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Chronic Developmental Trauma: Neurological and Psychological Impacts, Risk and Protective Factors, and Post-Traumatic Growth

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ABSTRACT

This review examines psychological and neurological literature regarding the long-term impacts of chronic developmental trauma and explores the risk and protective factors that influence whether survivors develop psychopathology or experience post-traumatic growth (PTG). Developmental trauma, including repeated experiences of abuse, neglect, or exposure to violence during childhood, occurs during a critical period of brain and emotional development. Research across neuroimaging studies, longitudinal designs, and systematic reviews shows that early trauma is associated with structural and functional changes in brain regions involved in emotion regulation, memory, and executive functioning, including the amygdala, hippocampus, and prefrontal cortex. These changes are linked to increased risk for anxiety, depression, substance use, psychosis, and suicidal thoughts later in life. Evidence suggests that cumulative trauma can increase vulnerability, but protective factors such as supportive relationships, meaning in life, optimism, and trauma-informed environments can reduce risk and support resilience. Research on post-traumatic growth presents more mixed findings. While some individuals report positive psychological changes following trauma, studies debate whether these changes lead to long-lasting personality transformation or coping processes that coexist with ongoing distress. Overall, the empirical literature suggests that developmental trauma increases long-term vulnerability but does not determine outcome, as environmental supports and individual factors play a significant role in shaping recovery and growth.

INTRODUCTION

Developmental trauma refers to repeated or ongoing traumatic experiences during childhood, especially those involving caregivers or close relationships, such as abuse, neglect, or exposure to violence (Fan & Kang, 2025; Copeland et al., 2018). Because childhood is a critical period for brain and emotional development, these experiences can have lasting effects on how individuals think, regulate emotions, and respond to stress later in life (Bloomfield et al., 2025; Rogerson et al., 2024). Research on emotion regulation, executive functioning, and post-traumatic growth helps explain the different ways individuals are shaped by early trauma (Henson et al., 2021; Jayawickreme & Blackie, 2014).

Earlier trauma research focused primarily on post-traumatic stress disorder in adults, but more recent studies show that trauma during childhood can alter brain development itself (Dell'Osso et al., 2022; Fan & Kang, 2025). Neuroimaging and longitudinal research have linked early trauma to structural and functional changes in brain regions involved in memory, emotional processing, and decision-making, including the amygdala, hippocampus, and prefrontal cortex (Bloomfield et al., 2025; Fan & Kang, 2025). These findings support the view that trauma is not only a short-term psychological response but a developmental issue that can affect functioning across the lifespan (Copeland et al., 2018).

Childhood trauma is also common and strongly associated with increased risk for anxiety, depression, substance use, cognitive impairment, and long-term functional difficulties (Copeland et al., 2018; Rogerson et al., 2024). Greater accumulation of traumatic experiences is linked to higher levels of psychiatric symptoms and adult impairment (Copeland et al., 2018). Because these effects can persist for years, developmental trauma remains an important focus of psychological and neurodevelopmental research (Fan & Kang, 2025).

Although many studies emphasize the risks associated with trauma, fewer examine protective factors such as supportive relationships, meaning in life, and trauma-informed environments (Bekker & Bekker, 2025; Olstad et al., 2023). In addition, research on post-traumatic growth presents mixed findings. Some studies suggest trauma can lead to positive psychological changes (Henson et al., 2021), while others question whether reported growth reflects actual personality change or coping strategies (Jayawickreme & Blackie, 2014).

This literature review examines how developmental trauma affects brain development and mental health (Bloomfield et al., 2025; Rogerson et al., 2024), what factors increase or reduce long-term risk (Copeland et al., 2018; Olstad et al., 2023), and whether trauma can contribute to post-traumatic growth (Henson et al., 2021; Jayawickreme & Blackie, 2014). The paper is organized into three sections: neurological and psychological impacts, risk and protective factors, and post-traumatic growth. Together, these sections aim to provide a clearer understanding of the long-term effects of childhood trauma and the potential for recovery.

