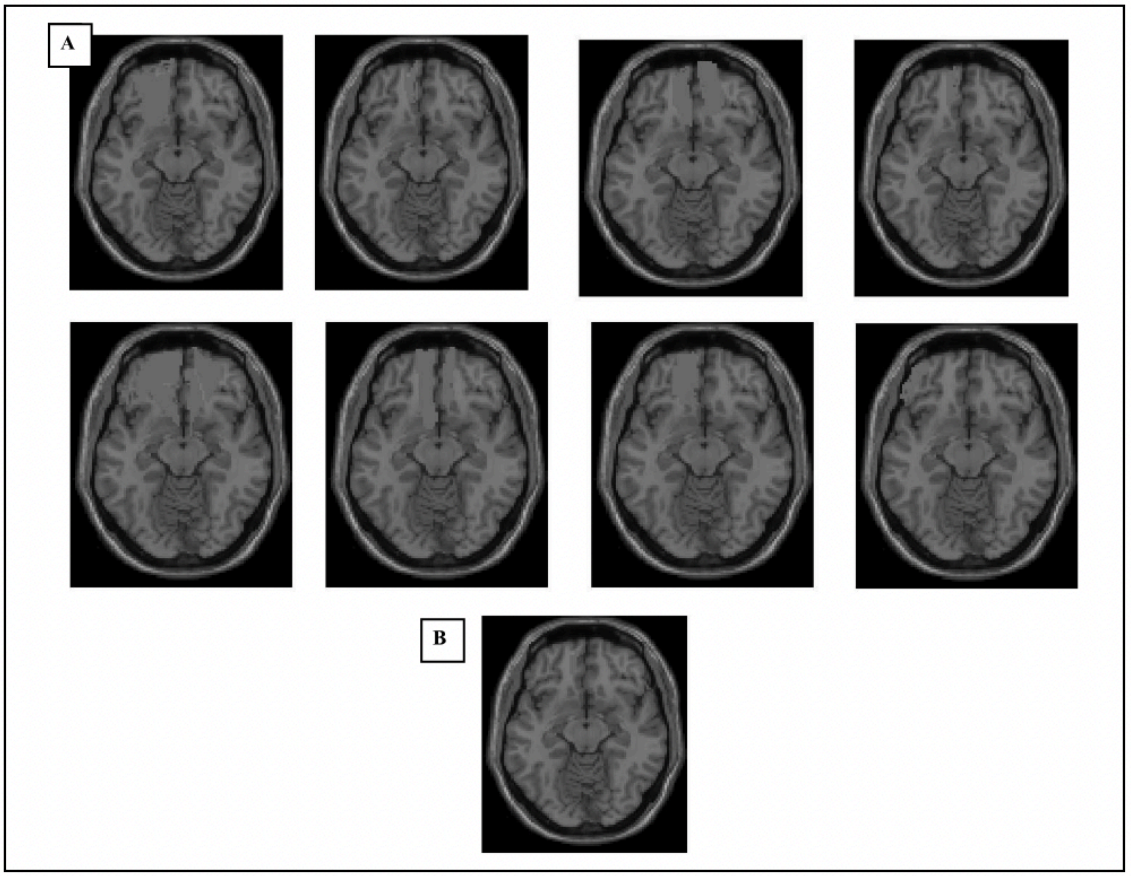

Figure 3. Lesions associated with impaired empathy. (A) Reconstruction of the PFC lesions in eight patients with the most impaired empathy scores. (B) Overlap of lesions in seven of the eight patients shown in A. All seven lesions included the RVM region.

Additionally, in the study the relationship between empathy and cognitive abilities varied based on the location of the brain damage, meaning that patients with dorsolateral prefrontal damage showed that their empathy was linked to their cognitive flexibility, but not to their ability to understand others' minds (theory of mind, TOM) or

recognize emotions. On the other hand, patients with ventromedial lesions had their empathy tied to TOM but not cognitive flexibility. These findings highlight the crucial role of the prefrontal cortex, particularly the right ventromedial region, in integrating cognitive and emotional processes to generate empathy. This can suggest that different parts of the prefrontal cortex contribute to empathy in unique ways, affecting how we connect with and understand the emotions of others.

Another perspective that has been considered by multiple studies is psychopathy. Psychopathy was well explained by Saladino et al. (2021) saying that it involves antisocial behavior and a lack of guilt or remorse, often commiting crimes without feeling bad about it and struggling to differentiate emotional stimuli from impulses. This lack of empathy affects their social skills and can be seen as a mix of biological and hereditary factors. Psychopathy and antisocial personality disorder are closely related, with antisocial personality disorder being a more concrete expression of psychopathic traits. A study by Díaz-Galván et al. (2015) explored differences in empathy among three groups: violent non prisoners, violent prisoners and a control group of individuals. Their results showed that the prisoned group had the highest psychopathy scores, followed by the violent non-prisoned group, with the control group scoring the lowest. Control group scored the highest in perspective-taking in terms of empathy which indicated better cognitive empathy, while other groups showed similar results. On top of that, violent prisoners had the highest personal distress scores which correlated with higher psychopathy levels. These findings suggest that deficits in both cognitive and emotional empathy components are significant in understanding violent and psychopathic behaviors. Multiple other studies have found evidence that there are

indeed brain differences between healthy individuals, violent offenders with and without psychopathy (Saladino et al., 2021; Gregory et al., 2012; Raine, 2013).

2.3.3 Social cognition

"A key component of effective social functioning is social cognition" (Rogers et al., 2018) referring to an individual's own ability to cognitively build up the social world and is necessary for smooth social interaction with other individuals (Rogers et al, 2018). Since it involves interpretation and response to social cues, multiple studies have explored the relation to violent offending. For example, it was found that impaired social cognition in violent offenders could be due to perceptual deficit or cognitive bias (Montagne et al., 2005; Viding et al., 2012; White et al., 2012) which was discovered due to weakened ability to recognize fearful expressions in antisocial populations. These findings may suggest that violent offenders might perceive and interpret social cues differently than non-offenders (Jusyte & Schönenberg, 2017), however it is also important to note that not all violent offenders have impaired social cognition (Jusyte & Schönenberg, 2017). While the previous studies focused on fearful expressions, Rogers et al. (2018) found in their study from interaction effects that offenders may have difficulties identifying anxious emotions compared to control groups, while often mistaking anxiety for surprise as shown in Figure 4.

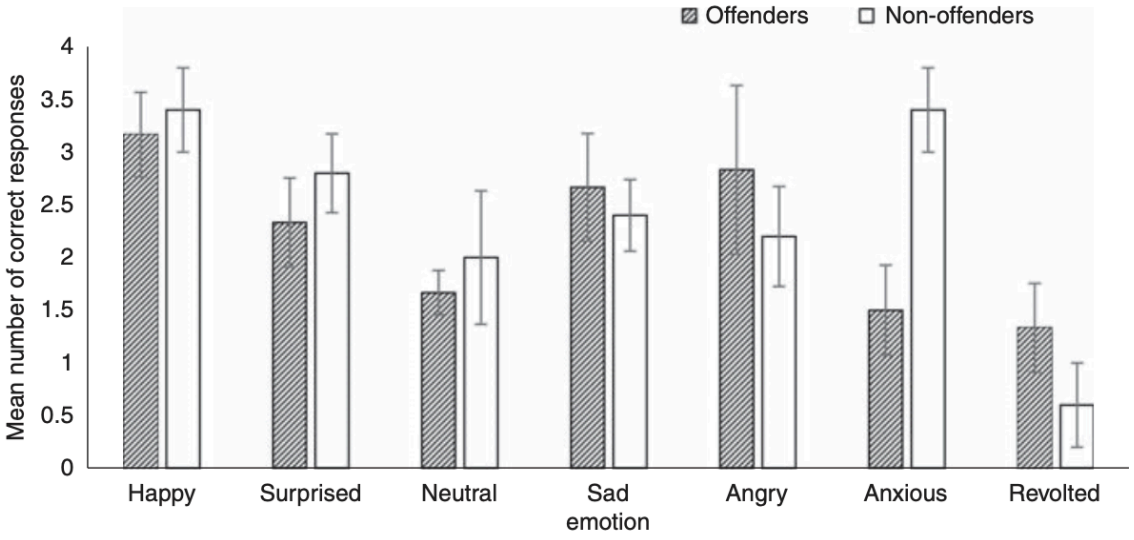

Figure 4. Comparison of correct responses for TASIT emotion evaluation component (

For instance, "interpersonal violence exposure has been linked to cognitive and affective theory of mind (ToM), core social-cognitive processes that underlie many aspects of social information processing" (Heleniak & McLaughlin, 2020). This linkage underscores the profound impact of social experiences on cognitive development. These processes play a crucial role in how individuals interpret and respond to social cues, which may influence their tendency for violent behavior. Furthermore, the integration of social-cognitive processes into the narrative of violent behavior underscores the multifaceted nature of its etiology (Cannon, 2009).

2.4 Neurocognitive processes influenced by childhood trauma

As it was said that "neurobiological systems may be particularly susceptible to the deleterious impact of childhood trauma" (Cross et al., 2017). Understanding the impact of childhood trauma on neurobiological development requires considering the timing and chronicity of trauma exposure first. Multiple studies about humans and animals

have pointed out the sensitive periods in brain development characterized by heightened plasticity, where experiences significantly influence neurogenesis, synaptic growth and neural circuit organization (Heim et al., 2012; Cross et al., 2017). During these sensitive periods, trauma can deeply and permanently alter the neurobiological landscape while increasing the risk of psychological, behavioral and neurocognitive issues (Cowell et al., 2015). Adding to this, as brain regions mature at different rates it depends deeply on the fact when trauma happens because it can differentially affect neurobiological changes across development (Cross et al., 2017). Therefore, looking into traumas that happened in childhood can give us a better understanding of long lasting effects of it. Study by Huffhines et al. (2024) explores how early childhood trauma influences various neurocognitive and emotional processes in young children, examining components like executive functioning, episodic memory, and emotion reactivity. Their results showed that repeated and interpersonal trauma were associated with deficits in episodic memory and overall cognitive abilities. For inhibitory control, it was affected particularly in tasks involving relational contexts, but trauma was not related to inhibitory control in decontextualized tasks. Surprisingly there was no significant association found between trauma and measures of emotion reactivity, which may suggest the need to consider more context-specific emotional assessments. Family socioeconomic adversity and parental depressive symptoms had no significant effect on the association between trauma and neurocognitive/emotional outcomes. This may suggest that factors further down the pathway—nearer to the child's daily life environment, such as parenting behaviors—may be more influential in the outcome on neurocognitive/emotional functioning. Another study by Majer et al. (2010) was trying to find associations of childhood trauma with cognitive function in healthy adults, and

showing a significant childhood trauma association with memory performance. Emotional abuse was significantly associated with higher error rates in the spatial working memory test, physical neglect was associated with more errors in the spatial working memory and delayed pattern recognition memory tests. There was also a less marked relationship with academic underachievement for sexual abuse or physical neglect. These results can suggest that childhood emotional abuse and physical neglect may have a long-term impact on memory functions beyond the presence of current psychiatric conditions in survivors. Multiple studies have investigated childhood trauma effects on psychotic disorders (Garcia et al., 2016; Aas et al., 2012; Schenkel et al., 2005, etc.) to have a better comprehension on the influence of early environmental risk factors on the disorder's expression (Vargas et al., 2019). It was found by majority of studies that people with psychotic disorders experienced more childhood trauma than healthy individuals (Schenkel et al. 2005; Garcia et al., 2016), especially in emotional and physical abuse and neglect and showing poorer cognitive performance (Garcia et al., 2016) and others discovered links between several cognitive areas, including working memory, verbal memory, and executive function (EF), and early trauma (Gracia et al., 2016; Aas et al., 2012). Interestingly Sideli et al. (2013) showed no association between trauma and cognition among first-episode psychosis patients, speculating that the lower IQ observed in cases might have acted as a floor effect, reducing the potential magnitude of the effect of childhood abuse on cognitive functioning in this group.

Chapter 3

3.1 The Neurobiology of Childhood Trauma, focusing on brain development and functioning

Having an overview of childhood trauma and its prevalence, it is crucial to investigate the neurobiological effect of the experienced trauma in order to understand the offender's behavior and actions better. Assogna (2020), in their review, emphasized that early traumatic experiences have significant implications for the physiology and structure of the brain, influencing information processing during early developmental stages. They stated that traumatic stress can disrupt brain development, impacting emotional regulation, impulse control, reasoning, and memory. Moreover, Assogna highlighted that long lasting stress can lead to the neurotoxic effects of steroid hormones, which affect the functioning of both the hippocampus and amygdala. This phenomenon, as noted by Assogna, may result in the forgetting of specific details of the trauma while making the responses of fear and anxiety to triggering cues. Given the complex interplay of various brain regions in developmental processes influenced by childhood trauma, this review focuses on the most significant regions involved. Perry (2006) explained that trauma interferes with typical brain development in various crucial regions: the brainstem, responsible for regulating stress, survival instincts, and metabolism; the midbrain and diencephalon, involved in sensory-motor functions, sleep patterns, and appetite control; the limbic system, governing emotions, attachment, mood, and pleasure responses; and the cortex, associated with cognitive abilities, language processing, and reasoning skills.

According to Nadel (1992), the amygdala, hippocampus and prefrontal regions mature at different rates in children, which affects how they respond to trauma. They explain that because the amygdala begins to function soon after birth, babies quickly learn to sense fear and sense danger and as the hippocampus, which is important for understanding threats in a spatial framework, develops gradually over the first five years of life, children similarly take time to acquire the ability to recognize and categorize threats. There seems to be a fair amount of evidence that early abuse and neglect noticeably can affect the development or maturation of the hippocampus, which makes children with trauma histories vulnerable in misinterpreting sensory input in the direction of danger and threat (van der Kolk, 2003). Namely the hippocampus was named one of the crucial and vulnerable brain regions in those individuals who tend to develop slowly during the postnatal period and who have a higher density of glucocorticoid receptors, and continue to generate new neurons after birth (Squire, 1991). Damage (trauma, injury) in the hippocampus has shown to have significant consequences because it is involving aspects like in learning and memory processes and is fundamental for the recovery of episodic memories and the ability to remember the location and the time of the event (temporal and spatial components)(Assogna, 2020). A study by Bertsch et al. (2013), exploring brain differences among male antisocial offenders with borderline personality disorder (BPD), those with high psychopathic traits (ASPD-PP), and healthy men (CON) showed that both offender groups had significant gray matter (GM) reductions in the occipital cortex and frontal pole (Figure 5.).

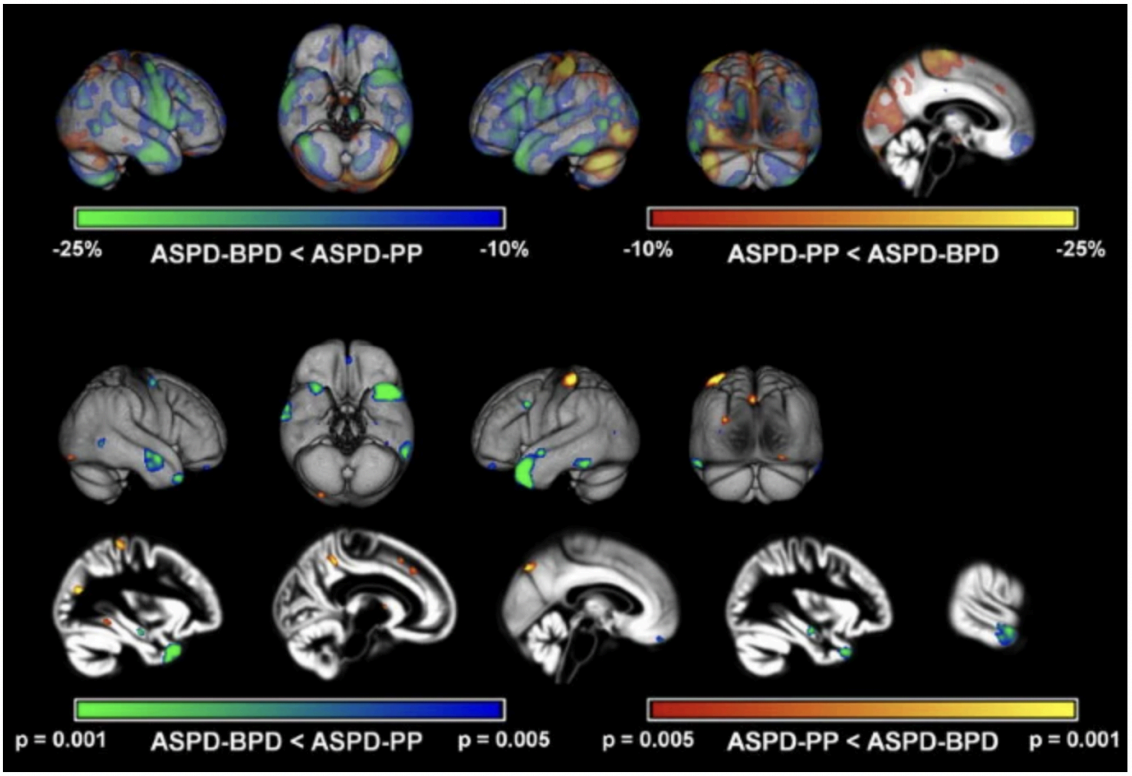

Figure 5. Voxel-based analysis showed gray matter (GM) differences between antisocial offenders with borderline personality disorder (ASPD-BPD) and those with high psychopathic traits (ASPD-PP). The top row displays GM reductions: ASPD-BPD compared to ASPD-PP (green-blue) and vice versa (red-yellow). The bottom row shows the statistical significance of these reductions. ASPD-BPD reductions range from green (-10%) to blue (-25%), while ASPD-PP reductions range from red (-10%) to yellow (-25%). Significance is color-coded green ($p < .005$) to blue ($p < .001$) for ASPD-BPD and red ($p < .005$) to yellow ($p < .001$) for ASPD-PP.

