

# Childhood Adversity, Emotion Regulation Difficulties and Executive Functioning in Young Adults: A Neurocognitive Framework and Study Protocol

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**Abstract:** ***Background:** Childhood adversity is among the most robust developmental risk factors for emotional difficulties in adulthood. Contemporary neurocognitive accounts propose that early stress becomes biologically embedded through dysregulation of stress-response systems and altered development of prefrontal–limbic circuitry, with downstream consequences for the cognitive control processes (executive functions) on which emotion regulation depends. Few studies have examined adversity, emotion regulation difficulties and executive functioning jointly in non-clinical young adults, particularly in India. **Objective:** To articulate an integrative neurocognitive framework linking childhood adversity, executive functioning and emotion regulation difficulties, and to present a protocol for testing its psychological-level predictions in young adults. **Framework:** Drawing on allostatic-load, sensitive-period, threat–deprivation and cognitive-control-of-emotion models, the article derives three testable propositions: that cumulative adversity is positively related to (H1) emotion regulation difficulties and (H2) executive functioning difficulties, and that (H3) these difficulties covary because effortful regulation draws on cognitive control. **Methods:** A quantitative, cross-sectional, correlational design is proposed. Approximately 50 young adults aged 18–30 years will complete the WHO Adverse Childhood Experiences International Questionnaire (ACE-IQ), the 16-item Difficulties in Emotion Regulation Scale (DERS-16) and the Adult Executive Functioning Inventory (ADEXI). Associations will be examined with descriptive statistics and Pearson’s correlations. **Significance:** The article specifies how neurobiological mechanisms are theorised to produce psychological-level associations, clarifies what a self-report, cross-sectional study can and cannot infer about them, and sets out a basis for longitudinal and multi-method research. No neuroimaging or laboratory neuropsychological measures are used, and the neural pathways described are theoretical rather than observed.*

**Keywords:** childhood adversity; allostatic load; prefrontal–limbic circuitry; emotion regulation; executive functioning; cognitive control; young adults

## 1. Introduction

Childhood is a critical period for psychological, emotional, social and cognitive development. A stable and supportive environment promotes healthy development, whereas exposure to threatening, unpredictable or neglectful circumstances may have consequences that extend well into adulthood. Such exposures are broadly described as childhood adversity or adverse childhood experiences (ACEs), and include physical, emotional and sexual abuse, neglect, parental separation, household substance misuse, exposure to violence and other forms of prolonged stress. The landmark ACE Study of more than 17,000 adults demonstrated a graded relationship between cumulative childhood adversity and later health and behavioural outcomes (Felitti et al., 1998). A subsequent meta-analysis of 206 studies covering more than half a million adults confirmed that ACEs are common, with a majority of adults reporting at least one adverse experience (Madigan et al., 2023).

The consequences of adversity are rarely confined to a single outcome. Repeated exposure to stress while emotional and cognitive systems are still developing may influence how individuals respond to emotional situations, cope with distress, regulate behaviour and process information. Two domains are of particular interest: **emotion regulation** and **executive functioning**.

Emotion regulation refers to the processes through which individuals influence which emotions they have, when they

have them, and how they experience and express them (Gross, 1998). Difficulties in this domain — such as problems understanding or accepting emotions, controlling impulses during distress, or accessing effective regulation strategies — are increasingly regarded as transdiagnostic, cutting across multiple forms of psychological difficulty rather than belonging to any one disorder. Executive functions are the higher-order cognitive processes that allow thought and behaviour to be organised around goals. Three core components are widely recognised: inhibitory control, working memory and cognitive flexibility (Miyake et al., 2000; Diamond, 2013). These abilities underpin everyday activities from concentrating and following instructions to controlling impulsive reactions and making decisions under pressure.

The two domains are conceptually distinct but closely interconnected. Regulating anger during an interpersonal conflict, for example, may require inhibitory control to suppress an impulsive response, working memory to keep the larger goal of the interaction in mind, and cognitive flexibility to consider an alternative interpretation of events. Conversely, intense or prolonged emotional distress can consume cognitive resources and impair concentration, impulse control and goal-directed behaviour. If early adversity affects both domains, they may not operate independently but may form part of a broader pattern of adaptation to early stress.