METHODS

Searches were conducted via databases, including PsycINFO, Google Scholar, and PubMed. Searches focused on developmental trauma and its long-term neurological and psychological effects. The following keywords were used: "developmental trauma," "childhood trauma," "brain development," "executive functioning," "cumulative trauma," "adult outcomes," "trauma AND protective factors," and "post-traumatic growth AND personality change," using AND/OR to combine as needed. Studies located on the aforementioned databases, using the keywords listed above, were mainly published between 2014 and 2025. Only English-language, peer-reviewed journal articles were included.

Studies were included if they examined developmental or childhood trauma and its relationship to brain development, mental health outcomes, protective factors, or post-traumatic growth. Both empirical studies and systematic reviews were reviewed. Studies were excluded if they focused only on adult trauma, were not peer-reviewed, or did not examine long-term psychological or neurodevelopmental outcomes.

The initial search identified approximately 40 articles. Titles and abstracts were screened for relevance, and unrelated studies were removed. The full text of the remaining articles was reviewed for eligibility. Articles were selected based on their relevance to the research questions, quality of evidence, and focus on long-term outcomes of developmental trauma. The selected studies were then compared to identify consistent findings, differences across populations, and relationships between trauma exposure, risk factors, and post-traumatic growth. In total, nine studies were included in the final review. The selected studies were grouped by theme: neurological and psychological impacts, risk and protective factors, and post-traumatic growth. This organization guided the structure of the literature review and allowed comparisons across study types and populations. Some relevant studies may have been missed, particularly those not indexed in the selected databases or published in other languages. Limiting the search to mostly recent studies may have excluded older research. The choice of keywords and databases also influenced which articles were identified.

NEUROLOGICAL AND PSYCHOLOGICAL IMPACTS OF DEVELOPMENTAL TRAUMA

Developmental trauma, especially trauma that happens in early childhood relationships, can have serious effects on how the brain and emotional systems develop (Fan & Kang, 2025). Research using neuroimaging studies, systematic reviews, and ecological momentary assessment has shown that early trauma is linked to long-term changes in brain structure and psychological functioning (Bloomfield et al., 2025; Rogerson et al., 2024). Studies have found that experiences such as abuse, neglect, and violence are associated with changes in important brain regions, including the amygdala, hippocampus, and prefrontal cortex (Bloomfield et al., 2025; Fan & Kang, 2025). These brain regions are responsible for emotion regulation, memory, and executive functioning (Fan & Kang, 2025). When they are disrupted by early trauma, individuals may experience difficulties with emotional control, increased stress sensitivity, sleep problems, and cognitive impairments later in life (Rogerson et al., 2024). Research also shows that these neurological changes can increase vulnerability to serious mental health conditions, including psychosis and suicidal thoughts (Bloomfield et al., 2025; Rogerson et al., 2024). Together, this research demonstrates that developmental trauma can have lasting neuropsychological effects across the lifespan (Fan & Kang, 2025).

Roggerson, O'Connor, and O'Connor (2024) conducted an empirical study using ecological momentary assessment (EMA) to examine how childhood trauma influences adult mental health through daily stress-related vulnerability factors. The study included 211 healthy young adults between the ages of 18 and 45, who were screened for chronic illness and sleep problems. Participants completed daily diaries

measuring stress, sleep quality, executive functioning, impulsivity, daily hassles, optimism, reasons for living, suicidal thoughts, and feelings of defeat and entrapment. The researchers found that childhood trauma was associated with higher daily stress, greater impulsivity, poorer sleep, and reduced executive functioning, which was in turn linked to increased feelings of defeat and entrapment, lower optimism, and fewer reasons for living — all of which have been found to underlie increased risk for suicide. Indirect pathways showed that trauma influenced suicide risk through executive functioning, impulsivity, stress, sleep quality, and daily hassles. The study also suggested that optimism can reduce some negative effects of trauma. Overall, the findings highlight that childhood trauma affects adult mental health through multiple daily factors and that interventions targeting modifiable variables like sleep, stress, and executive function may help reduce risk and support coping.