However, the reductions varied, with BPD offenders showing more GM loss in the ventromedial and lateral orbital frontal cortices, while psychopathic offenders had more reductions in cortical midline structures. These findings suggest distinct neurobiological patterns in antisocial offenders with BPD and those with high psychopathic traits, impacting social cognition, moral judgment, and emotion regulation.

3.1.1 Amygdala

This leads us to another important brain region, the amygdala. The amygdala “plays a central role in this system related to the perception of fear and the elaboration of the resulting reactions” (Assogna, 2020). It was explained that the amygdala is considered

somewhat like a gateway for the emotions that are recorded there, triggering adaptive physiological reactions involving thalamus, sensory circuits, hippocampus and predominantly frontal cortical regions (Assogna, 2020). In other words, the amygdala plays a turning point role in the evaluation of the emotional meaning of the afferent stimuli (LeDoux, 1992). The amygdala is important in evaluating how emotionally significant specific events are, especially for those related to anger, aggression, and fear, acting with the hippocampus, actively modulating the stored information (Assogna, 2020). In a study where Osumi et al. (2012) investigated the neural mechanisms underlying frustration-induced aggression in psychopathic individuals, found that people with high levels of psychopathic traits showed less activity in the amygdala when faced with unfair offers during a decision-making task (Figure 6.).

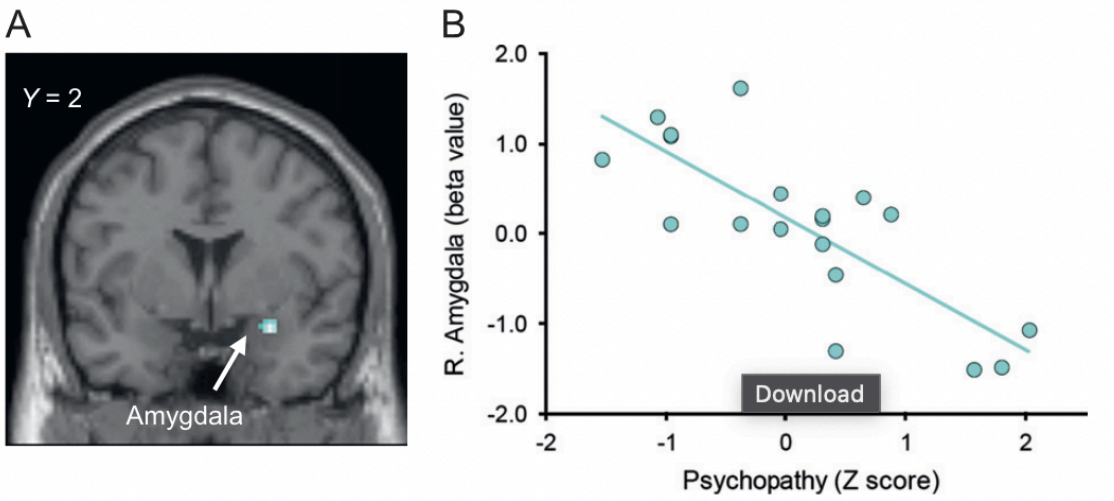

Figure 6. Relationship between psychopathy and right amygdala activity in response to unfair offers. (A) The illustration shows the location of the right amygdala that was negatively associated with psychopathy in the UG (unfair–fair)+DG (unfair fair) contrast. (B) The corresponding scatter plot depicts the correlation between psychopathy and parameter estimates of activity in the right amygdala in the UG (unfair–fair)+DG (unfair fair) contrast.

This reduced activity was connected to their lower tendency to punish others, even when the punishment was costly to themselves, compared to people with lower psychopathic traits. Furthermore, the study discovered that psychopathy was linked to

weaker connections between the right amygdala and brain areas involved in processing rewards, like the striatum, when the opportunity to punish unfair offers was present. This indicates that individuals with psychopathic traits have difficulty processing the value of punishment. Comparing these results with another study by Cunha-Bang et al. (2017) where it was found that violent offenders showed significantly higher reactivity in the amygdala and striatum when provoked, compared to healthy controls (Figure_).

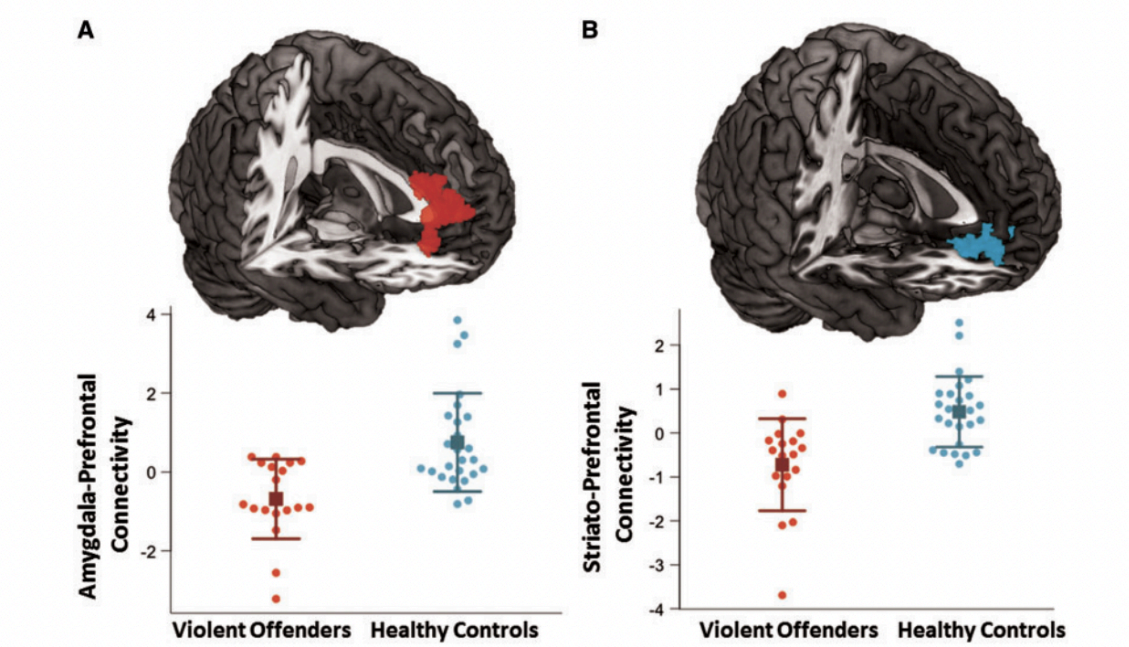

Figure_. (A) Control subjects had significantly greater functional connectivity in the bilateral amygdala compared to violent offenders, as shown by a cluster of 527 voxels. (B) Similarly, control subjects exhibited significantly greater functional connectivity in the bilateral striatum than violent offenders, shown by a cluster of 349 voxels.

This heightened reactivity was linked to aggressive behavior. The study also found that violent offenders had reduced connectivity between the amygdala, striatum, and prefrontal cortex, indicating that these individuals have impaired regulation of subcortical regions by the prefrontal cortex. Taking the information previously presented about psychopaths, it can be predicted that the first study showed lower amygdala responses in psychopathic traits because these individuals tend to have reduced emotional reactivity and empathy, which corresponds to lower amygdala

activity when processing emotional or threatening stimuli. Meanwhile Cunha-Bang et al. (2017) findings indicated that the increased reaction is linked to frustration-based aggression, where provocations upset their expectations or rewards, causing them to become more aggressive. Amygdala reduction in psychopaths was supported by multiple other studies (Yang et al., 2009; Schiltz et al., 2007; Marsh et al., 2011).

3.1.2 The prefrontal cortex

The prefrontal cortical region has direct connections with the amygdala and is involved in the activation of stress and fear circuits (Teicher, 2003). Findings from neuropsychological, neurological, and brain imaging research indicate a connection between antisocial and aggressive behavior and impaired functioning in the prefrontal area (Shaw, 2002; van der Kolk, 2003). It has been suggested by Shaw (2002) that the pressures of social and executive tasks in late adolescence may overwhelm the developing prefrontal cortex. This can cause problems in the prefrontal cortex and difficulty controlling antisocial and violent behavior, which tends to be at its peak at this stage. As seen from the review, all these cerebral structures play a key role in assessing a situation, selecting an appropriate response (prefrontal cortex) in reference to emotional content (amygdala) and content of past experiences (hippocampus and prefrontal cortex)(Assogna, 2020). Darby et al. (2017) showed in their study where they examined 17 lesions, which were spatially diverse, including nine in the medial frontal or orbitofrontal structures, three in the medial temporal lobe/amygdala, three in the medial temporal lobe/amygdala, three in the anterior lateral temporal lobe, one in the dorsomedial prefrontal cortex and one involving the ventral striatum and parts of the orbitofrontal cortex. Although the most common lesion location showed to be the

vmPFC/orbitofrontal cortex (out of 17 criminals), at least seven lesions were documented to not extend into this area (Figure 7.).

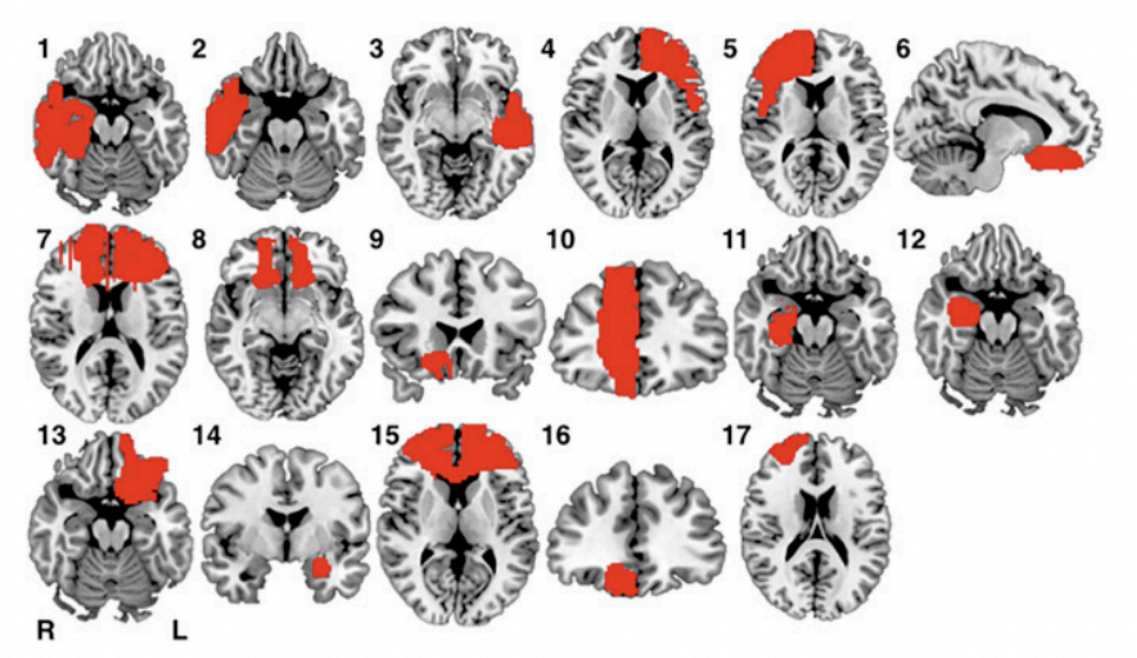

Figure 7. Lesions temporally associated with criminal behavior. Lesions from 17 patients with acquired criminal behavior, manually traced onto a common brain atlas (MNI).

Another interesting finding from their study, showing that criminality and morality overlapped in frontal cortex, temporoparietal junction (TPJ) and anterior cingulate cortex (ACC) (Figure 8.). Specifically the overlap was observed in the ventromedial prefrontal cortex (vmPFC), which is known to play a critical role in processing risk and fear, as well as in moral reasoning and decision-making; TPJ area is implicated in understanding others' perspectives and intentions, which is crucial for moral judgments; ACC region is involved in error detection, emotional regulation, and the experience of empathy and guilt, all of which are essential for moral behavior.

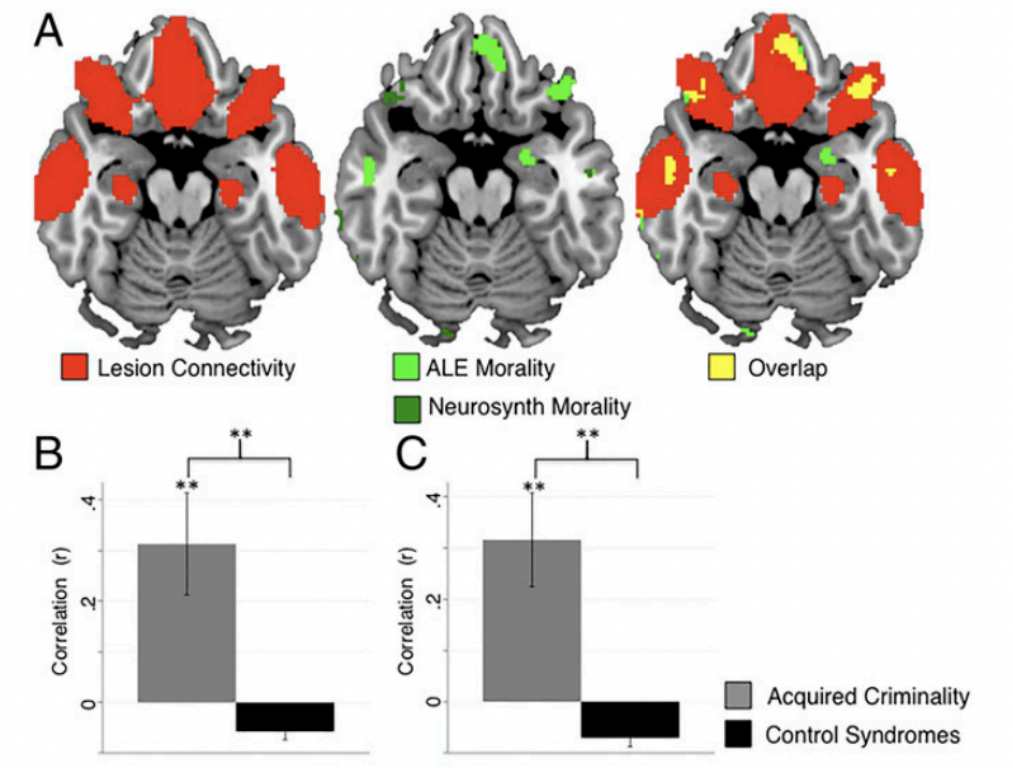

Figure 8. Relationship between lesions associated with criminal behavior and regions involved in morality. (A) Regions linked to criminal behavior (red) overlap with areas activated during moral decision-making tasks (green), shown in yellow. (B and C) Lesions related to criminal behavior (gray) are connected to moral decision-making regions identified in meta-analyses using Neurosynth (B) or activation likelihood estimation (ALE) (C), unlike other neurological syndromes (black). **P < 0.0001.

