

# How Adverse Childhood Experiences Contribute to Increased Risk for Anxiety Disorders in Adulthood.

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## ABSTRACT

Anxiety disorders are not only extremely common, but they also have a long-term adverse impact on the lives of people of all ages worldwide. One of the known risk factors for developing such psychopathology is adverse childhood experience (ACE). Although there has been much interest in understanding the causal relationship between ACE and physical and mental well-being in adults, data on how ACE may impact individuals differently in terms of increased risk for anxiety disorders is lacking. This article investigates how biological (neurological, gene methylation, and gene-environment) and psychosocial (attachment) factors influence a person’s susceptibility to ACE-related adulthood anxiety. The type of trauma, gender differences, and the total number of adversities emerged as three themes from the literature review on anxiety risk factors for individuals with ACE. Research suggests that early, multiple, repeated emotional traumas may have a greater adverse long-term effect, particularly in females. However, early adversity does not predispose children to develop psychopathologies since a secure attachment may lessen the detrimental impact of trauma and protect children from adverse experiences.

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## 1. Introduction

Anxiety disorders are highly prevalent and disabling mental health conditions for all ages worldwide that often develop in childhood and persist throughout adulthood if left untreated (Cai et al., 2023; Felitti et al., 1998; Van der Kolk, 2019). In Western nations, the illness affects around 18 % of the population, with an average onset age of 11 years (Donner & Lowry, 2013). In 2019, over 15% of adults in the U.S. experienced mild, moderate, or severe anxiety symptoms (Terlizzi & Villarroel, 2020). ACE is a common major risk factor for the development of anxiety symptoms and disorders. Approximately 64% of U.S.

adults reported having at least one type of ACE before age 18, and almost one in six (17.3%) reported having four or more types of ACE (Centres for Disease Control [CDC], 2023). In Europe, 23.5% of people had one ACE, while 18.7% had two or more ACE (Bellis et al., 2019). In addition, ACE was attributed to about 30% of cases of anxiety in North America and more than a quarter in Europe (Bellis et al., 2019).

Although studies have been conducted on the impact of childhood trauma on children’s well-being and adult behavior (Downey & Crummy, 2022), data on how ACE may contribute to increased risk for anxiety disorders in adulthood is lacking. This research gap limits our understanding

of how ACE may affect individuals differently. Therefore, by investigating the biological, psychological, and social factors that influence a person's susceptibility to ACE-related adulthood anxiety, this article aims to gain insight into the value of an effective early intervention as a prevention strategy against common psychopathology.

### *1.1 Defining and Measuring ACE*

ACE is described as a traumatic event that children and adolescents under the age of 18 have encountered. It is categorized into three groups: abuse, neglect, and household challenges (American Psychiatric Association, 2013; CDC, 2023; Crouch et al., 2019; Felitti et al., 1998). The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) recognizes ACE factors in the chapter titled "Other Conditions That May Be a Focus of Clinical Attention." However, since an ACE does not meet the criteria for mental disorders, this section is only intended to document additional relevant information that may affect the diagnosis, prognosis, or treatment of a patient (American Psychiatric Association, 2013). Renowned psychiatrists such as Van der Kolk (2014) have supported including the diagnosis of developmental trauma disorder in the DSM-5 due to the importance of an adequate diagnostic framework in applying effective, timely, and less costly treatments to individuals (Bremness, 2014; Van der Kolk, 2009). However, the proposal was denied, and the efficacy of the conceptual framework for developmental trauma disorder has remained a point of contention.

Although ACE is not a mental diagnosis, a lot has been learned recently about how trauma impacts children through the ACE Study run by the CDC and Kaiser Permanente (CDC, 2023; Felitti et al., 1998;

LaNoue et al., 2020). Using a retrospective self-reported survey of the ACE Questionnaire, which included questions on childhood abuse, neglect, and family dysfunction, the study examined different demographic groups at a single point in time. According to the findings, ACE is significantly more widespread than previously acknowledged, and it has a profound impact on adults' mental and physical health even a half-century later, even leading negative behaviors and emotions to be passed down from generation to generation (Felitti et al., 1998; LaNoue et al., 2020; Osofsky & Groves, 2018). The ACE score continues to be utilized today as a screening tool, although some concerns regarding its limitations are being raised (Anda et al., 2020).