Fan & Kang (2025) conducted a systematic review and meta-analysis of psychological and neurodevelopmental research on the relationship between early traumatic experiences and long-term changes in thinking, memory, and emotional control. The authors analyzed the current body of empirical literature in order to better understand how childhood trauma resulting from exposure to abuse, neglect, or violence may affect cognitive and emotional development by connecting it to how certain parts of the brain are affected. The studies reviewed by the authors included participants from low-income populations in the US, with ages ranging from children to adults (include age ranges), and sample sizes ranging from 37-626. The trauma types examined across studies included physical, emotional, and sexual abuse, neglect, domestic violence, and war-related trauma. Trauma exposure was most commonly measured using the Childhood Trauma Questionnaire (CTQ), while cognitive and emotional functioning were assessed using tools such as CANTAB, RBANS, and the Emotion Recognition Toolbox. The researchers found that early childhood trauma was associated with long-term difficulties in attention, working memory, emotional regulation, and executive functioning. These cognitive and emotional problems were linked to changes in key brain regions involved in learning and emotion, especially the hippocampus, amygdala, and prefrontal cortex. Neuroimaging findings showed increased amygdala activity and reduced connectivity between the amygdala and the prefrontal cortex, which helps explain difficulties with emotion regulation. Overall, the study highlights that developmental trauma can significantly shape brain development and psychological functioning across the lifespan.

Bloomfield et al. (2025) conducted a systematic review of neuroimaging studies examining how developmental trauma affects brain structure and function in adults diagnosed with psychosis. The study used a biopsychological and neurodevelopmental framework to explore whether early trauma disrupts brain development in ways that contribute to a trauma-related form of psychosis. The review included 31 studies with a total of 1,761 adults with psychosis and 1,775 control participants, with ages ranging from 18 to 65 and including individuals at high risk, first-episode, or with chronic psychosis. Trauma exposure was measured using tools such as the Childhood Trauma Questionnaire and the Early Trauma Inventory, and brain functioning was assessed through MRI, DTI, fMRI, and PET scans. The researchers found that developmental trauma was associated with smaller brain volumes, particularly in the frontal cortex, hippocampus, and amygdala, as well as weaker white matter connections. Functional imaging results showed increased activity in brain regions involved in emotion regulation, stress response, and executive

functioning. These findings suggest that early trauma can lead to lasting changes in brain structure and function that may increase vulnerability to psychosis later in life.

All three studies consistently show that childhood trauma has long-term effects on both brain development and mental health. Rogerson et al. (2024) found that early trauma is associated with higher daily stress, impulsivity, sleep disruption, and reduced executive functioning, all of which contribute to increased suicide risk. Fan and Kang (2025) similarly reported that childhood trauma is linked to long-term problems with attention, working memory, and emotional regulation, and these difficulties are connected to structural and functional changes in the amygdala, hippocampus, and prefrontal cortex. Bloomfield et al. (2025) further demonstrated that developmental trauma is associated with smaller brain volumes, weaker white matter connectivity, and altered neural activity in adults with psychosis. Across these studies, trauma is consistently shown to disrupt emotional regulation systems and cognitive functioning (Bloomfield et al., 2025; Fan & Kang, 2025; Rogerson et al., 2024). Overall, the evidence strongly supports the conclusion that early traumatic experiences can lead to lasting neurological and psychological consequences.

RISK AND PROTECTIVE FACTORS

This subsection focuses on the risk and protective factors that influence individuals who have experienced developmental trauma. Research shows that trauma increases the risk of long-term mental health problems and functional impairments (Copeland et al., 2018). At the same time, studies also identify factors that can support coping and recovery, especially during adolescence and in structured environments (Olstad et al., 2023). Trauma exposure can accumulate over time, increasing vulnerability to psychiatric disorders and life difficulties (Copeland et al., 2018). However, meaning in life, supportive relationships, and trauma-informed learning environments may act as protective factors (Bekker & Bekker, 2025; Olstad et al., 2023). Together, these sources show that while developmental trauma increases risk, certain relational and environmental supports can improve outcomes.