3.1.3 The Hypothalamic-Pituitary-Adrenal axis

The Hypothalamic-Pituitary-Adrenal (HPA) axis plays a crucial role in the body's response to stress (Smith, 2022). When a traumatic event occurs, the hypothalamus at the base of the brain signals the pituitary gland and adrenal glands to produce stress hormones, including cortisol (Murphy, 2022). This is part of the body's "fight or flight" response (van der Kolk, 2003). It has been shown previously by Nemereoff (2004) that trauma can alter changes in the brain areas and hormonal systems that are responsible for regulating stress. It has been said by Briere & Scott (2006) that according to these changes, it may happen that memory can get worse and an individual may have some kind of an impairment in processing information which was supported by Nemeroff

(2004) claiming that it can also be the reason for alterations in the hypothalamic-pituitary-adrenal (HPA) axis, which can end up affecting abilities to create cognitive and behavioral response to stressful situations in trauma survivors. Dye (2018) then explained that after a perceived threatening event, the HPA axis is then activated while causing an increase in the corticosteroids, which interact with cognitive functions plus physical functions like immunity and inflammation. Children exposed to trauma are more vulnerable to overexposure to corticosteroid due to the brain continuing to develop (Dye, 2018). Murphy (2022) provided an explanation in their review about the role played by the HPA axis in regulating alertness and attention, a process that begins with the hypothalamus releasing the Corticotropin Releasing Hormone (CRH) to enhance alertness and focus. "CRH prompts the release of adrenocorticotropic hormone (ACTH) from the pituitary, which subsequently induces the secretion of adrenal cortisol and cortisone" (Murphy, 2022). Under normal conditions, cortisol is released with a distinct diurnal rhythm, characterized by levels increasing during the night just prior to waking, a transient acute spike in release following awakening (the cortisol awakening response), followed by a steady decline throughout the day until sleep (Murphy, 2022). It is important to realize that studies have found different results in cortisol levels in PTSD, meaning that cortisol has been reported to be very high (Pitman, 1990; Hawk, 2000), low (Neylan, 2005; Mason, 1986) as reported in Figure 9;

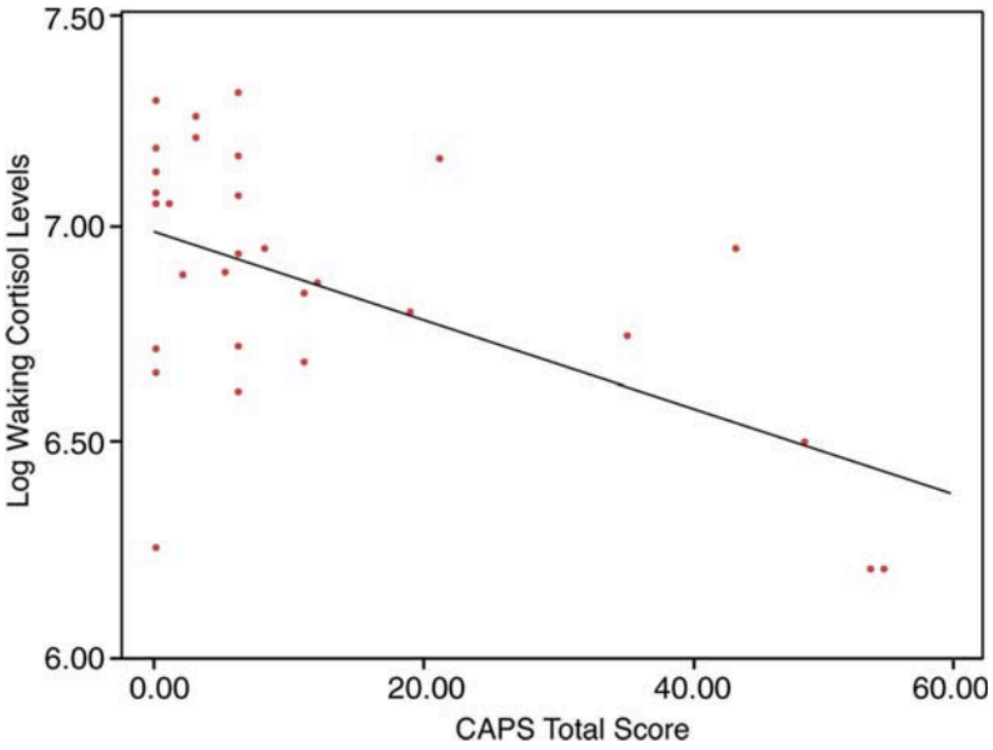

Figure 9. Waking cortisol (AUC, area under the curve for salivary cortisol levels obtained at 1, 30, 45, and 60 min after awakening) and PTSD symptoms.

and not to change at all (Young, 2004). It has been explained with studies which found that cortisol levels are elevated in people with childhood trauma (Heim, 2000; Nicolson, 2004) like for an example Nicolson (2004) found in their study that cortisol levels are higher in people with childhood parental loss while de Kloet (2007) found that cortisol levels are decreased in people with adult trauma.

Chapter 4

4.1 Psychological Mechanisms Underlying Violent Behavior

It could often happen that violence starts with childhood trauma, where abuse, neglect, and emotional distress create a foundation for future aggression. By examining the psychological mechanisms that link these early experiences to violent behavior, it can be possible to start to understand better how a troubled childhood leads to violence in adulthood, helping professionals and families to develop better interventions and support systems. One critical mechanism is the development of maladaptive schemas, which are deeply ingrained beliefs about oneself, others, and the world (Young et al., 2003). Studies indicate that children exposed to trauma may develop schemas that the world is a dangerous place, leading to hypervigilance and defensive aggression (Young et al., 2003). These suggestions make perfect sense, given that children's early experiences may have led them to anticipate danger and betrayal, reinforcing a mindset where aggression is seen as essential for self-defense and survival. Additionally, trauma can compromise the development of secure attachments, resulting in difficulties forming healthy interpersonal relationships and increasing the risk of violent behavior as a maladaptive means of interaction (van der Kolk, 2014). Research has found that insecure attachment styles are associated with higher levels of aggression and antisocial behavior (Fonagy et al., 1997) but I will dive into attachment relationships in the next chapter to analyze in more detail.

4.2 How maladaptive coping strategies and cognitive distortions may contribute to violent offending

Maladaptive coping strategies and cognitive distortions can be key contributors to violent offending among individuals with a history of childhood trauma, considering the mental burden they must feel and the need to find simple yet effective ways to cope with it. These strategies can include substance abuse, self-harm, and aggressive behavior, which serve as attempts to manage overwhelming emotions and trauma-related distress (Khantzian, 2013). Khantzian (2013) further suggests that individuals choose substances based on the specific symptoms they aim to relieve, selecting them according to their psychopharmacological properties (e.g., using alcohol to decrease anxiety). When self-medication effectively reduces these symptoms, the use of alcohol is negatively reinforced, potentially leading to the development of dependence. Spatz-Widom (2006) investigated whether childhood victimization increases the risk of illicit drug use and related issues in middle adulthood, including information like court-documented cases of childhood physical and sexual abuse and neglect. Participants were first assessed as young adults (mean age = 29 years) between 1989 and 1995 and again in middle adulthood (mean age = 40 years) between 2000 and 2002. Findings indicated that in middle adulthood, individuals who had been abused or neglected were approximately 1.5 times more likely than controls to report using any illicit drug (especially marijuana) in the past year. The results from Levenson's (2015) study demonstrate a significant correlation between childhood adversity and substance abuse problems with increased incidences of violence among criminal offenders. These findings align with prior research, which consistently shows that individuals who have experienced childhood maltreatment are more likely to engage in violent behavior as adults (Mersky, 2012). Curran et al. study (2021) takes a deeper look into how people cope with difficult experiences, such as their links between childhood trauma, gender

and depression. They examined how these factors influence how people seek help and cope with their problems, such as drug and alcohol abuse and suicidal thoughts. Using data from the National Epidemiological Survey on Alcohol and Related Conditions (NESARC), the study shows significant differences in coping between men and women, namely women with a history of childhood trauma and major depression were more likely than men to use maladaptive coping strategies, such as drug and alcohol abuse, and also showed a higher likelihood of suicide. On the other hand, men were more likely to report using aggressive and physical behaviors as coping mechanisms. These findings highlight the important role that gender plays in how people respond to childhood trauma and depression, and how these differences should be taken into account when designing interventions and support systems. Additionally their study emphasizes the importance of perceived social support in conquering childhood trauma negative effects and being able to effectively find right coping mechanisms. From this we can conclude that building a strong social support system may be effective which should be investigated and studied in future to help with prevention and intervention methods. Is it important to point out that Curran et al. (2021) study has a key strength, using a more sophisticated method called Latent Class Analysis (LCA) to better understand connection in childhood experiences influence on coping behavior, allowing a deeper look into how various types of trauma affect coping strategies. However, while all of the studies underline an important connection between childhood trauma, maladaptive coping mechanisms and violent behavior, they still share some similar limitations. Most of them use self-reported data that can create bias and inaccuracy, for instance Levenson's (2015), while being comprehensive, could benefit from additional data collection methods beyond self-reports. Another limitation is the cross-sectional

design used in many studies, including the ones by Spatz-Widom (2006) and Levenson (2015), which limits finding cause and effect. Longitudinal studies would help to better understand the temporal relationship between childhood trauma, maladaptive coping strategies, and violent behavior (Kuh et al., 2003) which would provide stronger evidence of how these factors interact over time and potentially lead to violent offending.

Chapter 5

5.1 Attachment theory and its relevance to understanding the impact of childhood trauma

Attachment theory, first introduced by John Bowlby (1969) in his work, emphasizes a deep impact of early relationships on children's emotional and psychological development. Bowlby has proposed that children are biologically pre-programmed or wired to form attachments with caregivers as a part of survival. He has further pointed out that these early attachments shape future relationships and can deeply influence a child's cognitive, social, and emotional development. When these early attachments are disrupted by trauma or abuse, the consequences can be deep, long lasting and far-reaching to multiple domains (Bowlby, 1969). To continue this angle from this century, Van der Kolk's (2003; 2005) influential work on the neurobiology of childhood trauma and abuse examines how attachment disorders can have far-reaching consequences for neurocognitive development. Van der Kolk's work is very beneficial because it is one of the few that addresses neurobiological impacts, many studies do not fully explore the neurobiological mechanisms linking attachment disruptions to violent behavior. Van der Kolk (2003) underlines the fact that trauma received and experienced in early childhood can change the structure and function of the brain. For example, chronic trauma-related stress activates the HPA axis, leading to overproduction of stress hormones like cortisol, a hormone also talked about in Chapter 3. Long-term exposure to these hormones can damage the process of developing the brain, particularly in regions involved in memory, learning, and emotional regulation, such as the hippocampus, amygdala, and prefrontal cortex (De Bellis et al., 1999). Therefore, it can be assumed that the lack of secure connection can slow the development of neural

networks that are important for cognitive functions. While many studies focus mostly on cross-sectional designs, a study by Navas-Martínez et al. (2023) used a longitudinal design to examine the impact of early attachment disruptions on later violent behavior, tracking individuals from childhood through adolescence, providing a better picture of how early experiences shape later outcomes and addressing the causality issue present in cross-sectional studies. They showed that children with insecure attachments can show hypervigilance and heightened sensitivity to threats, which can impair their ability to concentrate, learn and maintain new information. This constant state of alertness redirects cognitive resources away from exploration and learning, which are important activities in early childhood (Perry & Pollard, 1998). Consequently, these children may struggle academically and socially, further worsening their emotional and behavioral problems.

An interruption or a break in attachment has a way of affecting the development of self (as a person). Attached children learn to see themselves as worthy of love and care, forming a positive self-image (Bosmans et al., 2022). Alternatively, children who experience neglect or abuse may accept and carry on with negative beliefs, which in turn is leading to low self-esteem and an increased risk of mental health problems such as depression and anxiety (Cicchetti & Toth, 1995)(Bosmans et al., 2022). This negative self-perception and self-confidence can end up in creating a cycle of emotional difficulties and maladaptive behavior. In addition, van der Kolk (2003) put an emphasis on the role of dissociation as a coping mechanism in response to overwhelming trauma. Dissociation can damage a child's perception of self and reality, further complicating their cognitive and emotional development. This damaged view of self can make it

harder for children to integrate experiences, leading to difficulties in forming a coherent narrative about their life and identity (Putnam, 1997).

5.2 Affect in neurocognitive functioning

As it has been discussed in the previous articles, we can't only focus on actions and reasons, it is crucial to explain and further discover behaviors through neurocognitive functioning. Early attachment, explained by the bond between a child and their primary caregiver, forms the basis for healthy emotional and psychological development (Bowlby, 1969; van der Kolk 2003; 2005). If this connection is disrupted, either through neglect, abuse, or inconsistent care, it can damage a child's neurocognitive development, leading to long-term consequences (van der Kolk 2003; 2005) as briefly explained previously. The following findings strongly support discussed topics in Chapter 3 about neurobiology in violent behaviors, assuming that maltreatment probably is a factor for poor attachment bond. For an example, Tomoda et al. (2024) discuss how childhood abuse can affect brain structure and function pointing out that experiencing abuse during crucial stages of brain development can alter the structure of the brain, particularly in areas that manage emotions, impulse control, and social skills. The prefrontal cortex, which is important for decision-making and impulse control, was found to be particularly vulnerable meaning that damage or reduced volume to this part of the brain has been associated with increased impulsivity and aggression, which can lead to violent behavior. The authors point out that abuse can impact the structure, function, connectivity, and network architecture of the brain as well as cause phenotypic changes in sensory systems. These changes in the brain can affect cognitive function and result in psychopathology. The authors specifically address how abnormal structural and functional brain changes linked to childhood abuse are initiated or produced by

epigenetic modifications, such as methylation of oxytocin regulating genes and these changes can affect neurocognitive functioning, including aspects such as working memory and inhibitory control. Multiple studies have found that early institutionalization and adoption have shown to influence amygdala volume, meaning it was reported to be increased compared to non-adopted controls (Mehta et al., 2009; Tottenham et al., 2010). An interesting finding by Fries et al. (2005) shows that reduced oxytocin (OT) levels may lead to difficulties in forming healthy relationships and increased antisocial behavior. Their results show that control group children who had not been neglected by their mothers, showed increased oxytocin levels after interaction with their mothers, opposite to the children who had been neglected and who showed lower oxytocin levels (Figure 11.).

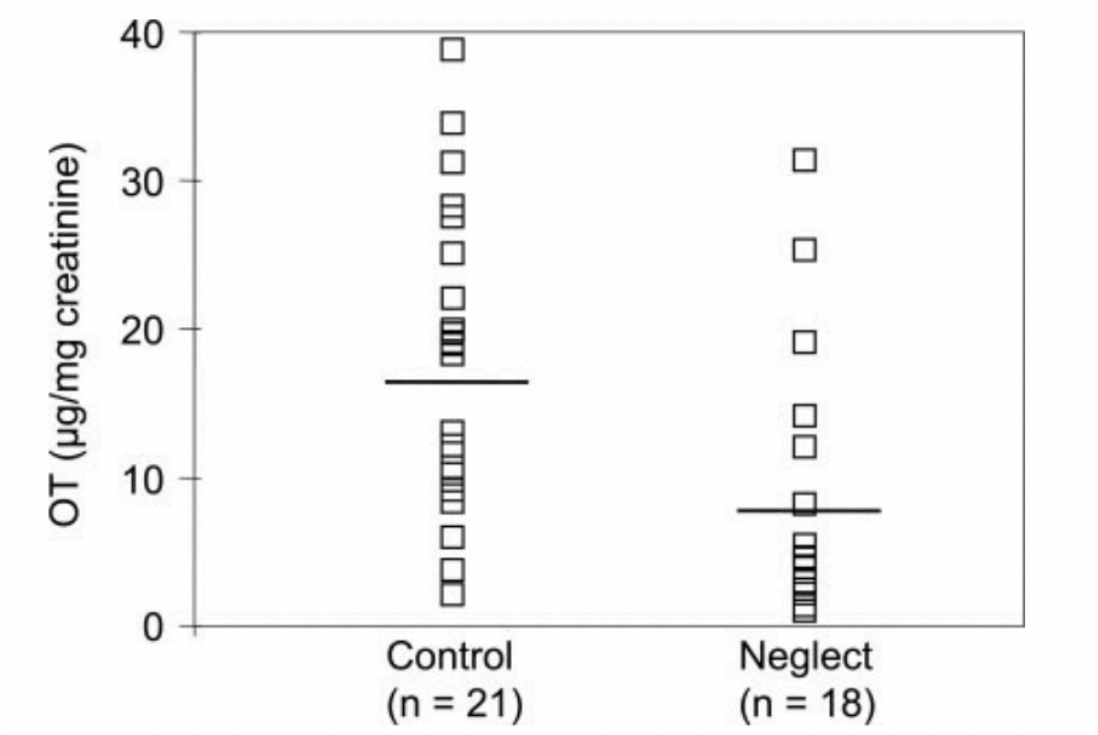

Figure 11. Control children had higher OT levels after the interaction with their mothers than early neglected children [F(1,37) 3.91, P 0.056].

Therefore we can say with the author's note that the calming and consoling effects that usually develop between young children and familiar adults who offer care and protection may be interfered with by disruptions in this system (Fries et al. 2005) which may lead to difficulties in forming trustworthy relationships, causing social isolation and increased aggression. But in this light, Bowman et al. (2018) have discussed in their study that regardless of a large amount of previous research on the risk factors for violence in different nations, social circumstances, family circumstances, only little is known about the contextual elements and mechanisms that develop these risks into violent acts. They explain that we need a deeper comprehension of these contextual triggers for violence because if we don't, our knowledge of violence remains something like “fuzzy” in their words. The authors further emphasize how significant it is to actually examining the situational settings that can influence the behavioral, affective, and interactional variables and processes that have been shown to contribute to being in part of violent acts, saying that theoretical and empirical studies on general risks for violence can be taken to next level (making it more advanced) and deepened by looking at these processes and circumstances as they form and arise in the real world.