### *1.2 Anxiety Disorders in the DSM-5*

The DSM-5 recognizes 11 anxiety disorders with features of persistently negative mood states, physical tension, and excessive worry about future threats (American Psychiatric Association, 2013). Anxiety disorders are found to commonly co-occur with other mood and anxiety-related disorders, particularly with depression, and several physical conditions (Barlow, 2021; Mackenzie et al., 2011). According to Ruscio et al. (2017), individuals whose presentation meets the criteria for generalized anxiety disorder are also likely to have met or currently meet the criteria for various anxiety and unipolar depressive disorders.

## **2. Literature Review**

Three themes emerged from the literature analysis on anxiety risk factors for adults with ACE: (a) type of trauma, (b) gender

disparities, and (c) an overall number of adversities.

### *2.1 Theme 1: Type of Trauma*

Studies have found that the kind of abuse that victims experience might affect the outcomes and post-trauma symptoms (De Bellis & Zisk, 2014; Downey & Crummy, 2022). Based on anxiety self-reports from 1277 Finnish participants aged 65–77 years old, Lähdepuro et al. (2019) investigated the association between various forms of early life stress (ELS) and anxiety symptoms in late adulthood. The data showed that childhood emotional trauma, which frequently co-occurs with physical trauma but often remains unrecognized, was most strongly correlated with anxiety symptoms in late adulthood, even after controlling for other ELS elements. This finding suggests that emotional trauma functions as an independent risk factor for anxiety. In contrast, the relationship between physical trauma and anxiety symptoms above the clinical threshold was no longer significant when controlling for emotional trauma (Lähdepuro et al., 2019).

Similarly, LaNoue et al. (2020) investigated self-reports from 679 adults with multiple ACE episodes, with a mean age of 45.73. The participants believed that childhood emotional abuse had the greatest psychological impact, whereas sexual and emotional abuse together had the most negative psychological impact. Furthermore, neglect alone had the least harmful effects. The study also revealed that perceived threat and self-reported impact ratings predicted mental health outcomes more accurately than the actual occurrence of stressful events (LaNoue et al., 2020). The findings suggest that people's subjective perceptions of their experiences may play a role in acquiring a range of psychiatric symptoms after

experiencing the same type of potentially stressful incident.

### *2.2 Theme 2: Gender Disparities*

In addition to certain types of traumas, being a female has also been found to be a risk factor for adulthood anxiety symptoms, with girls and women being twice as likely as males to develop general anxiety disorders (American Psychiatric Association, 2013; Anxiety & Depression Association of America [ADAA], 2021; Canuto et al., 2018; Donner & Lowry, 2013; Kessler et al., 2012). According to Terlizzi & Villarroel (2020), in the US in 2019, 19.0% of women experienced anxiety symptoms compared to 11.9% of men. Women are also more likely than men to have four or more ACE and are significantly more mentally affected by ACE (CDC, 2023; LaNoue et al., 2020). A cross-sectional survey of 4,344 US adults with a mean age of 54.1 years revealed that the prevalence of anxiety disorders was 11.4% higher for females with three to five ACE (Whitaker et al., 2021). The finding suggests that a synergistic relationship between ACE exposure and gender may play a key role in determining an individual's vulnerability to anxiety (CDC, 2023; Whitaker et al., 2021).

### *2.3 Theme 3: Overall Number of Adversities*

Another possible mechanism by which ACE raises the risk of anxiety is the accumulation of repeated childhood stressful episodes, or "stress pileup" (Allen, 2005, pp. 16-18; CDC, 2023). According to Lähdepuro et al. (2019), early life stress accumulation increases the levels of late adulthood anxiety symptoms and the likelihood of clinically severe anxiety in older adults. Although impactful, one-off childhood stresses, such as being separated

from one's parents during a war or experiencing a death in the family, were not significantly linked to anxiety symptoms later in life. On the other hand, the accumulation of only two stressors considerably raised the likelihood of experiencing clinically significant anxiety, suggesting that the number of stressors may further increase the possibility of late-life anxiety. One potential explanation for this result may be that stressful experiences early in life alter brain structures, making certain individuals more sensitive to future life stressors while also compromising their physical and mental health (Lähdepuro et al., 2019).