Olstad et al. (2023) conducted an empirical study examining how adolescents with developmental trauma understand and experience meaning in life while receiving outpatient mental health treatment. The researchers focused on how meaning in life connects to coping and recovery and how this understanding could be used to improve therapy for traumatized adolescents. The sample included 15 adolescents between the ages of 13 and 18 in Norway, all of whom had experienced developmental trauma such as abuse, neglect, or violence. Participants were selected by their therapists based on trauma history and ability to participate in interviews. Data were collected through in-depth, semi-structured interviews that used open-ended questions about meaning, purpose, and what makes life worth living, and responses were analyzed thematically. The researchers found that adolescents described meaning in life through relationships, routines, moments of peace, spirituality, and future goals, but trauma often made trust, safety, and belonging difficult. Despite these challenges, the findings suggest that supportive relationships, structure, hope, and, for some individuals, spirituality can act as protective factors that support coping and recovery after developmental trauma.

Copeland et al. (2018) conducted an empirical longitudinal study examining the effects of cumulative childhood trauma on adult psychiatric and functional outcomes. The study followed 1,420 children from rural counties in North Carolina, with participants initially assessed between the ages of 9 and 16 and followed again at ages 19, 21, 25, and 30. The sample was 49% female, primarily white, with American Indian participants oversampled. Childhood trauma exposure was measured using DSM-defined traumatic events such as violence, sexual trauma, and witnessing trauma, along with assessments of psychiatric disorders and family adversities, including low socioeconomic status and family instability. These findings also suggest that factors outside of the trauma itself may influence long-term outcomes. Low socioeconomic status and family instability can create additional stress and may make it more difficult for individuals to access resources or supportive environments. Environmental stressors that continue after the traumatic experience may therefore contribute to the effects of developmental trauma and increase vulnerability to negative outcomes. Adult outcomes included measures of anxiety, depression, and substance use disorders. The researchers found that childhood trauma is common and that greater accumulation of trauma is associated with increased risk for psychiatric disorders and functional impairments in adulthood. These effects remained even when other childhood risk factors were considered, indicating that cumulative trauma exposure is a major risk factor for long-term negative outcomes across multiple areas of life.

Bekker and Bekker (2025) conducted a literature review exploring how trauma exposure affects the neuropsychological processes involved in learning and behavior and the implications for inclusive education in South Africa. The authors synthesized secondary literature from neuroscience, trauma research, inclusive education policy, and international trauma-informed frameworks. Their review included an analysis of South African crime and trauma statistics to show how widespread trauma exposure is among learners, followed by a synthesis of research on how trauma affects brain regions such as the amygdala, hippocampus, and prefrontal cortex. The authors concluded that trauma has measurable effects on emotional regulation, attention, memory, and executive functioning, which directly interfere with learning and classroom behavior. They argue that trauma exposure is a common but often unseen barrier to education and inclusion. The study highlights trauma-responsive teaching practices as protective factors, suggesting that understanding trauma through a neuropsychological lens allows educators to adjust instruction, reframe behavior, and create emotionally safe learning environments that support recovery and learning.

The studies in this subsection show consistent patterns about both risk and protective factors related to developmental trauma. Copeland et al. (2018) found that childhood trauma is common and that experiencing more trauma increases the risk of psychiatric problems and functional difficulties in adulthood, even when other risk factors are considered. Olstad et al. (2023) show that adolescents with developmental trauma still find meaning in life through relationships, routines, goals, and spirituality, though trauma makes trust and safety harder. Bekker and Bekker (2025) explain that trauma affects attention, memory, and self-regulation, which can make learning difficult, but that trauma-responsive teaching can help reduce these barriers. Overall, the sources agree that trauma increases long-term risks,

but supportive relationships, structure, meaning, and trauma-informed environments can help protect against negative outcomes.