Chapter 6

6.1 Childhood Maltreatment and Violent Offending

Childhood abuse can have a serious impact on a person's life, significantly affecting their behavior and development. The World Health Organization (WHO) has defined child abuse as “all forms of physical and/or emotional ill-treatment, sexual abuse, neglect or negligent treatment or commercial or other exploitation, resulting in actual or potential harm to the child” (World Health Organization, 1999, p. 80)(Marono et al., 2020). To explain more clearly what different types of abuses are, physical child abuse means that someone acts out the behavior and causes actual physical harm or have the potential to cause harm to a person; sexual abuse is better defined as physical acts in which a child is used someone else's sexual gratification/satisfaction; psychological abuse can be described as an environment that lack support or behavioral acts of others that have an adverse effect on the emotional health and development of a child (Marono et al., 2020). It is crucial to take childhood abuse into account when assessing the likelihood of future crimes because it was found that on average, 50% of serial killers claim to have been the victim of psychological abuse, 36% of physical abuse, and 26% of sexual abuse (Mitchell & Aamodt, 2005)(Marono et al., 2020). In this section, I plan to explore the different types of childhood abuse: physical abuse, sexual abuse, emotional abuse, physical neglect and emotional neglect; and how each of them can lead to violent behaviour in the future. In addition, I will also highlight substance abuse as a mediator in violent offending more deeply.

6.1.1 Physical abuse in Childhood

Taking a look into some of the researches, it was found by Simons et al. (2008) that men who commit sexual offenses often report having experienced physical abuse themselves in childhood, suggesting that these victims may learn from the violent behaviors seen in their home environment, later using these behaviors in social and romantic relationships both as children and as adults. The found link in their study between early physical abuse and later violent behavior can suggest that witnessing or experiencing violence at home can normalize aggressive behavior for a child, leading to a constant use in adult relationships, thinking it's the only way to resolve problems, including sexual offending. To look at physical abuse under a slightly different light, a study by Marono et al. (2020) was investigating childhood physical abuse and its impact on later violent behavior, to see crime scene behavior, collecting information from male serial killers. Their study shows that people who have experienced physical abuse are more likely to experience extreme forms of violence, such as "overkill", meaning it involves using violence beyond what is necessary, indicating a person's deep aggression which may have been rooted in their own abusive experiences. The study also pointed out that specifically “physical abuse” group did not use as extreme methods for a kill, like mutilation and torture, as did other groups, but still demonstrated a high probability for “overkill”, indicating a severe level of aggression and frustration. The study further notes that individuals motivated by a desire for power carried out murders quickly, without unnecessary violence, differing from the overkill seen in physical abuse victims. This may suggest that motivations and psychological impacts vary between those who are seeking power and those acting out from a history of physical abuse. A study by Lansford et al. (2020) further supports previous findings by highlighting that

individuals who experienced early abuse showed a higher prevalence of lifetime convictions for violent crimes compared to those who did not experience abuse. This study also found significant associations between early physical abuse and later mental health issues, such as externalizing disorders (e.g., aggression, hostility) and internalizing disorders (e.g., depression, anxiety), which adds a potential risk of developing criminal behavior. Specifically, they indicated that those who experienced early physical abuse were significantly more likely to meet clinical criteria for various mental health disorders. For example, the odds of meeting the clinical range for any externalizing disorder were 2.42 times higher, and for any internalizing disorder, 2.10 times higher for those who experienced early abuse compared to those who did not. Furthermore, those who experienced early abuse showed a higher prevalence of criminal convictions, with the odds of being convicted in the last 12 months being 2.61 times higher than their non-abused peers.

6.1.2 Sexual Abuse in Childhood

Although a pattern of repeated experiences including both physical and emotional rejection in addition to sexual abuse may raise the likelihood that male victims of sexual abuse would go on to become abusers themselves, but it has to be said that sexual abuse alone does not produce violent sexual behaviour. (Ramirez et al., 2015). It has been more difficult to find proof based literature of sexual abuse possibly causing individuals to commit crimes, but several studies still claim that it is associated with an increased risk of engaging in violent and nonviolent criminal outcomes (Papalina et al., 2018; Widom, 1989; Briere, 1994), but it seems that there is not enough strong evidence to say for sure whether people who were sexually abused as children are more likely to become sexual abusers themselves (Papalia et al., 2018). An interesting finding by

Herrero et al., (2017) shows a significant realtion between a childhood maltreatment and sexual relations with the victims, claiming that serial killers who have suffered childhood abuse can most likey sexually attack their victims before killing them while those who did not experiment any kind of abuse during their childhood do not fit into this category. Study by Currie et al., (2012) indicate that individuals who experienced sexual abuse as children are more likely to engage in risky behaviors, such as substance abuse, early sexual activity, and criminal behavior, often because of their experiences of trauma and emotional confusion. Previously about physical abuse, I mentioned Marono et al. (2020) research where they similarly investigated sexual abuse and its impact as well. Their findings are suggestive of a clear, strong relationship between sexual abuse and a portion of violent behavior typologies. Sexual abuse relates to each of the violent behavior typologies that were considered for this article: rape/lust, power, anger, and financial gain. As concerns the rape/lust typology, torturing of victims showed to often replace overkill in individuals with a history of sexual abuse, indicative of violent, sadistic, and protracted tendencies. The connection between quickly committing murder without mutilating the victims showed a desire for control and dominance through swift, lethal actions. However, the anger typology showed that rage and impulsivity can drive someone to commit murder quickly, resulting in more immediate and less planned violence. Additionally, the findings suggest a strong link between sexual abuse and killing for financial gain, suggesting that those with a history of abuse might turn to quick ways of making money due to the psychological effects of their abuse. Authors also pointed out a strong link between binding, mutilation, and torturing victims, with over a third of sexually abused individuals showing violent and controlling behaviors. As we can see again, these results show the complex link between sexual abuse and

various violent behaviors and the strong connections highlight the need for targeted help and support for victims to prevent serious outcomes. I didn't find any study that filled all the criteria to get a complete understanding of wether sexual abuse alone can influence individuals to be more prone to criminal behavior in the future. From the multiple studies investigated, the ideal study would include longitudinal design, gender differences, other data collection methods instead of self-reported questionnaires, consideration of confounding factors like socioeconomic status etc.

6.1.3 Emotional Abuse and Neglect in Childhood

Social science literature began to document child's emotional abuse in the early 1970s. It is challenging to identify emotional abuse through psychiatric assessment since there is disagreement about what emotional abuse actually entails, victims are unlikely to report emotional abuse, symptoms are non-specific, and an examination yields no pathognomonic results (Thompson et al., 1996). Current existing definitions of emotional and psychological damage include a variety of terms such as impairment of essential mental processes and faculties like intelligence, memory, recognition, perception, attention, language, and moral development, or a marked reduction in their capacity for creativity and development (O'Hagan, 1993) and immediate or ultimate damage to the behavioral, cognitive, affective or physical functioning of the child (Hart et al, 1983)(Thompson et al., 1996). Childhood emotional abuse seems to be the least studied abuse (Xiao et al., 2021) but I found one systematic review that looks into the association between emotional abuse and neglect in traumatized school-aged kids where the pervasive impact of neglect and emotional abuse was clearly seen among children (Maguire et al.,, 2015) indicating that these deeply affect various aspects of children's lives, however, there is no systematic review or meta-analysis on the long-term mental

health effects of childhood psychological maltreatment on adults (Xiao et al., 2021). Previously, it seems that the only study that has looked into the impact of all forms of maltreatment together was a study conducted by Dias et al. (2017) finding evidence from a high-income sample from an European country that emotional abuse is significantly associated with revictimization and PTSD symptoms. Gama et al. (2020) conducted a study where they examined whether early childhood maltreatment, specifically emotional abuse, predicted revictimization and the severity of PTSD following a traumatic event. Revictimization is where a person who has experienced a traumatic event, such as abuse, becomes a victim of similar or different traumatic events again in the future. In the study, 74% of participants reported at least one form of childhood maltreatment, and 50.3% reported two or more types, with emotional abuse and emotional neglect being the most frequently mentioned. Emotional abuse and emotional neglect presented the highest frequencies of exposure, with a worldwide meta-analysis estimating rates of 36.3% for emotional abuse.

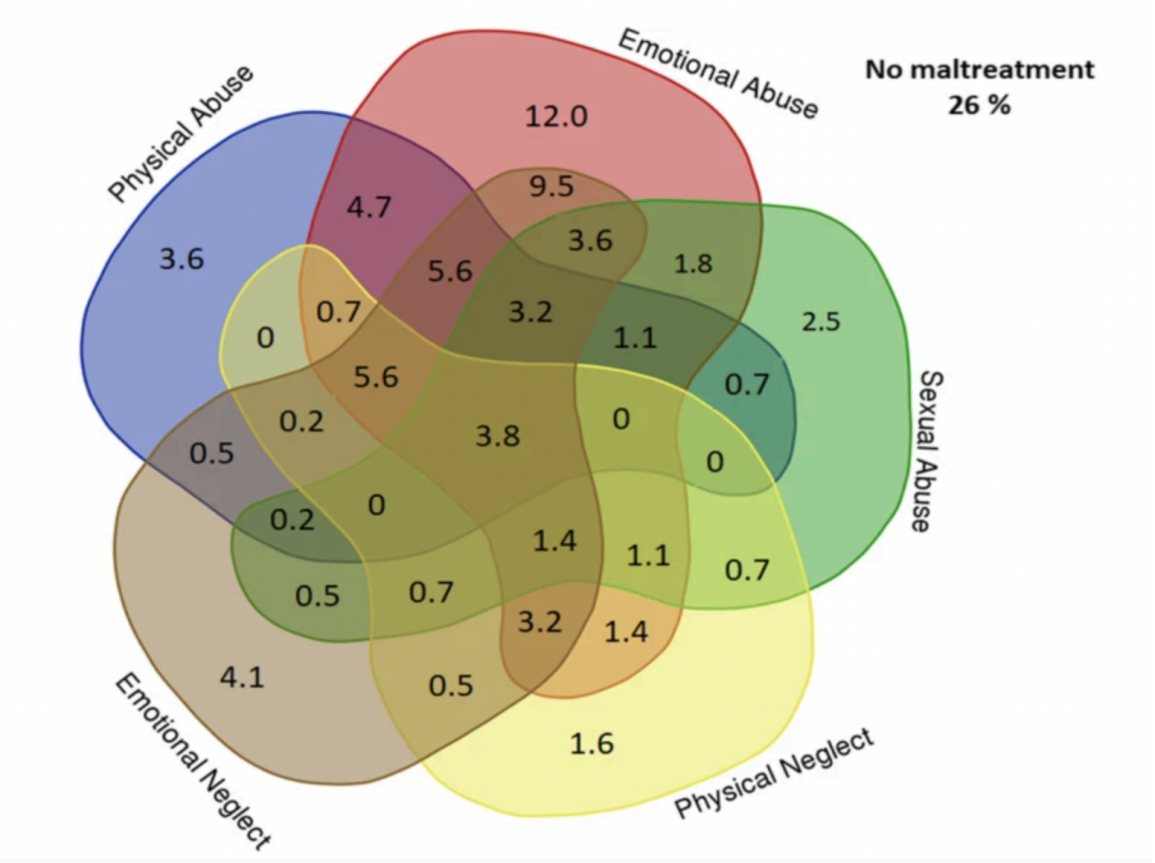

Figure 12. Venn diagram illustrating the percentage of single types and the overlap of types of childhood maltreatment in the original sample (n = 443)(Gama et al. 2020)..

The analyses showed that all forms of childhood maltreatment were associated with revictimization and the severity of PTSD. However, emotional and sexual abuse remained strong predictors even when considering multiple factors. This finding highlights a significant increase in subsequent traumatic events and PTSD symptom rates, with the effects of emotional abuse being particularly deep and widespread. From the read articles, the definitions of emotional abuse and neglect needs to be clarified more in future research to enable their identification and accurate assessment. Longitudinal studies might be helpful to see follow up on the long-term mental health outcomes of people exposed to emotional abuse and neglect since childhood and into adulthood, as well as systematic reviews and meta-analyses on the effects of childhood

emotional abuse and neglect throughout the adult life course are a critical need in the area.

6.2 Substance Abuse as a Mediator in Violent Offending

In the context of childhood maltreatment and possible future violence, I thought it would be interesting to discover the relations between maltreatment, substance use and violent behaviors. There are some aspects of family life and family relationships that have strong and consistent associations with the initiation, escalation, and recurrence of drug problems and variables such as poor relationships between parents and adolescents have shown to predict drug use among adolescents across diverse cultures and over a significant number of years (Brook et al., 2001). Peltonen et al. (2020) conducted an intriguing study where they analyzed the effects of childhood trauma on the likelihood of violent offending during adolescence. The reason why their study seemed intriguing is because there are few large-scale data on juvenile violence with available clinical observations of mental health and a study of risk factors makes engagement in this field limited. Also, usually, the latter do not combine multiple variables influencing violent behavior. The study noted that the diagnosis of trauma, like adjustment disorder, PTSD, and acute stress disorder at the age of 12 to 14 years were present in 0.4 percent of the population and the prevalence was higher in one having some other mental health or substance use disorder. This connection may explain that due to experienced trauma, individuals are more likely to develop substance use disorder because the victim might take the substance to erase the pain and stress that is occupying their mind regardless of when the trauma was experienced. To go even further from substance use, it can dramatically increase the effects of violence and it is supported by the current study, pointing out that violent crime was experienced more often among adolescents with

diagnoses of substance use disorders (12.2%) versus those teenagers whose diagnosis was something else than substance abuse (1.8%). It was also found that trauma presence more than tripled the relative risk of violent crime, showing that the lifetime prevalence of violence was 6.5% for those with a diagnosis of trauma compared with 1.8% among those without. They found a noticeable gender difference in the increased risk for violent crime among boys showing that the traumatic experiences of incarceration and substance abuse, especially, had a combined impact on their violent behavior. Therefore it can be assumed that the substance abuse magnifies the impact of trauma, activating violence, poor judgment and emotional deterioration. Another point of view from Levenson et al. (2015) explores the influence of adverse childhood experiences (ACEs) on adult substance abuse and violence in a sample of offenders. The study looked at 180 adult criminal offenders, of whom 146 were men and 34 were women, all under 40 years old. After filling out a survey about their childhood experiences, substance abuse, arrests, and violent behavior, results showed that the offenders had more childhood adversities compared to the general population. With 21% reporting zero ACEs and over 33% reporting four or more. Almost 46% of the sample had engaged in at least one act of violence. Higher ACE scores were significantly related to higher substance abuse and higher scores for violence. Overall, the study found that those with higher ACE scores were more likely to have substance abuse problems and engage in violent behavior. The more childhood trauma they experienced, the more likely they were to have these issues as adults. It was pointed out by the authors, that relying fully on self-reported data and not having a fully representative sample may not be as accurate. According to Burnette et al. (2008) findings, a significant association with substance use was found between childhood trauma and violence perpetration. The researchers

found that childhood physical abuse (CPA) and childhood sexual abuse (CSA) emerged as both boosters for and predictors of violent behavior in adulthood. Specifically, while CPA significantly enhanced the odds of violence perpetration in men and women, respectively, CSA only boosted the odds among women. The evidence shows that individuals with backgrounds of trauma tend to become victims of substance use disorder which is a way of coping and in turn it leads to aggressive and violent behavior. Since there are not many studies about how childhood maltreatment can lead to substance use which in turn can lead to violent behavior, I think these few studies are very important to concentrate on because as seen, studies have indicated how childhood trauma leads to substance use as a coping strategy and, therefore, is linked with a higher propensity to become violent. The cross-sectional nature of many studies makes it challenging to determine the direction of these relationships. For example, while substance use is linked to increased violence among adolescents, it remains unclear whether substance use directly causes violent behavior or if both are outcomes of underlying trauma, so once again longitudinal design would help us understand it better.

Chapter 7

7.1 Overview of Forensic Assessment and Legal Implications (US & Estonia)

Inevitably, people who commit crimes have to eventually face legal consequences, but nowadays it is not possible to approach every crime from the same angle, meaning it is necessary to consider the degree of crime, mental state (disorders, illnesses) of the criminal and many other aspects. Since there have been more people identified with neurobehavioral impairments in forensic evaluations which have been slowly being influenced by taking into account factors such as social history, technology, testing and deeper understanding of human's neural networks and its processes (Woods et al., 2012). It feels like we are starting to increasingly recognize that brain damage can significantly affect an offender's ability to understand their actions or control their behavior. This understanding is crucial in determining how responsible criminals are for their actions and what kind of punishments are appropriate for the committed crimes (Woods et al., 2012). It is important to use the right forensic tools to assess the neurocognitive functioning process and to understand the psychological and neurobiological profile of the criminal, which can influence legal decisions and treatment plans. The first paper I plan to elaborate on, is an overview article by Marcopulos et al. (2024), diving into the important role of forensic neuropsychological assessments in both criminal and civil cases in The United States of America. The authors outline the key components of these assessments, which include:

1. Reviewing an individual's records, to gather information that provides context for the current assessment from medical records, psychological evaluations, school records, employment history, legal documents and so on. This step helps to understand the

individual's fundamental behavioral and cognitive functioning, past medical and psychological issues, and any relevant background information that might affect the current assessment.

