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The psychological and physiological sequel of child maltreatment: A forensic perspective

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ABSTRACT

Background: It has long been recognized that sustained or repeated child maltreatment has lasting psychological and emotional effects on the victims. This has helped to inform the criminal and civil justice systems how best to deal with perpetrators of abuse, as well social and health services when treating the victims. However, what is generally less well recognized is that physical and emotional abuse has a lasting and potentially non-reversible effect on brain function.

Methods: We conducted a literature review on the forensic, mental, psychological, and pathophysiological impact of child maltreatment and discuss the implications of child maltreatment as a potential mitigating factor in criminal court in cases where victims of abuse become perpetrators themselves.

Findings: Repeated exposure to traumatic experiences changes the responsiveness in the hypothalamus-pituitary-adrenal axis with lasting consequences in the developing brain for structures, such as the hippocampus and amygdala. These physiological changes are thought to cause a range of mental disorders, which are associated with poor affect regulation, anxiety, depression, and substance abuse.

Conclusions: The importance of developing our understanding of the long-term effects of child abuse and neglect cannot be overestimated as the result of child maltreatment will perpetrate criminal acts since offenders have higher rates of mental illness than the general community.

1. Child maltreatment

The term 'child maltreatment' (CM) covers a number of actions, or inactions, on the part of a caregiver. These include, physical, sexual, and emotional abuse, as well as physical and emotional neglect (Leeb, Paulozzi, Melanson, Simon, & Arias, 2007; Schury & Kolassa, 2012). The current literature review explores the forensic, mental, psychological, and pathophysiological impact of CM and discusses whether CM should be considered a mitigating factor in criminal court in cases where victims of CM become perpetrator themselves.

In terms of determining who is perpetrating CM, official statistics are limited to including only those cases reported to departments responsible for child protection, it is therefore likely that the true extent of abuse and neglect are understated. As an example, according to data provided by the Australia Government, in 2012–2013, 135,139 children received child protection services. Of these, 91,370 were subject to investigations, 40,571 of which were substantiated,[1] 44,136 unsubstantiated, and 6,663 remained open or had no possible outcome. Approximately 40,500 children were the subjects of substantiated abuse or neglect cases. This represents around 1 in every 128 children aged between 0–17 years, with children under 1 year of age being most at risk (14.4 in every 1000 children) (Australian Institute of Health & Welfare, 2014).

Sexual abuse is another form of serious child abuse, and we are only now beginning to get a clearer picture on how widespread child sexual abuse (CSA) is. Because of the covert nature of this activity, obtaining accurate data is very problematic; however around 10% of victims of substantiated maltreatment will have suffered sexual abuse. Children who have experienced sexual abuse are more likely to have experienced another form of abuse (Bravehearts, 2012). Research indicates that over 70% of victims do not disclose for at least 12 months (Children's Bureau, 2012), 45% for at least 5 years, and many never disclose the

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[1] A report will be substantiated if there is sufficient reason to believe that a child has been, is being, or is likely to be, abused, neglected or otherwise harmed (Australian Institute of Health & Welfare, 2014).

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abuse (Bravehearts, 2012).

Emotional abuse and psychological harm can be difficult to demonstrate, as there is often no physical evidence to substantiate that abuse is taking place; however it is thought to represent around 10% of total CM cases (Children's Bureau, 2012). Often people underestimate the damage that can be done by emotional or psychological abuse; however, persistent and excessive criticism, intimidatory or threatening behaviour, exposure to domestic violence, or the withholding of affection can all have very significant and long-term consequences for a child or young person (Australian Institute of Health & Welfare, 2014). Emotional abuse and neglect is thought to be the most common form of child abuse, and comprises the most common primary type of substantiated abuse, and were also the most likely to co-occur, with an average occurrence of 27% of substantiated reports.

Neglect represents the most common type of child abuse in Westernized world. Of the substantiated cases of CM, around 75% comprise of neglect.

1.1. The link between child abuse and crime

CM has been clearly established to have life-long adverse consequences for the survivors, including implications for their health, social interaction, and behavioural problems (Fang, Brown, Florence, & Mercy, 2012). Previous research has established a link between CM and adult criminality and violent behaviour (Fang & Corso, 2007). One study suggesting that "*being abused or neglected as a child increased the likelihood of arrest as a juvenile by 59%, as an adult by 28%, and for a violent crime by 30%*" (Widom & Maxfield, 2001).