POST TRAUMATIC GROWTH

Post-traumatic growth (PTG) refers to positive psychological changes that some individuals report after experiencing trauma (Henson et al., 2021). This idea challenges the assumption that trauma only results in negative outcomes such as stress disorders or long-term emotional distress (Dell'Osso et al., 2022). Researchers question whether PTG reflects real, lasting personality change or whether it represents perceived growth that helps individuals cope with adversity (Jayawickreme & Blackie, 2014). Studies also examine how PTG is measured, most commonly through self-report tools such as the Post-Traumatic Growth Inventory (Henson et al., 2021; Jayawickreme & Blackie, 2014). Because PTG often coexists with psychological distress, researchers debate whether it truly protects against psychopathology (Dell'Osso et al., 2022; Henson et al., 2021). This subsection examines how trauma may influence personality, coping strategies, and identity development, while also considering the challenges in distinguishing real growth from perceived improvement (Jayawickreme & Blackie, 2014).

Henson et al. (2021) conducted a systematic literature review of empirical studies examining factors that promote post-traumatic growth and whether PTG protects against psychopathology. The review included 281 studies with participants including first responders, veterans, and survivors of illness, disasters, and violence, and used international samples from multiple countries. The researchers reviewed both cross-sectional and longitudinal studies identified through databases including PsycINFO, PsycARTICLES, and ScienceDirect. Post-traumatic growth was most commonly measured using the Post-Traumatic Growth Inventory (PTGI). Across studies, PTG was associated with cognitive processing, social support, and adaptive coping strategies. However, the authors found that PTG often coexists with psychological distress and is not always protective against mental health problems. The findings suggest that while growth after trauma is possible, it can have mixed outcomes and does not necessarily mean reduced psychopathology.

Dell'Osso et al. (2022) conducted a literature review exploring how trauma can lead to both post-traumatic stress disorder and post-traumatic growth, with attention to vulnerability, development, and environmental factors. The review drew from clinical and empirical studies of trauma survivors and included a focus on individuals with autistic traits. The authors reviewed existing trauma and PTG literature and referenced commonly used measures such as the PTGI and PTSD symptom scales. Using neurodevelopmental and psychoanalytic perspectives, the study found that PTG and PTSD often co-occur rather than existing as opposite outcomes. Trauma responses were shown to depend on identity vulnerability and the presence of support systems. The authors also suggested that autistic traits may increase vulnerability to distress while also allowing for certain forms of growth. Overall, the study describes PTG as a process of identity transformation rather than full recovery from trauma.

Jayawickreme and Blackie (2014) conducted a literature review to determine whether post-traumatic growth reflects genuine personality change or perceived growth related to coping, optimism, or self-enhancement. The review included studies involving trauma survivors, college students, cancer patients, and bereaved individuals, with sample sizes varying widely. The authors focused on the limitations of retrospective self-report measures, particularly the PTGI, and on the reliance on cross-sectional designs and limited longitudinal data. They emphasized the lack of pre-trauma baseline measures and the absence of behavioral or informant-based data in much of the research. The authors concluded that reported PTG often does not represent actual personality change and may instead function as a coping strategy. When prospective methods are used, true growth appears to be rare but is associated with reduced distress. The study suggests that PTG reports may reflect stable personality traits rather than changes caused by trauma.

The three studies present different perspectives on post-traumatic growth. Henson et al. (2021) found that PTG is often associated with cognitive processing, social support, and adaptive coping, but it frequently coexists with psychological distress. Dell'Osso et al. (2022) similarly argued that PTG and PTSD are not opposites and may develop at the same time, depending on vulnerability and environmental support. In contrast, Jayawickreme and Blackie (2014) questioned whether reported PTG reflects actual personality change, suggesting that many reports may represent coping strategies rather than true transformation. Across the research, perceived growth appears common, but strong evidence for lasting personality change is limited (Jayawickreme & Blackie, 2014). Overall, while trauma can lead to positive psychological shifts in some individuals, the nature and durability of that growth remain debated (Dell'Osso et al., 2022; Henson et al., 2021).