2. Conducting clinical interviews with the examinee and additional sources (family, friends etc.), to get a better overview of the individual's history, symptoms, and experiences. One of the interview types are structured or semi-structured interviews which are conducted to explore cognitive, emotional, and behavioral issues. Another one is direct interview which provides insights into the individual’s subjective experience and which can find differences between self-reports and documented history. In this step, family members and friends are interviewed to get a better understanding of an individual's functioning across different settings and times.

3. Selecting appropriate neuropsychological tests that are relevant to the specific case and that can provide reliable and valid feedback while being scientifically approved. Selecting an appropriate test is crucial to ensure the accuracy and reliability of the assessment, especially in legal contexts where the results are to be examined. These tests usually test for attention and concentration, memory and learning, expressive and receptive language, intelligence, executive functions, problem-solving, visuospatial/visuoconstructive, and sensorimotor functioning. Memory testing has shown to be particularly important, as memory loss is a common symptom of brain injury and dysfunction. Assessments also include objective measures of personality and mood like the Beck Depression Inventory (BDI), Geriatric Depression Scale (GDS), Minnesota Multiphasic Personality Inventory, and Personality Assessment Inventory.

4. Interpreting test results, while performing the tests in a consistent way and to understand the results clearly based on the individual's history and current problems. Administering tests of attention, memory, language, intelligence, executive functions, and sensorimotor functioning. Clear and correct administration and interpretation are crucial for identifying cognitive deficits, understanding the extent and nature of any brain dysfunction, and determining the validity of the individual's performance.

5. Detecting exaggeration and malingering, to identify any attempts of individuals to exaggerate or fake any cognitive deficits. In cases like this, symptom validity tests and performance tests are used.

In criminal cases, as explained by Marcopulos et al. (2024), these assessments are used to evaluate issues related to mens rea (sanity, mitigation), competency to proceed, risk assessment, and death penalty cases which differ from civil cases. The authors empathize to consider multiple factors in assessment like cultural factors, ethical considerations and the impact of practice effects. They provide a great overview of the foundation of the forensic assessment process in the USA which aligns mostly with the ones found in Estonia (Auväärt & Jengalõtsev, 2018). Since there is a limited amount of information found about the Estonian forensic assessment process, I can draw some conclusions based on the book by Auväärt & Jengalõtsev (2018). In their book, they explain that forensic psychology examines the mental state of a psychologically healthy person but in the case of any kind of mental health conditions, and if necessary, a complex examination is ordered, involving not only the psychologist but also a psychiatric expert. Psychological expertise is described to not only be based on the person's mental state, but it is also about the individual's abilities for example to know

the law and norm and whether they are aware of them. Before the assessment process begins, the person interested in conducting the examination will agree with the psychologist on the data required for the examination which must contain information about the mental state of the individual during the act/crime and their perspective of the act/crime in as much detail as possible. It is crucial for the examination to have a certified expert in the field because oftentimes, the methodologies used in a comprehensive examination of the subject of the expertise provide only empirical material that needs to be analyzed and scientifically interpreted. All the methods used in psychology can be used as a research method for psychological expertise. If there are doubts about the validity of the expert's opinion, it is necessary to carry out a re-examination or, if necessary, even a committee examination. It is important to point out that psychological expertise is always possible, and in some cases necessary, in all types of legal proceedings: civil, criminal and others. Since the very limited information about the Estonian forensic assessment process, it is difficult to compare the two countries, and it should be pointed out that Estonia is a small country with around 1.3 million people, while the USA has an approximate population of around 330 million with understandably more criminal cases.

As seen before, forensic assessment plays an important role in criminal cases, but it has another aspect which should be considered and it is determining whether an individual is fully competent to stand trial. In this case, evaluations to determine competency are carried out to make sure that defendants understand the charges against them and can participate in their defense. Neuropsychological assessments help identify cognitive impairments that may play a role in a defendant's ability to comprehend legal proceedings or communicate effectively with their attorney (Pirelli et al., 2011). These

assessments provide the court with valuable information about the individual's mental capacity and can influence decisions regarding trial proceedings and possible accommodations (Heilbrun et al., 2002).

7.2 Legal implications and childhood trauma

Realizing how deeply childhood trauma affects brain development is becoming crucial in legal settings as I am about to discuss in this chapter. From previously touched subjects, negative childhood experiences can severely delay cognitive abilities, self-control, and decision-making which are essential considerations when determining criminal responsibility and fair sentencing (Bagaric et al., 2019; Goldenson et al., 2021; Denno, 2019). Goldenson et al. (2021) are discussing in their paper how in the United States, the consideration of childhood trauma in legal defenses has been quite inconsistent. They have pointed out that some cases in the US have recognized the effects of trauma as a mitigating factor, especially in capital sentencing hearings, but it depends widely on the situation. For instance, during these capital sentencing hearings, trauma-focused mitigation testimony has shown to significantly influence sentencing outcomes in some cases by emphasizing how adverse experiences have shaped the defendant's behavior. Denno (2019) supports this way of application by explaining that research in neurobiology and epidemiology shows that childhood abuse and adverse events can significantly raise the risk of brain dysfunction linked to criminality and violence. They completed a research where they examined 266 criminal cases to see how courts consider childhood trauma as solid evidence. It was found that childhood trauma evidence is mostly used by attorneys to get a lighter punishment for their clients but it was shown to be especially important in cases where a defendant claims their

attorney did not properly defend them, pointing out their childhood trauma, like in some death penalty cases. Despite this, their findings also indicate that courts often give attorneys too much freedom by accepting their claims of "strategic" decisions to leave out childhood trauma evidence, even when these decisions lack empirical support. However, Denno (2019) has said that in case of not having formal PTSD diagnosis from a licensed psychologist/psychiatrist, it can make the experienced trauma seem less serious in front of court, potentially disadvantaging defendants who don't quite fit into diagnostic categories but are still severly impacted by their traumatic experiences. This review underscores the importance of establishing a clear link between a defendant's childhood trauma and their adulthood criminal behavior. They empathize that attorneys who understand the long-term effect and impact of childhood trauma can present the evidence better in court for clients' benefit. This approach not only supports more nuanced legal arguments but also promotes a deeper understanding of the defendant's background which can lead to more fair legal outcomes.

7.3 Neuroimaging in Criminal Trials

At the end of the day, we need to understand what exactly makes us behave the way we do: our brains or our choices. For years already, neuroscientists have been examining this issue, and now that society and technology have reached an advanced point, we may be moving closer to a solution. The criminal justice system sets the severity of punishment for criminal behavior, while neuroscience aims to explain why people behave in certain ways. Therefore, it should come as no surprise that neuroscience has found its way into the criminal justice system. I found an interesting study by Gkotsi et al. (2019) examining the increasing use of neuroimaging techniques in criminal courts and the role of expert witnesses in presenting this evidence. The study illustrates how

neuroimaging is used to explain the defendant's behavior due to mental illness or brain injury, analyzing 27 instances from the US and Europe. While they say that the goal of neuroimaging is to "objectify" illnesses such as schizophrenia, state specialists frequently question its relevance, diagnostic efficacy, and interpretation. For example, they pointed out that there is often disagreement in the scientific community on the reliability and validity of PET scans and MRIs for diagnosing PTSD or head injury. Emphasizing that experts for the prosecution and defense can interpret neuroimaging data very differently from each other or from how it was meant to interpret, highlighting the subjective nature of this type of research. The study further underlines that, despite neuroimaging value in understanding brain activity, it can't fully prove someone guilty or not guilty beyond a reasonable doubt. Neuroimaging legal significance depends on expert interpretation, therefore how jurors and judges evaluate it and how critically they are doing it. To enhance evaluation of the data, the authors advise teaching legal professionals how to properly analyze neuroscientific evidence. Overall they mention that in order to avoid an overly theoretical perspective of behavior and to guarantee a fair and equal legal system, neuroimaging should be included in a larger spectrum of evidence which also includes elements of psychological, sociological, and economic aspects. Hardcastle and Lamb (2018) further investigate the use of neuroimaging evidence in criminal proceedings. In their study they address concerns that colorful brain scans could unfairly influence juries and judges, giving the impression that the evidence is more trustworthy than it actually is, naming it a phenomenon known as the "Christmas tree effect." Through their analysis of multiple appellate decisions from October 2015 to April 2016, they discovered that although the usage of brain imaging data is growing, it is still quite uncommon and has no effect on the outcome of court

cases, showing that behavioral evidence is continuously more trusted by juries and judges, and prior case law sometimes having a greater influence on legal decisions than empirical evidence. According to Roache (2014) and Morse (2014) works, there has been much discussion over the use of neuroimaging evidence in criminal courts. In Roache's analysis where they walked about the use of neuroimaging to support defendants' claims of lower moral responsibility, note that while this type of evidence can impact court decisions, the underlying neuroscience is still in its early stages and open to many different ways of interpretations. They highlight that demonstrating criminal impunity while using brain scans raises both scientific and philosophical issues regarding the connection between free will and brain activity. According to Roache, moral responsibility is not always reduced by differences in brain function between criminals and non-criminals. They emphasize the need for a thorough understanding of brain activity that is consistent with free will, which seems to be currently lacking. According to Morse's study, neuroscience focuses on how mechanisms work, which differs from the psychological standards of law, making it difficult for neurotechnological evidence to demonstrate its legal relevance. They believe that most neuroscientific discoveries are correlative rather than causal, and that the field is still in its very early steps, especially its functions to legal issues. To draw attention to exaggerated claims about the importance of neuroscience in legal terms/settings, Morse presented the idea of "brain overclaim syndrome" (BOS). They emphasize that although neuroimaging can be the start to shed light on how the brain functions, it cannot directly address issues of competence and accountability in the legal and criminal system. Roache and Morse both seem to agree that the state of neuroscience today is not as good for providing solid evidence in court. In order to appropriately assess whether a criminal

is guilty or not, they both emphasize the need for subjective interpretation of neuroimaging data and the necessity to take sociological, psychological, and economic elements into account. Their areas of emphasis however differ slightly: Morse seems to be more concerned with the practical legal implications and the dangers of relying too much on neuroimaging evidence without adequate behavioral context, whereas Roache seems to be more focused on the philosophical/theoretical implications and the need to include philosophical insights into neuroscientific interpretations.

Chapter 8

8.1 Programs for Children with trauma

Children who experience abuse and trauma often experience profound and lasting effects (Bowlby, 1969), making it necessary to carry out therapies that suit their specific needs. I found a number of evidence-based therapies, each having pros and cons, that have been created to assist in the rehabilitation of abused and traumatized children, like Child and Family Traumatic Stress Intervention (CFTSI), Trauma-Focused Cognitive Behavioral Therapy (TF-CBT), and Trust-Based Relational Intervention (TBRI). To start off with TF-CBT, Cohen et al. (2012) explain that there are three steps to the evidence-based treatment for child trauma, which is designed for both parents and children. During the first phase, children are gradually, step-by-step being reminded of their trauma, while also on the same step focusing on building skills and getting support from their parents. This treamtent's goal is to also work on increasing their emotional and behavioral self-regulation. In order to make the exposure work more accurately, children need to describe and cognitively analyze their trauma experiences during the second part of the programme which is called Trauma Narrative (TN). The last step of the treatment, the closure stage, is focused on future safety planning and collaborative sessions between caregivers and children, meaning also that this stage usually is the combination of all the previous stages as well. It was found by Cohen et al. (2012) that TF-CBT has been effective in reducing trauma symptoms and improving overall functioning in children exposed to abuse and other traumatic events. This finding is supported by another study by Deblinger et al. (2006), indicating that TF-CBT significantly reduces PTSD, depression, and behavioral problems in children. Cohen et

al. (2004) in their earlier study found TF-CBT to be effective in treating sexually abused children, showing results in significant reduction of PTSD symptoms and improvement of overall functioning.

In research, it is important to consider how these trauma therapy models affect a child's carer's participation and collaboration, as they play a crucial role in their children's recovery while having an effect on children's trauma symptoms (Hahn et al, 2019). Hahn et al. (2019) explain in their research that one mental health treatment called the child and family traumatic stress intervention (CFTSI) has shown to lower children's symptoms of trauma and, hence, lowering the likelihood that children will have developed more serious PTSD and other related disorders (Epstein et al., 2017; Hahn et al., 2015; Marans, 2013). They clarified that children aged 7 to 18 and their non-offending parents/caregivers are required to participate in the Cognitive Behavioural Therapy Screening Interview (CFTSI) in the days and weeks that follow a potentially traumatic event or the official event of physical or sexual abuse (such as in a forensic interview). They explained that there are five to eight sessions in which the programme is administered. Targeting traumatic reactions, including avoidance, intrusive symptoms, arousal changes, and detrimental cognitive alterations, is the aim of CFTSI. Another research by Berkowitz et al. (2011) demonstrated that CFTSI significantly reduces PTSD symptoms and boosts family communication, a follow-up study by Kearney et al. (2014) also highlighted the effectiveness of CFTSI in preventing chronic PTSD among young people. However, Berkowitch et al. (2011) didn't quite find which specific points in CFTSI are essential for its therapeutic effects. They claim that it is unclear if caregiver support is the central component in CFTSI or if discussion of symptoms with the patient, which may act as an imaginary exposure, are more

important. They further pointed out that the effectiveness of Behavioral Skill Modules (core mindfulness, distress tolerance, emotion regulation, interpersonal effectiveness) are also not evaluated in CFTSI. They suggest that future studies should analyze these elements to specify the model because as said, the full effectiveness of CFTSI across different trauma types remains unexplored and should be examined in future research.

Another intervention that I found to be research proven is Trust-Based Relational Intervention (Purvis et al, 2013; Howard et al, 2014; Cross et al, 2015). It was explained by Purvis et al. (2013) that TBRI is a therapeutic approach teaching carers how to effectively assist and manage children who are at-risk. At-risk, meaning for example orphanages, courts, residential treatment centers, group homes, foster and adoptive homes and schools have all used TBRI. They explain that this treatment consists of connecting, empowering, and correcting principles that assist caretakers in setting up a secure and growth supportive environment for the child's developmental needs. According to Purvis et al. (2013), TBRI helps children from difficult backgrounds to deal with attachments, to develop a healthy one and have fewer behavioral issues. A study by Howard et al. (2014) additionally explains that TBRI has shown to help traumatized children with emotional control and to improve caregiver-child interactions, being helpful for attachments. Furthermore, TBRI has shown to dramatically boost the emotional and behavioral functioning of kids who have been neglected and traumatized (Cross et al., 2015). As seen from the studies, most of them have proven that these therapies can be effective for children and their parents, but at the same time it is crucial to evaluate every situation separately and determine the focus according to every situation before landing on one certain treatment, because TF-CBT, CFTSI and TBRI are all built for slightly different goals.

8.2 Programs for Adults with trauma

Similarly to programs for children with trauma, I found three treatment programs for adults with trauma, supported by multiple studies. In this chapter I plan to explore three evidence-based interventions designed to help adults with childhood trauma: Eye Movement Desensitization and Reprocessing (EMDR), Cognitive Behavioral Therapy (CBT), and Dialectical Behavior Therapy (DBT). Starting with the study by Chen et al. (2015) where they explain that international guidelines support cognitive behavioral therapy (CBT) and eye movement desensitization and reprocessing (EMDR) for trauma victims seeking treatment for PTSD. It is interesting to point out that they emphasize in their study that adults should not take antidepressants as a treatment option unless psychological therapies are unavailable, ineffective, or the patient also has co-occurring moderate to severe depression. According to EMDR founder Shapiro (1989), this treatment helps the brain combine and in a way relive traumatic memories, using bilateral stimulation, such as taps, tones, or eye movements. In order to treat adults with PTSD resulting from childhood trauma, Boterhoven de Haan et al. (2020) compared how effective EMDR and Imagery Rescripting (ImRs) are. They discovered that there were no big differences in the effectiveness of ImRs and EMDR in terms of their ability to reduce PTSD symptoms. Therefore, according to the study's findings, EMDR and ImRs are equally beneficial in treating PTSD symptoms resulting from childhood trauma. I call it a successful research because there was a very small dropout rate and both treatments were well-tolerated among individuals .Similarly Chen et al. (2015) explored differences in EMDR and CBT in their systematic review for the treatment of PTSD in adults. A total of 424 participants from 11 randomized control trials were included in the study and the discovery stated that when it came to lowering intrusion

and arousal symptoms, EMDR was marginally more successful in reducing all PTSD symptoms than CBT. On the other hand, there was no noticeable improvement in avoidance in both of the two therapies. Because of methodological limitations and the small number of included research in their study, the authors advise taking caution when interpreting these results. Comparing Chen et al. (2015) findings to Ho & Lee (2012) systematic review, which revealed, while comparing CBT to EMDR, no significant differences between these two therapies. In contrast to CBT, EMDR had a noticeable advantage in lowering depression. Additionally, the study found that EMDR needed less homework than CBT, which may indicate that EMDR can be more effective in some situations, like for more complicated individuals for whom the homework could be a challenge. The results emphasize how crucial it is to conduct more study in order to comprehend the mechanics underlying these therapies and how homework contributes to their efficacy. From another perspective, a study where criminals and offenders were investigated, Clark (2011) results showed that CBT is effective in reducing recidivism (relapse into criminal behavior) in both juvenile and adult offenders. They emphasize how CBT assists criminals in identifying and modifying incorrect thought processes that motivate criminal behavior. The study also highlights the effectiveness of CBT in a variety of environments, such as community-based initiatives and prisons. In addition, this research shows that CBT is especially helpful for high-risk offenders and works best when paired with other forms of support like job, education, and mental health counseling.