Other studies further support a direct correlation between the number of ACE and late-life negative outcomes such as chronic disease, incarceration, and employment difficulties (CDC, 2023). A psychiatrist Lenore Terr (2003) classified childhood trauma-stress conditions into two categories: type I and type II. She claimed that type I traumas—unforeseen, single shocking experiences—have a different impact on children than type II traumas, which are prolonged and repeated exposure to intense events over many years. Children who encounter type II trauma may develop self-defense and coping mechanisms to safeguard themselves through a range of mental alterations that may later account for certain psychotic thought patterns and anxiety disturbances in adulthood (Terr, 2003). Van der Kolk (2019) also noted the distinction between single and ongoing child maltreatment. He claimed that isolated episodes result in distinct conditioned behavioral and biological reactions to reminders of the trauma, such as those documented in the posttraumatic stress disorder (PTSD) diagnosis. Chronic trauma, on the other hand, has far-reaching impacts

on neurobiological development (Van der Kolk, 2019).

### **3. Conceptualization**

#### *3.1 Biological Factors*

Childhood is a critical developmental period for the brain. During this time, the brain undergoes tremendous change, including simultaneous neuronal proliferation and pruning, as well as extensive rewiring of existing neuronal connections (Jeong et al., 2021). Although brain plasticity can be adaptive, it also can change when the negative effects of early traumatic life experiences accumulate (Allen, 2005).

The hypothalamic-pituitary-adrenal (HPA) axis is one region of the brain that may be impaired by early childhood exposure to high levels of stress and trauma (De Bellis & Zisk, 2014; Kuhlman et al., 2015; Luo et al., 2022; Tyrka et al., 2016). The HPA axis is a neuroendocrine system that governs the body's response to stress (Sheng et al., 2021). In adults with anxiety disorders, ACE has been linked with persistent HPA axis sensitization and significantly higher cortisol reactivity (De Bellis & Zisk, 2014). When the HPA axis is over-activated, stress hormones are secreted in excess and the body remains hypervigilant in anticipation of impending danger.

Childhood trauma may not only increase the vulnerability to anxiety by dysregulating the HPA axis (De Bellis & Zisk, 2014; Luo et al., 2022), but various forms of ACE may also have diverse effects on HPA-axis functioning (Kuhlman et al., 2015). Physical abuse, in particular, may be associated with faster responses to acute stress while emotional abuse may be related to delayed cortisol recovery from acute stress

(Kuhlman et al., 2015). Interactions between each genetic variation and increased levels of emotional neglect may also be associated with heightened reactivity to anger and fear in the dorsal amygdala, which is crucial in emotional processing and has an activating influence on the HPA axis (De Bellis & Zisk, 2014).

Childhood maltreatment is also found to have a strong adverse correlation with resting-state functional connectivity (RSFC) between the left centromedial amygdala (CMA) and the left anterior insula (Luo et al., 2022). The amygdala, the primary stress response limbic system responsible for the emotional processing and regulation of fearful and threatening stimuli, is stimulated when stressors associated with the traumatic event are processed by biological sensory systems via the thalamus (De Bellis & Zisk, 2014). Amygdala dysfunction is found in clinically anxious individuals due to elevated cortisol levels through the transmission of a fear signal to neurons in the prefrontal cortex, hypothalamus, and hippocampus. Furthermore, anomalies in amygdala activation and other biological stress systems are caused by increased activity in the locus coeruleus and sympathetic nervous system (De Bellis & Zisk, 2014; Luo et al., 2022). The relationship between ACE and the alterations in amygdala structure and function suggests that early-life stress has a stronger influence on the left hemisphere, which increases the risk of developing anxiety disorders in adulthood (Luo et al., 2022).

Furthermore, epigenetic DNA alterations are a mechanism through which the biological response to ACE may influence gene activity and expression. In particular, methylation of glucocorticoid signaling genes is involved in adversity-induced HPA axis dysfunction in children (Allen, 2005;

De Bellis & Zisk, 2014; Hernando-Herraez et al., 2015; Tyrka et al., 2016). While gene methylation may be the most stable form of epigenetic modification that regulates the stress response, there is growing evidence that it is plastic during childhood and into adulthood, increasing the biological risk generated by early stress exposure, which can lead to long-term consequences (Allen, 2005; Tyrka et al., 2016). In response to stressful stimuli, the glucocorticoid receptor (GR), which is distributed throughout limbic brain regions and numerous other organ systems, engages a negative feedback loop that inhibits further cortisol release through cortisol binding at the hypothalamus and pituitary to prevent the damaging effects of extreme or chronic activation (Tyrka et al., 2016). Prolonged stress and glucocorticoid treatment impede neurogenesis, cell proliferation, and dendritic branching in the hippocampus and promote cell loss and atrophy. When glucocorticoids decrease GR levels over time, structural changes in brain circuitry that are critical for emotional and behavioral adaptation may occur. Therefore, when risk genes and childhood trauma combine, epigenetic alterations in the neurobiological stress system due to gene-environment interactions may result in a variety of adult emotional, behavioral, and neurobiological abnormalities (De Bellis & Zisk, 2014). These excessive stress-induced changes in methylation of glucocorticoid activity at receptors, as well as changes to the sensitivity of this system, may explain associations between early adversity and risk for stress-related anxiety disorders (Tyrka et al., 2016).