CONCLUSION

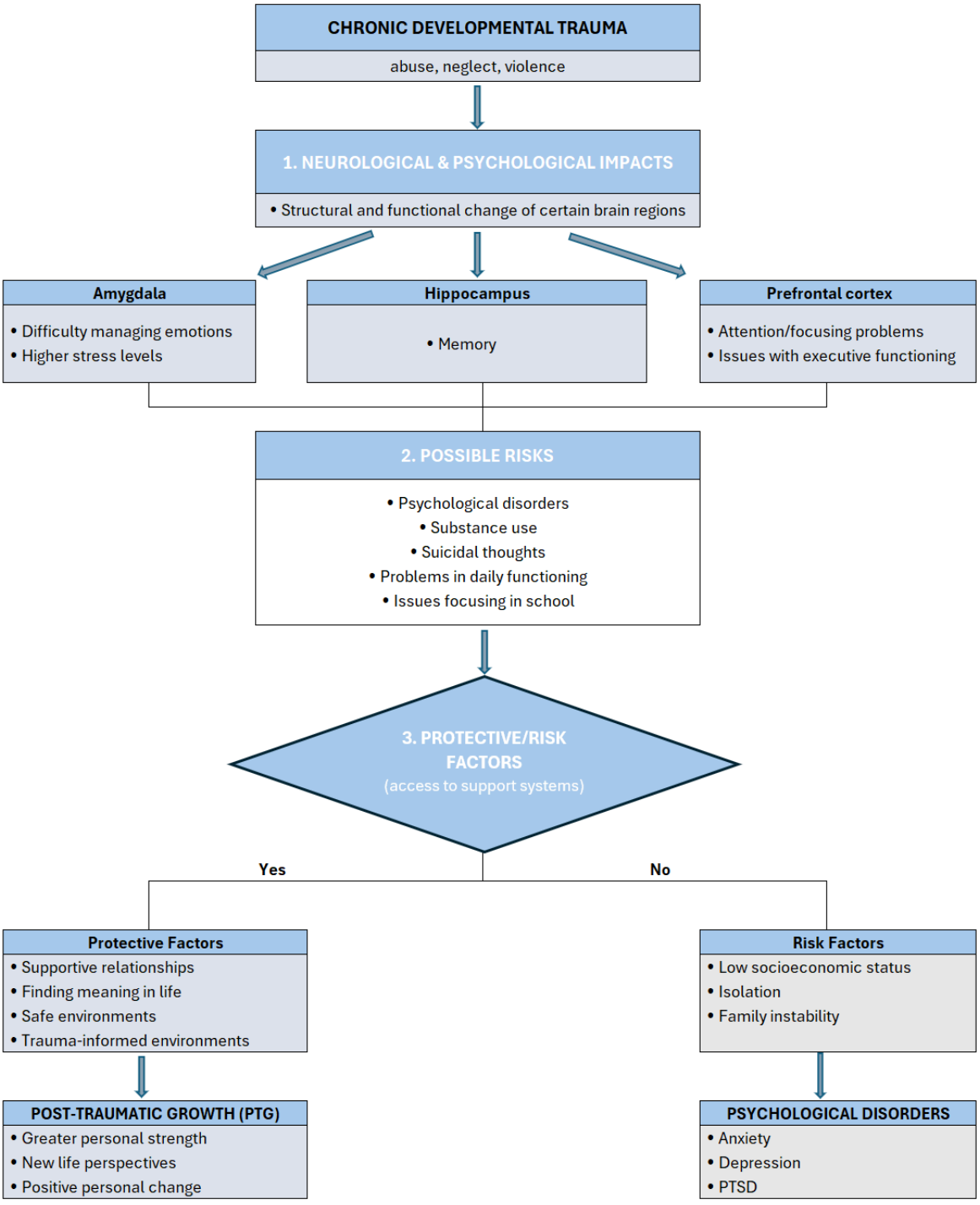
The research reviewed in this paper shows that developmental trauma has long-term effects on both brain development and psychological functioning. Section 1 demonstrates that childhood trauma is associated with structural and functional changes in brain regions involved in emotion regulation, memory, and executive functioning, including the amygdala, hippocampus, and prefrontal cortex (Bloomfield et al., 2025; Fan & Kang, 2025). These neurological differences help explain why individuals who experience early trauma are at greater risk for anxiety, depression, substance use, and suicidal thoughts later in life (Copeland et al., 2018; Rogerson et al., 2024). Overall, the evidence strongly supports the idea that developmental trauma disrupts core regulatory systems and increases long-term vulnerability.