The next treatment I found is dialectical behavior therapy (DBT) which was first created by Linehan (1993) to treat borderline personality disorder. It has since then been modified for use with people (mostly women) who are suffering from trauma-related

disorders, focusing on developing skills in mindfulness, emotion regulation, distress tolerance, and interpersonal effectiveness (Harned et al. 2014). Harned et al. (2014) have noted that DBT addresses issues in the present rather than living in the past, including trauma from the past. DBT does not often address PTSD, instead, it places a higher priority on treating purposely caused self-harm and other types of behavioral inability to have control. DBT has shown to be rather controversial, since multiple studies have shown that among self-injuring individuals with borderline personality disorder (BPD) and/or PTSD have had less improvement during DBT treatment only (Harned et al., 2008; Barnicot & Priebe, 2013). Therefore I found two studies that integrated PTSD treatment for DBT. First one is a study by Harned et al. (2014) whose goal was to treat PTSD in BPD patients who were suicidal and self-harming, creating and assessing a combined treatment plan that includes normal outpatient DBT with the DBT Prolonged Exposure (DBT PE) protocol for a year. The findings demonstrated that the combined DBT+DBT PE treatment doubled the remission rate among treatment participants (80% vs. 40%) and produced bigger and more durable reductions in PTSD symptoms than using the standard DBT treatment alone. In addition, those in the DBT+DBT PE group demonstrated noticable improvements in dissociation, trauma-related guilt cognitions, shame, anxiety, depression, and general functioning, while also being less likely to attempt suicide or self-harm. The results point out the potential effectiveness of DBT+DBT PE above DBT alone for this population only, because we can't draw conclusions on the entire population, which means that bigger sample sizes and additional study are required to validate these findings. The second study I wanna compare it to is by Bohus et al. (2020), this research examined the effectiveness of cognitive processing therapy (CPT) and DBT for PTSD (DBT-PTSD)

in the treatment of female patients diagnosed with both BPD and PTSD. They explain that DBT-PTSD is a model phase-based treatment made to address the needs of childhood abuse victims who have developed extremely complex PTSD symptoms, including symptoms of BPD. Both treatments considerably showed reduced PTSD symptoms, according to the results, however the DBT-PTSD group's benefits were more noticeable. Additionally the results showed that participants in the DBT-PTSD group had higher declines in high-risk behaviors, self-harm and dissociation after the treatment, demonstrating a higher likelihood for long-term recovery. Furthermore, in comparison to the CPT group, the DBT-PTSD group had a lower dropout rate. Though it is important to point out again that more investigation is required to validate these results and examine long-term consequences, the study indicates that DBT-PTSD may be more beneficial for this demographic.

While these studies provide a great overview of each therapy, therapy for childhood trauma and abuse must be individualized to meet the requirements of every kid and adult. Evidence-based treatments that have shown to work for children include TBRI, CFTSI, and TF-CB, but these are just a few I found the most information about. While CFTSI reduces PTSD symptoms and improves family communication, TF-CBT reduces trauma symptoms and improves general functioning, and TBRI fosters safe bonds and handles behavioral problems. Meanwhile, therapies including DBT, CBT, and EMDR are well-known for treating adults who have experienced childhood trauma. When it comes to reducing PTSD symptoms, EMDR has shown to work better than CBT, but yet again it can't be generalized to everyone since for some people CBT can show better effect. While DBT, especially when combined with prolonged exposure techniques (DBT PE), dramatically improves general functioning and PTSD symptoms, CBT helps

minimize recidivism among offenders and improves mental health outcomes. Future research should specify these therapies, explore their effectiveness across different populations, and examine long-term outcomes. Understanding the role of caregiver involvement and addressing comorbid conditions will be crucial to understand the therapy's effectiveness more deeply. Integrating insights from both child and adult trauma therapies could lead to more comprehensive treatment approaches in the future.

Conclusion and Future Directions

Summary of Key Findings and Implications for Theory, Research, and Practice

The aim of the thesis was to give a comprehensive examination of the complex connection between violent behavior, neurocognitive development, and childhood trauma. It provides a deeper understanding of how early negative experiences influence people's developmental paths, focusing on those who are more likely to engage in violent behavior, by analyzing multiple relevant research from a variety of fields. As pointed out in this thesis, multiple important works have shown that emotional, physical, and sexual abuse experienced as a kid can cause deep and complex effects on the development of neurocognition. Deficits in impulse control, mood regulation, and social cognition have been considered to be among the mentioned complex effects meaning that these abilities are vital for adaptive behavior and decision-making. As seen from research, insecure attachment styles, the formation of maladaptive coping mechanisms, and defective schemas are important psychological processes that can connect early trauma to violent crime in the future. These results also suggest that normal developmental processes have been affected by trauma, which results in long-term changes in brain structure and function, especially in regions mentioned throughout the thesis, like the prefrontal cortex, hippocampus, and amygdala. From the multiple studies that I elaborated on, I noticed that our understanding of the paths from trauma to violence can be improved by taking into account the knowledge from the fields of criminology, psychology, and neuroscience. This can mean that to take it to the next step, longitudinal research studies can be important in determining the causal linkages and long-term efficacy of various therapeutic methods. Looking from a

practical standpoint, the findings in this thesis emphasize the value of customized, research-based therapy approaches for traumatized adults and children since we have seen from the many interventions that demonstrated different levels of effectiveness in addressing symptoms related to trauma and reducing violent behavior. I talked about interventions like Dialectical Behaviour Therapy (DBT), Eye Movement Desensitisation and Reprocessing (EMDR), Child and Family Traumatic Stress Intervention (CFTSI), Trust-Based Relational Intervention (TBRI), and Trauma-Focused Cognitive Behavioural Therapy (TF-CBT) but once again, I pointed out only few of many, because of their literature relevance. Most of the findings I talked about, seem to have significant implications for social policies and practices, emphasizing how crucial it is to recognise and treat childhood trauma as soon as possible in order to prevent the occurrence of maladaptive behaviors and potential future aggressive behaviors. From the last chapter where I talked about forensic assessments and programs for adults/children, we can say that the government and practitioners should stand for more comprehensive support systems that address the needs of trauma-affected individuals, making mental health services, educational support, and community-based resources more accessible.

To further understand the relationship between childhood trauma, neurocognitive development, and violent behavior, from my knowledge from writing this thesis and from the previous researches, future research should focus on the next few things proposed:

1. Longitudinal studies: for carrying out long-term research to keep track on how childhood trauma affects the development of neurocognition and its skills and

aggressive behavior at different stages of life, helping to understand the evolution of trauma consequences and the development of how and why it happened. It is advised to include large and diverse cohorts in the future research to account for differences in experiences and results.

2. Diverse populations: like I pointed out the need for diverse populations in the previous point, it is also necessary for evaluating how effective different therapeutic approaches are on a range of individuals, including those with varying age ranges, genders (so far most of the studies are based on men), and cultural backgrounds. This will guarantee that the interventions are both culturally relevant and successful.
3. Comorbid problems: examining how the propensity to engage in violent behavior and the effectiveness of trauma interventions are influenced by co-occurring problems such as drug addiction, mental health problems and socio-economic conditions. Future research should consider a combination of approaches that take into account the interplay of these factors in influencing behavioral outcomes.
4. Mechanisms of therapy: it would be beneficial to explore the underlying mechanisms that make certain therapies effective, such as the role of emotional regulation in DBT and the specific components of EMDR that contribute to its success. Understanding these mechanisms will allow for improved treatments and the development of more targeted interventions.
5. Neurobiology: future research should focus more on neurobiology and neurocognitive development, detecting the differences between normal

population and violent offenders, while also pointing out whether any underlying mental disorders were caused by childhood trauma, brain injury etc.

It is understandable that to create a perfect study can be hard, especially with criminal populations but I believe what we can so far see, gives us a great overview of the unanswered questions and can direct the future research further.

But in that light, addressing childhood trauma is crucial in preventing and intervening in violent offending.

Bibliography

Aas, M., Steen, N. E., Agartz, I., Aminoff, S. R., Lorentzen, S., Sundet, K., Andreassen, O. A., & Melle, I. (2012). Is cognitive impairment following early life stress in severe mental disorders based on specific or general cognitive functioning? *Psychiatry Research, 198*(3), 495–500. https://doi.org/10.1016/j.psychres.2012.01.012

Abbasi, M. (2018). Examining the relationship between social learning theory and substance abuse in adolescents. *Journal of Substance Use, 23*(6), 592-599.

Afifi, T. O., MacMillan, H. L., Boyle, M., Taillieu, T., Cheung, K., & Sareen, J. (2014). Child abuse and mental disorders in Canada. Canadian Medical Association Journal, 186(9), E324–E332. https://doi.org/10.1503/cmaj.131792

Agnew, R. (1992). Foundation for a general strain theory of crime and delinquency. *Criminology, 30*(1), 47-87.

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.). Arlington, VA: American Psychiatric Association.

Anderson, C. A., & Bushman, B. J. (2002). Human Aggression. *Annual Review of Psychology*, 53, 27-51.

Assogna, F., Piras, F., & Spalletta, G. (2020). Neurobiological basis of childhood trauma and the risk for neurological deficits later in life. In G. Spalletta, D. Janiri, F. Piras, & G. Sani (Eds.), Childhood trauma in mental disorders (pp. 403-421). Cham, Switzerland: Springer. https://doi.org/10.1007/978-3-030-49414-8_18

Auväärt, A., & Jengalõtsev, A. (2018). *Forensic Psychology: Principles and Practice*. Tallinn: Tartu University Press.

Bagaric, M., Wolf, G., & Isham, P. (2019). Trauma and Sentencing: The Case for Mitigating Penalty for Childhood Physical and Sexual Abuse. *Stanford Law & Policy Review, 30*, 1.

Baglivio, M. T., Wolff, K. T., DeLisi, M., Vaughn, M. G., & Piquero, A. R. (2016). Effortful control, negative emotionality, and juvenile recidivism: An empirical test of DeLisi and Vaughn's temperament-based theory of antisocial behavior. The Journal of Forensic Psychiatry & Psychology, 27(3), 376-403. https://doi.org/10.1080/14789949.2016.1145720

Bandura, A. (1973). Aggression: A social learning analysis. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1977). *Social Learning Theory*. Englewood Cliffs, NJ: Prentice Hall.

Barnicot, K., & Priebe, S. (2013). Post-traumatic stress disorder and the outcome of dialectical behaviour therapy for borderline personality disorder. *Psychology and Psychotherapy: Theory, Research and Practice*.

Beardslee, W. R., Keller, M. B., Seifer, R., Lavori, P. W., Staley, D., Podorefsky, D., & Shera, D. (1996). Prediction of adolescent affective disorder: Effects of prior parental affective disorders and child psychopathology. Journal of the American Academy of Child & Adolescent Psychiatry, 35(3), 279-288. https://doi.org/10.1097/00004583-199603000-00008

Berkowitz, S. J., Stover, C. S., & Saxe, G. N. (2011). The Child and Family Traumatic Stress Intervention: A pilot study. *Journal of Traumatic Stress, 24*(4), 467-470.

Bertsch, K., Grothe, M., Prehn, K., et al. (2013). Brain volumes differ between diagnostic groups of violent criminal offenders. *European Archives of Psychiatry and Clinical Neuroscience, 263*(7), 593–606. https://doi.org/10.1007/s00406-013-0391-64o

Bingenheimer, J. B. (2005). Firearm violence exposure and serious violent behavior. Science, 308(5726), 1323-1326. https://doi.org/10.1126/science.1110096

Bosmans, G., Van Vlierberghe, L., Bakermans-Kranenburg, M.J. et al. A Learning Theory Approach to Attachment Theory: Exploring Clinical Applications. Clin Child Fam Psychol Rev 25, 591–612 (2022). https://doi.org/10.1007/s10567-021-00377-x

Boterhoven de Haan, K. L., Lee, C. W., Fassbinder, E., van Es, S. M., Menninga, S., Meewisse, M.-L., Rijkeboer, M., Kousemaker, M., & Arntz, A. (2020). Imagery rescripting and eye movement desensitisation and reprocessing as treatment for adults with post-traumatic stress disorder from childhood trauma: Randomised clinical trial. *The British Journal of Psychiatry*, 1–7.

Bowlby, J. (1969). Attachment and Loss: Vol. 1. Attachment. New York: Basic Books.

Bowman, B., Whitehead, K. A., & Raymond, G. (2018). Situational factors and mechanisms in pathways to violence.Psychology of Violence, 8(3), 287–292. https://doi.org/10.1037/vio0000188

Bradshaw, C. P., Rodgers, C. R. R., Ghandour, L. A., & Garbarino, J. (2009). Social-cognitive mediators of the association between community violence exposure and aggressive behavior. School Psychology Quarterly, 24(3), 199-210.

Briere, J., & Elliott, D. M. (1994). Immediate and long-term impacts of child sexual abuse. The Future of Children, 4(2), 54-69.

Briere, J. (2004). Psychological assessment of adult posttraumatic states: Phenomenology, diagnosis, and measurement (2nd ed.). Washington, DC: American Psychological Association.

Briere, J., & Scott, C. (2006). Principles of trauma therapy: A guide to symptoms, evaluation, and treatment. Sage Publications, Inc.

Brook, J. S., Brook, D. W., Arencibia-Mireles, O., Richter, L., & Whiteman, M. (2001). Risk factors for adolescent marijuana use across cultures and time. Journal of Genetic Psychology, 162(3), 357-374.

Burger, C.A. (2000). *Heterosexual context and adolescent sexual risk-taking behaviour: An explorative study in a coloured community* (Master's thesis, University of Stellenbosch)

Burnette, M. L., Ilgen, M., Frayne, S. M., Lucas, E., Mayo, J., & Weitlauf, J. C. (2008). Violence perpetration and childhood abuse among men and women in substance abuse treatment. *Journal of Substance Abuse Treatment, 35*(2), 217-222. doi:10.1016/j.jsat.2007.11.003.

Butler, T., Schofield, P. W., Knight, L., et al. (2021). Sertraline hydrochloride for reducing impulsive behaviour in male, repeat-violent offenders (ReINVEST): Protocol for a phase IV, double-blind, placebo-controlled, randomised clinical trial. BMJ Open, 11, e044656. https://doi.org/10.1136/bmjopen-2020-044656

Cauffman, E., & Steinberg, L. (2000). (Im)maturity of judgment in adolescence: Why adolescents may be less culpable than adults. Behavioral Sciences & the Law, 18, 741-760.

Chen, L., Zhang, G., Hu, M., & Liang, X. (2015). Eye Movement Desensitization and Reprocessing Versus Cognitive-Behavioral Therapy for Adult Posttraumatic Stress Disorder: Systematic Review and Meta-Analysis. *The Journal of Nervous and Mental Disease, 203*(6), 443–451.

Chester, D. S., DeWall, C. N., & Enjaian, B. (2019). Sadism and Aggressive Behavior: Inflicting Pain to Feel Pleasure. Personality and Social Psychology Bulletin, 45(8), 1252-1268.

Cicchetti, D., & Toth, S. L. (1995). A developmental psychopathology perspective on child abuse and neglect. Journal of the American Academy of Child & Adolescent Psychiatry, 34(5), 541-565.

Cicchetti, D., Rogosch, F. A., Maughan, A., Toth, S. L., & Bruce, J. (2003). False belief understanding in maltreated children. *Development and Psychopathology, 15*(4), 1067-1091

Clark, P. M. (2011). Cognitive-behavioral therapy: An evidence-based intervention for offenders. *Corrections Today, 73*(1), 62-64.

Cloitre, M., Cohen, L. R., & Koenen, K. C. (2006). Treating the trauma of childhood abuse: Therapy for the interrupted life. New York, NY: Guilford.

Cross, D. R., Purvis, K. B., & Sunshine, W. L. (2015). The importance of addressing complex trauma in schools: Implementing Trust-Based Relational Intervention in the classroom. *Journal of Child & Adolescent Trauma, 8*(3), 201-213.