The majority of the work looking at child abuse and neglect victims and the effects of that victimization in adulthood have focused on child sexual abuse, seen as the most impactful form of abuse. There is a common misconception that all sexual offenders were themselves victims of child sexual abuse. Whilst this is not the case, the literature does suggest that there is a high proportion of offender and victim population groups report a history of CSA. One study that assessed the linkages between victimization as a child and 1) re-victimization as an adult, and 2) victims of CSA becoming offenders in adulthood. The results showed that CSA victims were 1.43 times more likely to come into contact with the police, either as a victim or perpetrator of a crime. The study also showed that 2124 of 2759 (77%) of CSA victims with a medically confirmed CSA did not have a criminal record compared to 835 individuals (23%) who had a severe criminal history. Importantly, CSA victims, both male and female, were almost five times more likely to be charged with all types of offences, with the strongest correlations being for sexual offences and violent offences. Mental illness was found to increase offending rates by more then three times. The magnitude of the effects on the general populace cannot be overestimated, as the CSA victims in this study were also more likely to commit murder – the most serious criminal offence of all. Four of the victims of CSA went on to commit murder, whilst none in the control of non-abused victims were convicted for this crime. Although the sample size limits extrapolation, if we consider, for instance, that two murders per 100,000 persons in the Australian population is expected, the results here suggest that CSA victims may account for approximately 145 murders per 100,000 while female CSA victims are as likely as their male counterparts to commit murder (Cutajar, Ogloff, & Mullen, 2011).

Whilst it can be concluded that the majority of abuse victims do not perpetuate the cycle into adulthood, both male and female victims (including victims of CSA) are more likely than non-abused members of the population to be both victims and offenders of a range of criminal offences, including violent and sexual offences.

2. Psychological mechanisms of abuse

The physical mechanisms of trauma are clear, and their physical effects can be permanent, especially if medical help is not sought. The psychological mechanisms of abuse that lead to psychological harm are more difficult to identify and qualify, and different forms of abuse will have different physiological affects on the victim. There are common physical and emotional signs that a child may exhibit, although an individual's response and the specific context of the abuse will affect the presentation of trauma-related symptoms.

For example, in CSA cases, the victim can suffer feelings of guilt, fear, confusion, and love. If a parent is the abuser, children will often not report because they do not want the family to be broken up, or fear reprisals if they are not believed. In cases where very young children are abused they are unable to protect themselves or report the abuse, and if it continues, this may even become "normal" behaviour. Psychological abuse can make children withdrawn, depressed, angry, violent, and suicidal. All of the abuse types can lead to relationship problems as adults, issues of trust, alcohol and drug-dependency, and problems with depression and criminality.

Until recently, the academic – and legal – community has largely ignored the effects of negative childhood experiences. This has become problematic in terms of offenders who were victimized as children seeking and receiving fair treatment if they come into contact with the criminal justice system. A 2012 study suggests that various mechanisms of CM lead to an increased risk of victims suffering multiple psychiatric diagnoses, and that CM may increase vulnerability to various psychiatric disorders. The authors argue that our delayed focus on childhood may have profound implications for recovery (Keyes et al., 2012). This, in turn, may be supporting the cycle of victim becoming offender as research has shown that offenders have higher rates of mental illness than the general community highlighting a fundamental problem – the over-representation of the mentally ill in the criminal justice system (Ogloff, Davis, Rivers, & Ross, 2007).

2.1. Mental illness as a consequence of childhood trauma

It is unequivocally accepted that CM affects the victim's mental health. There also appears to be a differential pattern of conditions associated with the child's age when the abuse took place, the duration and nature of maltreatment, and its severity. Conditions linked to affect dysregulation and poor impulse control are common. These include childhood disorders of anxiety, depression and sleep, intermittent explosive and oppositional defiant behaviours as well as attention-deficit hyperactivity disorder (Caffo, Forresi, & Strik Lievers, 2005). Particularly neglect at a very young age with poor parental bonding often results in conditions affecting interpersonal relationships well into adulthood thereby giving rise to personality disorders (Carr, Martins, Stingel, Lemgruber, & Juruena, 2013). Substance use, such as alcohol abuse (Brady & Back, 2012), as well as conduct disorders (Humphreys & Zeanah, 2015) are also commonly seen in adolescents and young adults as a consequence of childhood trauma. Exposure to abuse as a child has even been identified as a contributing factor for psychotic disorders, such as schizophrenia (Kraan, Velthorst, Smit, de Haan, & van der Gaag, 2015). Last but not least, there is also growing evidence for an increased risk of deliberate self-harm behaviour, suicidal ideation, and suicide attempts of victims of CM (de Kloet et al., 2011). Taken together, these sequels suggest a common pathophysiological mechanism as a consequence of childhood trauma, thus leading to a lasting change in regulatory brain function and subsequently increasing the risk of mental illness.

3. Pathophysiology of childhood trauma

Physiological changes as a consequence of psychological trauma and thereby, for instance, leading to post-traumatic stress disorder are probably better understood in adults than in children. One reason is that trauma exposure has a differential effect dependent on the stage of brain development, both in terms of vulnerabilities as well as opportunities for intervention. The human brain is highly adaptive and the

extended period of childhood of primates when compared to most other mammals is evidence for the importance of environmental factors guiding neuroplasticity when the brain matures.

At the core of a trauma experience is usually a vitally threatening and non-resolvable conflict without escape options. Crucial is that the victim *perceives* the situation as such, rather than the 'objective' characteristics of the abuse situation. Hence, the same situation can also have different consequences along with the developmental ability to comprehend the abuse situation as such, so that the understanding of what has happened may follow years after the actual abuse. This awareness of what has actually happened can further facilitate or even sometimes cause the trauma but also offers opportunities for treatment.