Section 2 builds on this by examining both risk and protective factors. Research shows that cumulative trauma significantly increases the likelihood of psychiatric disorders and functional impairment in adulthood (Copeland et al., 2018). However, the findings also show that outcomes are not entirely predetermined. Supportive relationships, meaning in life, and trauma-informed educational environments can reduce risk and promote resilience (Bekker & Bekker, 2025; Olstad et al., 2023). This suggests that while trauma raises vulnerability, environmental and relational supports play a critical role in recovery.

Section 3 explores post-traumatic growth and presents more mixed findings. Some studies suggest that trauma can lead to positive psychological changes, particularly when individuals engage in cognitive processing and receive social support (Henson et al., 2021). At the same time, other researchers argue that reported growth may reflect coping strategies rather than true personality transformation (Jayawickreme & Blackie, 2014). Evidence also indicates that post-traumatic growth and distress can coexist rather than function as opposite outcomes (Dell'Osso et al., 2022). As a result, the long-term reality of personality change after trauma remains debated.

While the literature includes strengths such as neuroimaging research and longitudinal designs (Bloomfield et al., 2025; Copeland et al., 2018), there are also limitations. Some studies rely heavily on self-report measures, particularly in post-traumatic growth research (Henson et al., 2021). Others use small or specific samples, which may limit generalizability. In addition, much of the research focuses more on harm than on long-term recovery processes (Bekker & Bekker, 2025). Future research should include more diverse samples, longer longitudinal studies, and more objective measures to better distinguish perceived growth from measurable change (Jayawickreme & Blackie, 2014).

Overall, developmental trauma should be understood as a complex developmental issue shaped by neurological, psychological, and environmental factors. Although early trauma increases risk for long-term difficulties, protective factors and targeted interventions can support recovery. These findings have important implications for clinical practice, including the need for trauma-informed therapy, early intervention, and educational support that address both risk and resilience.


CHRONIC DEVELOPMENTAL TRAUMA
abuse, neglect, violence
1. NEUROLOGICAL & PSYCHOLOGICAL IMPACTS
• Structural and functional change of certain brain regions
Amygdala
• Difficulty managing emotions
• Higher stress levels
Hippocampus
• Memory
Prefrontal cortex
• Attention/focusing problems
• Issues with executive functioning
2. POSSIBLE RISKS
• Psychological disorders
• Substance use
• Suicidal thoughts
• Problems in daily functioning
• Issues focusing in school
3. PROTECTIVE/RISK FACTORS
(access to support systems)
Yes
No
Protective Factors
• Supportive relationships
• Finding meaning in life
• Safe environments
• Trauma-informed environments
Risk Factors
• Low socioeconomic status
• Isolation
• Family instability
POST-TRAUMATIC GROWTH (PTG)
• Greater personal strength
• New life perspectives
• Positive personal change
PSYCHOLOGICAL DISORDERS
• Anxiety
• Depression
• PTSD

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