Cohen, J. A., Mannarino, A. P., & Deblinger, E. (2004). Treating trauma and traumatic grief in children and adolescents. *Guildford Press*.

Cohen, J. A., Mannarino, A. P., & Deblinger, E. (2012). Trauma-focused cognitive-behavioral therapy for children and adolescents: An empirical update. *Journal of Clinical Child & Adolescent Psychology, 41*(1), 93-113.

Cowell, R. A., Cicchetti, D., Rogosch, F. A., & Toth, S. L. (2015). Childhood maltreatment and its effect on neurocognitive functioning: Timing and chronicity matter. Development and Psychopathology, 27, 521–533. doi:10.1017/S0954579415000139

Cross, D., Fani, N., Powers, A., & Bradley, B. (2017). Neurobiological development in the context of childhood trauma. *Clinical Psychology: Science and Practice, 24*(2), 111–124. https://doi.org/10.1111/cpsp.12198

Curran, E., Perra, O., Rosato, M., Ferry, F., & Leavey, G. (2021). Complex childhood trauma, gender and depression: Patterns and correlates of help-seeking and maladaptive coping. *Journal of Affective Disorders, 292*, 603-613.

De Santiago Herrero, F. J., Torres Delgado, C., & García-Mateos, M. (2017). Serial killers: Relation between childhood maltreatment and sexual relations with the victims. *European Psychiatry, 41*(S1), S585-S586. https://doi.org/10.1016/j.eurpsy.2017.01.886

Deblinger, E., Lippmann, J., & Steer, R. (2006). Treating sexually abused children and their non-offending parents: A cognitive-behavioral approach. *The Guilford Press*.

Denno, D. W. (2019). How Courts in Criminal Cases Respond to Childhood Trauma. *Marquette Law Review*, 103.

Dias, A., Sales, L., Mooren, T., Mota-Cardoso, R., & Kleber, R. (2017). Child maltreatment, revictimization and post-traumatic stress disorder among adults in a community sample. *International Journal of Clinical and Health Psychology, 17*(2), 97-106.

Díaz-Galván, K. X., Ostrosky-Shejet, F., & Romero-Rebollar, C. (2015). Cognitive and affective empathy: The role in violent behavior and psychopathy. *Revista Médica Del Hospital General De México, 78*(1), 27-35. https://doi.org/10.1016/j.hgmx.2014.11.007

Dodge, K. A., Bates, J. E., & Pettit, G. S. (1990). Mechanisms in the cycle of violence. Science, 250(4988), 1678-1683.

Dogra, T. D.; Leenaars, A. A.; Chadha, R. K.; Manju, M.; Lalwani, S.; Sood, M.; Lester, D.; Raina, A.; Behera, C. (2012). A Psychological Profile of a Serial Killer: A Case

Report. OMEGA - Journal of Death and Dying, 65(4), 299–316. doi:10.2190/OM.65.4.d

Currie, J., & Tekin, E. (2012). Understanding the Cycle. *Journal of Human Resources, 47*(2), 509–549. https://doi.org/10.3368/jhr.47.2.509

Dye, H. (2018). The impact and long-term effects of childhood trauma. Journal of Human Behavior in the Social Environment, 28(3), 381-392. https://doi.org/10.1080/10911359.2018.1435328

Epstein, C., Hahn, H., Berkowitz, S., & Marans, S. (2017). The Child and Family Traumatic Stress Intervention. In M. A. Landolt, M. Cloitre, & U. Schnyder (Eds.).Evidence-Based Treatments for Trauma Related Disorders in Children and Adolescents (pp. 145–166).

Evenden, J. (1999). Varieties of impulsivity. Psychopharmacology, 146, 348-361. https://doi.org/10.1007/PL00005481

Everett, B., & Gallop, R. (2000). *The Link Between Childhood Trauma and Mental Illness: Effective Interventions for Mental Health Professionals*. Thousand Oaks, CA: Sage Publications.

Fabricio Gama, C. M., Lima Portugal, L. C., Gonçalves, R. M., de Souza Junior, S., Vilete, L. M. P., Mendlowicz, M. V., Figueira, I., Volchan, E., David, I. A., de Oliveira, L., & Pereira, M. G. (2021). The invisible scars of emotional abuse: A common and highly harmful form of childhood maltreatment. *BMC Psychiatry, 21*, Article 156. https://doi.org/10.1186/s12888-021-03156-1

Fairchild, G., Baker, E., & Eaton, S. (2018). Hypothalamic-pituitary-adrenal axis function in children and adults with severe antisocial behavior and the impact of early adversity. Current Psychiatry Reports, 20, 84. https://doi.org/10.1007/s11920-018-0952-5

Flannery, D. J., Vazsonyi, A. T., & Waldman, I. D. (Eds.). (2007). The Cambridge handbook of violent behavior and aggression. Cambridge, UK: Cambridge University Press. https://doi.org/10.1017/CBO9780511816840.010

Fonagy, P., Steele, M., Steele, H., Higgitt, A., & Target, M. (1994). The Emanuel Miller Memorial Lecture 1992 The Theory and Practice of Resilience. *Journal of Child Psychology and Psychiatry*, 35(2), 231–257. doi:10.1111/j.1469-7610.1994.tb01160.x

Fox, B. (2017). It's nature and nurture: Integrating biology and genetics into the social learning theory of criminal behavior. *Journal of Criminal Justice, 49*, 22-31.

Gannon, T. A. (2009). Social cognition in violent and sexual offending: An overview. Psychology, Crime & Law, 15(2-3), 97-118. https://doi.org/10.1080/10683160802190822

Garofalo, C. (2022). Emotion and emotion regulation. Clinical forensic psychology (pp. 125-142). Cham, Switzerland: Palgrave Macmillan.

Garcia, M., Montalvo, I., Creus, M., Cabezas, Á., Solé, M., Algora, M. J., Moreno, I., Gutiérrez-Zotes, A., & Labad, J. (2016). Sex differences in the effect of childhood trauma on the clinical expression of early psychosis. *Comprehensive Psychiatry, 68*, 86-96.

Garofalo, C., & Velotti, P. (2017). Negative emotionality and aggression in violent offenders: The moderating role of emotion dysregulation. Journal of Criminal Justice, 51, 9-16. https://doi.org/10.1016/j.jcrimjus.2017.05.015

Gregory, S., Ffytche, D., Simmons, A., Kumari, V., Howard, M., Hodgins, S., et al. (2012). The antisocial brain: psychopathy matters: a structural MRI investigation of antisocial male violent offenders. *Arch. Gen. Psychiatry* 69, 962–972. doi: 10.1001/archgenpsychiatry.2012.222

Golden, C. J., Lashley, L. K., & Stewart, J. J. (2017). Neuropsychology of violence. In V. Van Hasselt & M. Bourke (Eds.), Handbook of behavioral criminology (pp. 167-184). Cham, Switzerland: Springer. https://doi.org/10.1007/978-3-319-61625-4_37

Goldenson, J., & Brodsky, S. L. (2021). Trauma-Focused Mitigation Testimony in Capital Sentencing Hearings. *Journal of the American Academy of Psychiatry and the Law Online*. DOI: https://doi.org/10.29158/JAAPL.210090-21

Gkotsi, G. M., Gasser, J., & Moulin, V. (2019). Neuroimaging in criminal trials and the role of psychiatrists expert witnesses: A case study. *International Journal of Law and Psychiatry, 65*, 101359.

Hahn, H., Oransky, M., Epstein, C., Stover, C., & Marans, S. (2015). Findings of an Early Intervention to Address Children's Traumatic Stress Implemented in the Child Advocacy Center Setting Following Sexual Abuse. Journal of Child & Adolescent Trauma, 9(1), 55–66. https://doi.org/10.1007/s40653-015-0059-7.

Hahn, H., Putnam, K., Epstein, C., Marans, S., & Putnam, F. (2019). Child and family traumatic stress intervention (CFTSI) reduces parental posttraumatic stress symptoms: A multi-site meta-analysis (MSMA). *Child Abuse & Neglect, 92*, 27-36. https://doi.org/10.1016/j.chiabu.2019.03.010

Hardcastle, V. G., & Lamb, E. (2018). What difference do brain images make in US criminal trials? *Journal of Evaluation in Clinical Practice, 24*(4), 909-915. https://doi.org/10.1111/jep.12932

Harned, M. S., Chapman, A. L., Dexter-Mazza, E. T., Murray, A., Comtois, K. A., & Linehan, M. M. (2008). Treating co-occurring Axis I disorders in recurrently suicidal women with borderline personality disorder: A 2-year randomized trial of dialectical behavior therapy versus community treatment by experts. Journal of Consulting and Clinical Psychology, 76(6), 1068–1075.

Harned, M. S., Korslund, K. E., & Linehan, M. M. (2014). A pilot randomized controlled trial of Dialectical Behavior Therapy with and without the Dialectical Behavior Therapy Prolonged Exposure protocol for suicidal and self-injuring women with borderline personality disorder and PTSD. *Behaviour Research and Therapy, 55*, 7–17.

Hart, S., Germain, B. & Brassard, M. (Eds) (1983) Proceedings Summary of the International Conference on Psychological Abuse of Children and Youth. Indiana University: Office for the Study of the Psychological Rights of the Child.

Heim, C., Newport, D. J., Heit, S., Graham, Y. P., Wilcox, M. M., Bonsall, R., Miller, A. H., & Nemeroff, C. B. (2000). Pituitary-adrenal and autonomic responses to stress in women after sexual and physical abuse in childhood. JAMA, 284(5), 592-597.

Jacquin, K. M. (2024). Violence. In Encyclopedia Britannica.

Heim, C., & Binder, E. B. (2012). Current research trends in early life stress and depression: Review of human studies on sensitive periods, gene–environment interactions, and epigenetics. Experimental Neurology, 233(1), 102–111. doi:10.1016/j.expneurol.2011.10.032

Heilbrun, K., Marczyk, G., & DeMatteo, D. (2002). *Forensic mental health assessment: A casebook*. Oxford University Press.

Heleniak, C., & McLaughlin, K. A. (2020). Social-cognitive mechanisms in the cycle of violence: Cognitive and affective theory of mind, and externalizing psychopathology in children and adolescents. *Development and Psychopathology, 32*(2), 735-750.

Howard, A. R. H., Parris, S. R., Nielsen, L. E., Lusk, R., Bush, K. R., Purvis, K. B., & Cross, D. R. (2014). Trust-Based Relational Intervention (TBRI) for adopted children receiving therapy in an outpatient setting. *Child Welfare, 93*(5), 47-64.

Huesmann, L. R., & Kirwil, L. (2007). Why Observing Violence Increases the Risk of Violent Behavior by the Observer. In D. Flannery, A. Vazsonyi, & I. Waldman (Eds.), *The Cambridge Handbook of Violent Behavior and Aggression* (pp. 545-570). Cambridge University Press.

Huffhines, L., Parade, S. H., Martin, S. E., et al. (2024). Early childhood trauma exposure and neurocognitive and emotional processes: Associations in young children in a partial hospital program. *Development and Psychopathology*, 1-17. https://doi.org/10.1017/S0954579424000956o

Hurlemann, R., Patin, A., Onur, O. A., Cohen, M. X., Baumgartner, T., and Metzler, S. (2010). Oxytocin enhances amygdala-dependent, socially reinforced learning and emotional empathy in humans. J. Neurosci. 30, 4999–5007. doi: 10.1523/JNEUROSCI.5538-09.2010

Jansen, J. E., Pedersen, M. B., Trauelsen, A. M., Lyse Nielsen, H.-G., Haahr, U. H., & Simonsen, E. (2016). The experience of childhood trauma and its influence on the course of illness in first-episode psychosis: A qualitative study. *The Journal of Nervous and Mental Disease, 204*(3), 210-216.

Jusyte, A., & Schönenberg, M. (2017). Impaired social cognition in violent offenders: Perceptual deficit or cognitive bias? European Archives of Psychiatry and Clinical Neuroscience, 267(3), 257-266. https://doi.org/10.1007/s00406-016-0727-0

Kearney, C. A., Wechsler, A., Kaur, H., & Lemos-Miller, A. (2014). Posttraumatic stress disorder in maltreated youth: A review of contemporary research and thought. *Clinical Child and Family Psychology Review, 17*(3), 209-232. https://doi.org/10.1007/s10567-014-0161-0

Khantzian, E. J. (1985). The self-medication hypothesis of addictive disorders: Focus on heroin and cocaine dependence. American Journal of Psychiatry, 142(11), 1259-1264.
Khantzian, E. J. (2013). Addiction as a self-regulation disorder and the role of self-medication. Addiction, 108(4), 668-669.

Khoshnood, A., & Väfors Fritz, M. (2017). Offender characteristics: A study of 23 violent offenders in Sweden. *Deviant Behavior, 38*(2), 141-153.

Kuh, D (2003). Life course epidemiology. Journal of Epidemiology & Community Health, 57(10), 778–783. doi:10.1136/jech.57.10.778

Krueger, R. F., Hicks, B. M., Patrick, C. J., Carlson, S. R., Iacono, W. G., & McGue, M. (2002). Etiologic connections among substance dependence, antisocial behavior and personality: Modeling the externalizing spectrum. Journal of Abnormal Psychology, 111, 411-424.

Lang, A. J., Rodgers, C. S., & Lebeck, M. M. (2014). Associations between childhood maltreatment and psychological adjustment: Evidence from a community sample of women. Journal of Interpersonal Violence, 29(4), 676–698. https://doi.org/10.1177/0886260513505708

Lansford, J. E., Godwin, J., McMahon, R. J., Crowley, M., Pettit, G. S., Bates, J. E., Coie, J. D., & Dodge, K. A. (2021). Early physical abuse and adult outcomes. *Pediatrics, 147*(1), e20200873. https://doi.org/10.1542/peds.2020-0873

LeDoux, J. E. (1992). Emotion and amygdala. In The amygdala: Neurobiological aspects of emotion, memory, and mental dysfunction (pp. 23-50). New York, NY:

Levenson, J., & Grady, M. (2015). Childhood Adversity, Substance Abuse, and Violence: Implications for Trauma-Informed Social Work Practice. Journal of Social Work Practice in the Addictions, 16(1–2), 24–45. https://doi.org/10.1080/1533256X.2016.1150853

Linehan, M. M. (1993). Cognitive-behavioral treatment of borderline personality disorder. Guilford Press.

Lishak, V., Scott, K. L., Dyson, A., & Milovanov, A. (2019). General criminality as a marker of heterogeneity in domestically violent men: Differences in trauma history, psychopathology, neurocognitive functioning, and psychophysiology. *Journal of Interpersonal Violence, 36*(17-18), NP9623-NP9648.

Maguire, S. A., Williams, B., Naughton, A. M., Cowley, L. E., Tempest, V., Mann, M. K., Teague, M., & Kemp, A. M. (2015). A systematic review of the emotional, behavioral and cognitive features exhibited by school-aged children experiencing neglect or emotional abuse. *Child: Care, Health and Development*. https://doi.org/10.1111/cch.12227

Majer, M., Nater, U.M., Lin, J.M.S. et al. Association of childhood trauma with cognitive function in healthy adults: a pilot study. BMC Neurol 10, 61 (2010). https://doi.org/10.1186/1471-2377-10-61

Marans, S. (2013). Phenomena of childhood trauma and expanding approaches to early intervention. International Journal of Applied Psychoanalytic Studies, 10(3), 247–266. https://doi.org/10.1002/aps.1369.

Marcopulos, B. A., Kaufmann, P., & Patel, A. C. (2024). Forensic neuropsychological assessment. *Behavioral Sciences & the Law*. First published: 07 April 2024. https://doi.org/10.1002/bsl.2656

Marono, A. J., Reid, S., Yaksic, E., & Keatley, D. A. (2020). A behaviour sequence analysis of serial killers' lives: From childhood abuse to methods of murder. *Psychiatry, Psychology and Law, 27*(1), 126-137.

Marsh, A. A., Finger, E. C., Fowler, K. A., Jurkowitz, I. T. N., Schechter, J. C., Yu, H. H., Pine, D. S., & Blair, R. J. R. (2011). Reduced amygdala–orbitofrontal connectivity during moral judgments in youths with disruptive behavior disorders and psychopathic traits. *Psychiatry Research: Neuroimaging, 194*(3), 279-286. https://doi.org/10.1016/j.pscychresns.2011.06.015

Mason, J. W., Giller, E. L., Kosten, T. R., Ostroff, R. B., & Podd, L. (1986). Urinary free-cortisol levels in posttraumatic stress disorder patients. Journal of Nervous and Mental Disease, 174(3), 145-149.

McCloskey, L. A., & Lichter, E. L. (2003). The contribution of marital violence to adolescent aggression across different relationships. Journal of Interpersonal Violence, 18(4), 390-412. https://doi.org/10.1177/0886260503251179

McCrory, E., De Brito, S. A., & Viding, E. (2011). The impact of childhood maltreatment: A review of neurobiological and genetic factors. Frontiers in Psychiatry, 2, 48.