### *3.2 Psychological & Social Factors*

Children are particularly vulnerable to the long-term impacts of interpersonal trauma. Their susceptibility is due to a complete

reliance on their caretakers for survival and a lack of the cognitive and behavioral skills necessary for effectively comprehending and responding to distressing circumstances (Allen, 2005; Downey & Crummy, 2022). Early traumatic experiences, particularly those caused by their parents, have been linked to a variety of adulthood challenges such as low self-esteem, feelings of inadequacy, emotional dysregulation, and anxiety symptoms as a result of insufficient early bonding (Downey & Crummy, 2022). Not all children are impacted by the same adversity in the same way or to the same extent, though, since most children are able to recover when given adequate support from an attentive caregiver (Substance Abuse and Mental Health Services Administration [SAMHSA], 2023). The degree to which children are vulnerable to the long-term effects of trauma exposure may be significantly influenced by the reliable and consistent presence of a supportive, caring, and sensitive family member or caregiver (SAMHSA, 2023).

The importance of social support in terms of secure attachment in early childhood has been extensively studied by many researchers. John Bowlby (1973, 1979, 1980, 1982, 1988) found that people are born with a need to form close emotional bonds with their caregivers, and the earliest bonds formed by children with their caregivers have a tremendous impact that continues throughout life. Through her study on attachment theory, Mary Ainsworth proposed that the mother-infant attachment style depends on the mothers' emotions, behavior, and responsiveness and that sensitive mothers are more likely to form secure attachment styles with their children (Ainsworth et al., 1978). Her research comparing disrupted mother-child bonds to normal mother-child relationships reported that a child's lack of a mother figure leads to

adverse developmental effects even in later life (Ainsworth et al., 1978). According to Van der Kolk (2019), early patterns of secure attachment are important for children to learn to trust their feelings and to understand the world. The experience of being understood provides children the confidence to trust their abilities and the capacity to seek help from others (Allen, 2005; Van der Kolk, 2019). On the other hand, children with insecure attachment struggle to trust others for support and are unable to regulate their emotional states, which can lead to excessive anxiety, anger, and longings to be cared for throughout their lives (Allen, 2005; Van der Kolk, 2019). As a result, while insecure attachment can magnify the harmful effects of childhood trauma, secure attachment can mitigate the detrimental impact in both childhood and adulthood.

#### **4. Conclusion**

There has been much interest in understanding the causal relationship between ACE and physical and mental well-being in adults. Recent studies suggest that early, multiple, repeated, emotional traumas may have a greater adverse long-term effect, particularly in females. This is because children are more likely than adults to lack the cognitive and behavioral capacities to comprehend distressing situations and respond to them effectively. Therefore, trauma may trigger abnormalities in early relationships and stable attachment formation that affect brain development, emotion control, and self-perception. These abnormalities also lead to a wide range of associated psychological and physiological illnesses, including adulthood anxiety. The environment, epigenetics, and an individual's genetic makeup appear to have an impact on their vulnerability to

developing late-life psychopathologies. However, studies have found that adversity does not predestine children to poor outcomes because secure attachment can lessen the negative impact of trauma and shield children against adverse experiences.

Although the impacts of ACE have been investigated, further research is required due to several shortcomings of the available data. One of the research limitations is the use of retrospective self-report questionnaires, which are subject to reporting bias due to lengthy recollection times. The second challenge of evaluating developmental consequences is the inability to track and monitor developmental changes over time. Because existing data on anxiety symptoms only reflect on a single point in time, it is impossible to determine if anxiety symptoms have been persistent throughout the life course or have only recently developed. In order to track the long-term impact of ACEs across a person's lifespan, longitudinal data are required. Another obstacle is that since anxiety disorders are often comorbid with other mood or anxiety-related disorders, it is difficult to study the anxiety symptoms in isolation. Lastly, the implications of not including developmental trauma disorder as a distinct diagnosis in the DSM-5 must be investigated because having an adequate diagnostic framework is crucial for providing effective, timely, and less costly treatments to those suffering from such prevalent mental illnesses.

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