Little is known, however, about how brain physiology is affected at different stages of brain development, which is often due to the retrospective nature of assessing trauma data. It is particularly difficult to obtain information from a victim who was abused at an early age due to lacking the capacity to remember. The memories may also have become confounded over time. However, this does not mean that the brain's physiology will not have been permanently affected by the abusive episode/s.

Notwithstanding, most studies point to a dysregulation in the hypothalamus-pituitary-adrenal (HPA) axis, which is modulating stress response (Stetler & Miller, 2011). Human and animal studies consistently show that persistent exposure to stress or cumulative trauma alters the responsiveness of the HPA axis, such as the hypersecretion of cortisol in depressive illness that is thought to be caused by an insensitive negative feedback in the HPA axis loop, which is mediated by the corticotropin-releasing hormone receptor 1 in response to stress (de Kloet et al., 2006). Genetic and epigenetic mechanisms have been identified in the receptor-mediated stress response suggestive of a predisposition to HPA dysregulation and allowing for environmental factors to alter HPA responsiveness (see review by Ehlert, 2013).

The aforementioned physiological changes to the stress response have further lasting consequences. Lim et al. (2017) reported widespread structural abnormalities in grey matter volumes and thickness in young people with a history of childhood abuse suggestive of the impact of chronic stress on brain development. Specifically hippocampus and amygdala increase their volumes during normal brain development, particularly around pre-puberty (Uematsu et al., 2012), which makes these brain regions particularly vulnerable to maladaptation. The hippocampus is crucial for long-term memory formation. This limbic brain structure is also rich in glucocorticoid receptor, which explains its responsiveness to stress. Reduced neuronal excitability, decreased rates of neuronal genesis in dentate gyrus, and dendrite atrophy of CA3 pyramidal cells (Pawluski et al., 2012) have been identified as consequences of long-term stress exposure. As a macroscopic result, smaller hippocampal CA3 subfields have been found in adults with a history of childhood trauma (Teicher, Anderson, & Polcari, 2012). Animal research further suggests that hippocampus atrophy as a result of childhood stress is irreversible (Campbell & Macqueen, 2004).

The amygdala's primary role is storing information associated with emotional events and fear conditioning. An increased responsiveness of the amygdala to threat stimuli has been repeatedly shown for people suffering from anxiety conditions, including post-traumatic stress disorder along with macroscopic anatomical changes (Dannlowski et al., 2012). The amygdala is also involved in guiding social interactions whereby a larger amygdala volume appears to be associated with greater emotional intelligence, thereby enabling an individual greater societal integration and cooperation with others (Buchanan, Tranel, & Adolphs, 2009).

The amygdala plays a key role initiating a 'flight-versus-fight' response when facing environmental stressors. A traumatic event is particularly severe when the options 'flight' or 'fight' are not available, i.e. no escape is possible and defending is not an option, thereby creating an existential conflict for the victim. In particular, CM is often characterized by this constellation due to the perpetrator's status and role in relation to the child, such as, for instance, parent, teacher, or cleric.

4. Conclusions

CM is a major contributor to a large proportion of poor mental health in our society, and by extension a significant amount of criminal activity, as research has shown that offenders have higher rates of mental illness than the general community (Bureau of Justice Statistics, 2017; Fazel, Långström, & Hjern, 2009; Fazel, Lichtenstein, Grann, Goodwin, & Långström, 2010; Herrenkohl, Jung, Lee, & Kim, 2017; Papalia, Olgoff, & Cutajar, 2018). The scale of the problem and its impact on society have been only fairly recently acknowledged by conducting large scale inquiries and appropriately recognizing childhood abuse victims as such. We now also better understand how CM impacts on brain development by leaving lasting and potentially irreversible trauma signatures in brain structures, such as the hippocampus and the amygdala, thereby giving rise to a range of mental conditions with often lifelong consequences for individual victims of childhood abuse.

It was also the aim of our paper to raise awareness of these changes and the repercussions they may have for victims, as many victims later also become offenders. The criminal justice system in Australia already recognises that CM and other forms of trauma do affect later behaviours, which can be taken in to consideration at the time of sentencing once someone has been found guilty. At this stage, offenders can make a statement to the court, to bring the judge's attention to any past-traumas, but it is at the judge's discretion how much weight they attribute to that trauma in terms of reducing criminal culpability. However, it is by far too early to say that the physiological consequences of trauma exposure as a child should always be considered a mitigating factor in criminal court along with the psychological sequel when a victim of abuse becomes perpetrator himself or herself, as we not yet fully understand implications and long-term outcomes of CM. What can be said is that childhood trauma exposure itself is an identifiable risk factor of becoming an offender and therefore requires preventive intervention not only for the psychological consequences but also aiming to break the often generational cycle of abuse and neglect. Research to date also suggests that childhood trauma-induced damage to key brain structures involved in emotion memory and regulation, thereby guiding social interactions and enabling empathy, is the lasting physiological legacy of CM, which increases the risk of becoming child abuse offenders themselves.

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Ethics

This review did not require ethics approval.

Declaration of Competing Interest

The authors report no conflicts of interest.

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