Miller, N. E., & Dollard, J. (1941). Social learning and imitation. New Haven, CT: Yale University Press.

Mitchell, H., & Aamodt, M.G. (2005). The incidence of child abuse in serial killers. Journal of Police and Criminal Psychology, 20(1), 40–47. doi: 10.1007/BF02806705

Mehta, M. A., Golembo, N. I., Nosarti, C., Colvert, E., Mota, A., Williams, S. C. R., Rutter, M., and Sonuga-Barke, E. J. S. (2009). Amygdala, hippocampal and corpus callosum size following severe early institutional deprivation: the English and Romanian Adoptees Study Pilot. *J. Child. Psychol. Psychiatry* 50, 943–951.

Mersky, J. P., Topitzes, J., & Reynolds, A. J. (2012). Unsafe at any age: Linking childhood and adolescent maltreatment to delinquency and crime. Journal of Research in Crime and Delinquency, 49(2), 295-318. https://doi.org/10.1177/0022427811415284

Monahan, K. C., King, K. M., Shulman, E. P., Cauffman, E., & Chassin, L. (2015). The effects of violence exposure on the development of impulse control and future orientation across adolescence and early adulthood: Time-specific and generalized

effects in a sample of juvenile offenders. Development and Psychopathology, 27(4pt1), 1267-1283. https://doi.org/10.1017/S0954579414001394

Monahan, K. C., Steinberg, L., Cauffman, E., & Mulvey, E. P. (2009). Trajectories of antisocial behavior and psychosocial maturity from adolescence to young adulthood. Developmental Psychology, 45, 1654-1668.

Montagne, B., van Honk, J., Kessels, R. P., Frigerio, E., Burt, M., van Zandvoort, M. J., & de Haan, E. H. (2005). Reduced efficiency in recognising fear in subjects scoring high on psychopathic personality characteristics. Personality and Individual Differences, 38(5), 1105-1116.

Morgan, C. A. III, Southwick, S., Steffian, G., Hazlett, G. A., & Loftus, E. F. (2013). Misinformation can influence memory for recently experienced, highly stressful events. International Journal of Law and Psychiatry, 36(1), 11–17. https://doi.org/10.1016/j.ijlp.2012.11.002

Morse, S. J. (2014). Brain Imaging in the Courtroom: The Quest for Legal Relevance. *AJOB Neuroscience, 5*(2), 24-27.

Nadel, L. (1992). Multiple memory systems: What and why. Journal of Cognitive Neuroscience, 4, 179-188.

Navas-Martínez, M.J., León, S.P. & Cano-Lozano, M.C. Mediating Effects of Insecure Parental Attachment on the Relationship Between Direct and Vicarious Family Victimization and Child-to-Parent Violence. J Fam Viol (2023). https://doi.org/10.1007/s10896-023-00649-w

Nascivera, N., Annunziato, T., Messina, M., Di Leva, A., Letterese, M., and Alfano, Y. M. (2019). Il grado zero dell'empatia: capacità empatiche e correlate neurali nella psicopatia. Phenom. J. 1, 76–82. doi: 10.32069/pj.2019.1.49

Neylan, T. C., Brunet, A., Pole, N., Best, S. R., Metzler, T. J., Yehuda, R., & Marmar, C. R. (2005). PTSD symptoms predict waking salivary cortisol levels in police officers. Psychoneuroendocrinology, 30(4), 373-381. https://doi.org/10.1016/j.psyneuen.2004.10.005

Nicolson, N. A. (2004). Childhood parental loss and cortisol levels in adult men. Psychoneuroendocrinology, 29(8), 1012-1018.

Nicholson, J., & Higgins, G. E. (2017). Social Structure Social Learning Theory: Preventing Crime and Violence. In *Preventing Crime and Violence* (pp. 25-42).

Nye, R. D. (1996). Three psychologies: Perspectives from Freud, Skinner, and Rogers (4th ed.). Pacific Grove, CA: Brooks/Cole Publishing Company.

O'Hagan,K. (1993) Emotional and Psychological Abuse of Children. Buckingham: Open University Press.

Peltonen, K., Ellonen, N., Pitkänen, J., et al. (2020). Trauma and violent offending among adolescents: a birth cohort study. *Journal of Epidemiology & Community Health*, 74, 845-850.

Perry, B. D., & Pollard, R. (1998). Homeostasis, stress, trauma, and adaptation: A neurodevelopmental view of childhood trauma. Child and Adolescent Psychiatric Clinics of North America, 7(1), 33-51.

Pirelli, G., Gottdiener, W. H., & Zapf, P. A. (2011). A meta-analytic review of competency to stand trial research. *Psychology, Public Policy, and Law*, 17(1), 1-53.

Pitman, R. K., & Orr, S. P. (1990). Twenty-four hour urinary cortisol and catecholamine excretion in combat-related posttraumatic stress disorder. Biological Psychiatry, 27(2), 245-247.

Polaschek, D. L. L. (2019). The Psychology of Violent Offending. In D. L. L. Polaschek, A. Day, & C. R. Hollin (Eds.), *The Psychology of Violent Offending* (Chapter 12). Wiley.

Popma, A., Jansen, L. M., Vermeiren, R., Steiner, H., Raine, A., Van Goozen, S. H., et al. (2006). Hypothalamus-pituitary-adrenal axis and autonomic activity during stress in delinquent male adolescents and controls. Psychoneuroendocrinology, 31(8), 948-957.

Putnam, F. W. (1997). Dissociation in Children and Adolescents: A Developmental Perspective. New York: Guilford Press.

Purvis, K. B., Cross, D. R., Dansereau, D. F., & Parris, S. R. (2013). Trust-Based Relational Intervention (TBRI): A systemic approach to complex developmental trauma. *Child & Adolescent Social Work Journal, 30*(4), 360-386. https://doi.org/10.1080/0145935X.2013.859906

Raine, A. (2013). *The anatomy of violence: The biological roots of crime.* New York, NY: Pantheon/Random House.

Roache, R. (2014). Can Brain Scans Prove Criminals Unaccountable? *AJOB Neuroscience, 5*(2), 35-37.

Rogers, L. P. W., Robertson, J., Marriott, M., & Belmonte, M. K. (2018). Social cognition in intellectually disabled male criminal offenders: A deficit in affect perception? *Journal of Intellectual Disabilities and Offending Behaviour*.

Ross, C. A. (2007). Borderline personality disorder and dissociation. Journal of Trauma & Dissociation, 8(1), 71–80.

Sachs-Ericsson, N., Cromer, K., Hernandez, A., & Kendall-Tackett, K. (2014). Review of childhood abuse, health, and pain-related problems: The role of psychiatric disorders and current life stress. (pp. 62-81). Routledge.

Saladino, V., Lin, H., Zamparelli, E., & Verrastro, V. (2021). Neuroscience, Empathy, and Violent Crime in an Incarcerated Population: A Narrative Review. *Frontiers in Psychology*, 12, 694212. https://doi.org/10.3389/fpsyg.2021.694212

Séguin, J. R., Sylvers, P., & Lilienfeld, S. O. (2007). The neuropsychology of violence. In D. J. Flannery, A. T. Vazsonyi, & I. D. Waldman (Eds.), The Cambridge handbook of violent behavior and aggression (pp. 187-214). Cambridge, UK: Cambridge University Press. https://doi.org/10.1017/CBO9780511816840.010

Shapiro, F. (1989). Eye movement desensitization: A new treatment for post-traumatic stress disorder. *Journal of Behavior Therapy and Experimental Psychiatry, 20*(3), 211-217.

Shaw, M., Strother, S., McFarlane, A., Morris, P., Anderson, J., Clark, R., et al. (2002). Abnormal functional connectivity in posttraumatic stress disorder. Neuroimage, 15, 661-674.

Shamay-Tsoory, S. G., Tomer, R., Berger, B. D., & Aharon-Peretz, J. (2003). Characterization of Empathy Deficits following Prefrontal Brain Damage: The Role of the Right Ventromedial Prefrontal Cortex. *Journal of Cognitive Neuroscience, 15*(3), 324–337. https://doi.org/10.1162/089892903321593063

Schenkel, L. S., Spaulding, W. D., DiLillo, D., & Silverstein, S. M. (2005). Histories of childhood maltreatment in schizophrenia: Relationships with premorbid functioning, symptomatology, and cognitive deficits. *Schizophrenia Research, 76*(2–3), 273–286. https://doi.org/10.1016/j.schres.2005.03.001

Schiltz, K., Witzel, J., Northoff, G., et al. (2007). Brain Pathology in Pedophilic Offenders: Evidence of Volume Reduction in the Right Amygdala and Related Diencephalic Structures. *Archives of General Psychiatry, 64*(6), 737–746. https://doi.org/10.1001/archpsyc.64.6.737

Sideli, L., Fisher, H. L., Russo, M., Murray, R. M., Stilo, S. A., Wiffen, B. D. R., O'Connor, J. A., Falcone, M. A., Pintore, S. M., Ferraro, L., Mule', A., La Barbera, D., Morgan, C., & Di Forti, M. (2013). Failure to find association between childhood abuse and cognition in first-episode psychosis patients. *European Psychiatry, 29*(1), 32–35. https://doi.org/10.1016/j.eurpsy.2013.02.0

Simons, D. A., Wurtele, S. K., & Durham, R. L. (2008). Developmental experiences of child sexual abusers and rapists. Child Abuse & Neglect, 32(5), 549–560. https://doi.org/10.1016/j.chiabu.2007.03.027

Smith, S. M., & Vale, W. W. (2006). The role of the hypothalamic-pituitary-adrenal axis in neuroendocrine responses to stress. Dialogues in Clinical Neuroscience, 8(4), 383-395. https://doi.org/10.31887/DCNS.2006.8.4/ssmith

Souza, M. L. P. (2016). Narrativas indígenas sobre suicídio no Alto Rio Negro, Brasil: tecendo sentidos. Saúde e Sociedade, 25(1), 145-159.

Spatz Widom, C., Marmorstein, N. R., & Raskin White, H. (2006). Childhood victimization and illicit drug use in middle adulthood. *Psychology of Addictive Behaviors, 20*(4), 394-403.

Spatz Widom, C. (2014). Varieties of Violent Behavior. *Criminology, 52*(3), 405-433.

Squire, L. R., & Zola-Morgan, S. (1991). The medial temporal lobe memory system. Science, 253(5026), 1380-1386.

Stadler, C., Kroeger, A., Weyers, P., Grasmann, D., Horschinek, M., Freitag, C., et al. (2011). Cortisol reactivity in boys with attention-deficit/hyperactivity disorder and disruptive behavior problems: The impact of callous unemotional traits. Psychiatry Research, 187(1-2), 204-209.

Teicher, M. H., Andersen, S. L., Polcari, A., Anderson, C. M., Navalta, C. P., & Kim, D. M. (2003). The neurobiological consequences of early stress and childhood maltreatment. Neuroscience & Biobehavioral Reviews, 27(1-2), 33-44.

Thompson, A. E.; Kaplan, C. A. (1996). Childhood emotional abuse. The British Journal of Psychiatry, 168(2), 143–148. doi:10.1192/bjp.168.2.143

Thompson, R. A. (2006). Nurturing future generations: Promoting resilience in children and adolescents through social, emotional and cognitive skills. New York, NY: Routledge.

Tonnaer, F., Siep, N., van Zutphen, L. et al. Anger provocation in violent offenders leads to emotion dysregulation. Sci Rep 7, 3583 (2017).

Tottenham, N., Hare, T. A., Quinn, B. T., Mccarry, T. W., Nurse, M., Gilhooly, T., Millner, A., Galvan, A., Davidson, M. C., Eigsti, I. M., Thomas, K. M., Freed, P. J., Booma, E. S., Gunnar, M. R., Altemus, M., Aronson, J., and Casey, B. J. (2010). Prolonged institutional rearing is associated with atypically large amygdala volume and difficulties in emotion regulation. *Dev. Sci.* 13, 46–61.

Tomoda, A., Nishitani, S., Takiguchi, S., et al. (2024). The neurobiological effects of childhood maltreatment on brain structure, function, and attachment. European Archives of Psychiatry and Clinical Neuroscience. https://doi.org/10.1007/s00406-024-01779-y

van der Kolk, B. A. (2003). The neurobiology of childhood trauma and abuse. Child and Adolescent Psychiatric Clinics of North America, 12(2), 293-317.

van der Kolk, B. A. (2005). Developmental trauma disorder: Towards a rational diagnosis for children with complex trauma histories. Psychiatric Annals, 35(5), 401-408.

van der Kolk, B. A. (2014). The body keeps the score: Brain, mind, and body in the healing of trauma. New York, NY: Viking.

Vaskinn, A., Rokicki, J., Bell, C., Tesli, N., Bang, N., Hjell, G., Fischer-Vieler, T., Haukvik, U. K., Friestad, C. (2024). Violent offending in males with or without schizophrenia: A role for social cognition? *Schizophrenia Bulletin, 50*(3), 663-672.

Vargas, T., Lam, P. H., Azis, M., Osborne, K. J., Lieberman, A., & Mittal, V. A. (2019). Childhood trauma and neurocognition in adults with psychotic disorders: A systematic review and meta-analysis. *Schizophrenia Bulletin, 45*(6), 1195–1208. https://doi.org/10.1093/schbul/sby150

Viding, E., Sebastian, C. L., Dadds, M. R., Lockwood, P. L., Cecil, C. A., De Brito, S. A., & McCrory, E. J. (2012). Amygdala response to preattentive masked fear in children with conduct problems: The role of callous-unemotional traits. American Journal of Psychiatry, 169, 1109-1116.

Walters, G. D. (2022). Crime and social cognition: A meta-analytic review of the developmental roots of adult criminal thinking. Journal of Experimental Criminology, 18, 183-207. https://doi.org/10.1007/s11292-020-09435-w

White, S. F., Williams, W. C., Brislin, S. J., Sinclair, S., Blair, K. S., Fowler, K. A., Pine, D., Pope, K., & Blair, R. J. (2012). Reduced activity within the dorsal endogenous orienting of attention network to fearful expressions in youth with disruptive behavior disorders and psychopathic traits. Development and Psychopathology, 24, 1105-1116.

Widom, C. S. (1989). The cycle of violence. Science, 244(4901), 160-166. https://doi.org/10.1126/science.2704995

Woods, G. W., Freedman, D., & Greenspan, S. (2012). Neurobehavioral assessment in forensic practice. *International Journal of Law and Psychiatry, 35*(5–6), 432-439. Available online 9 October 2012.

Wyatt, Gail E.; Newcomb, Michael D. (1990). Internal and external mediators of women's sexual abuse in childhood.. Journal of Consulting and Clinical Psychology, 58(6), 758–767. doi:10.1037/0022-006x.58.6.758

Xiao, Z., Baldwin, M. M., Meinck, F., Obsuth, I., & Murray, A. L. (2021). The impact of childhood psychological maltreatment on mental health outcomes in adulthood: A protocol for a systematic review and meta-analysis. *Systematic Reviews, 10*, Article 224. https://doi.org/10.1186/s13643-021-01738-1

Xie, P., Wu, K., Zheng, Y., Guo, Y., Yang, Y., He, J., Ding, Y., & Peng, H. (2013). Psychological adjustment in Chinese women reporting childhood abuse: An exploratory study. Journal of Interpersonal Violence, 28(17), 3528-3550. https://doi.org/10.1177/0886260513499364

Xie, P., Wu, K., Zheng, Y., Guo, Y., Yang, Y., He, J., Ding, Y., & Peng, H. (2018). Prevalence of childhood trauma and correlations between childhood trauma, suicidal ideation, and social support in patients with depression, bipolar disorder, and schizophrenia in southern China.

Yang, Y., Raine, A., Narr, K. L., Colletti, P., & Toga, A. W. (2009). Localization of Deformations Within the Amygdala in Individuals With Psychopathy. *Archives of General Psychiatry, 66*(9), 986–994. https://doi.org/10.1001/archgenpsychiatry.2009.110

Young, E. A., Tolman, R., Witkowski, K., & Kaplan, G. (2004). Salivary cortisol and posttraumatic stress disorder in a low-income community sample of women. Biological Psychiatry, 55(6), 621-626.

Young, J. E., Klosko, J. S., & Weishaar, M. E. (2003). Schema therapy: A practitioner's guide. New York, NY: Guilford Press.

Zhang, S., Lin, X., Liu, J., Pan, Y., Zeng, X., Chen, F., & Wu, J. (2020). Prevalence of childhood trauma measured by the short form of the Childhood Trauma Questionnaire in people with substance use disorder: A meta-analysis. *Psychiatry Research, 294*, 113524.

Fries, A. B. W.; Ziegler, T. E.; Kurian, J. R.; Jacoris, S.; Pollak, S. D. (2005). *From The Cover: Early experience in humans is associated with changes in neuropeptides critical for regulating social behavior. Proceedings of the National Academy of Sciences, 102(47), 17237–17240.* doi:10.1073/pnas.0504767102