Volume 15 Issue 10, October 2026

Fully Refereed | Open Access | Double Blind Peer Reviewed Journal

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## 1.1 Conceptual Orientation

This article adopts a neurocognitive perspective, in which emotional and cognitive functioning are understood as emerging from the interaction of neural systems, cognitive processes and environmental experience across development. Section 2 develops this perspective into an explicit theoretical model. The empirical component of the study operates at the psychological level: it measures cumulative adversity, emotion regulation difficulties and perceived executive functioning difficulties by self-report. The neurobiological mechanisms discussed are therefore *theorised explanations* for the associations the study tests, not variables that the study observes.

## 1.2 Young adulthood as a developmental window

The transition to adulthood brings growing independence and demands in education, employment, relationships, finances and long-term planning. Managing these demands requires effective emotion regulation and cognitive control, while the influence of earlier developmental experiences may persist. Studying young adults in non-clinical samples also allows psychological functioning to be understood dimensionally: individuals need not meet criteria for a psychiatric disorder to experience difficulties in emotion regulation or executive functioning, and identifying such difficulties may offer insight into vulnerability and protective processes before problems become more severe.

## 2. Theoretical Framework: A Neurocognitive Model of Adversity and Emotional Difficulty

The central theoretical claim is that childhood adversity shapes adult emotional functioning not only through learned beliefs and coping habits but also through its effects on the biological and cognitive systems that make emotional self-regulation possible. Four bodies of theory are integrated below: stress biology, prefrontal–limbic development, dimensional models of adversity, and models of the cognitive control of emotion.

### 2.1 Biological Embedding of Early Stress

Stress activates the hypothalamic–pituitary–adrenal (HPA) axis and the autonomic nervous system, releasing mediators such as cortisol that are adaptive in the short term. The concept of *allostatic load* describes the cumulative physiological cost incurred when these systems are activated repeatedly or fail to shut off (McEwen, 1998). Because the stress-response systems and the brain regions that regulate them are still maturing in childhood, prolonged or unpredictable stress during sensitive periods is thought to calibrate their set-points, a process often described as biological embedding (Lupien et al., 2009; McEwen & Morrison, 2013). On this view, the long-term consequences of adversity are partly *adaptive calibrations* to a threatening or unpredictable environment—such as heightened vigilance and rapid reactivity—that become costly when the environment changes.

## 2.2 Prefrontal–Limbic Circuitry

Emotional reactivity depends heavily on limbic structures such as the amygdala, which rapidly evaluates the significance of stimuli, whereas the prefrontal cortex supports top-down modulation of that reactivity. Prefrontal regions mature over a prolonged period, and the amygdala–prefrontal circuitry is considered a developmental target of stress, with the timing of exposure influencing its trajectory (Tottenham & Galván, 2016). Reviews of the maltreatment literature report altered structure, function and connectivity in regions including the prefrontal cortex, amygdala and hippocampus (Teicher et al., 2016). Functionally, the theoretical implication is a shift in the balance between bottom-up emotional reactivity and top-down regulatory control: stronger or faster emotional responses combined with a diminished capacity to modulate them.

## 2.3 Dimensions of Adversity: Threat and Deprivation

Cumulative-risk approaches, including the ACE tradition (Felitti et al., 1998), treat adverse experiences as additive. Dimensional models argue that qualitatively different forms of adversity may influence development through different pathways. In particular, experiences involving *threat* (for example abuse and violence exposure) are proposed to affect emotional learning and salience processing, whereas experiences involving *deprivation* (for example neglect and reduced cognitive or social stimulation) are proposed to affect the development of cognitive control (McLaughlin et al., 2014). Under this model, threat-related adversity would be expected to relate most directly to emotion regulation difficulties and deprivation-related adversity to executive functioning difficulties, although in practice the two dimensions frequently co-occur. This distinction matters for the present study because a cumulative ACE-IQ score cannot separate them (see Section 7).

## 2.4 The Cognitive Control of Emotion

Emotion regulation is not a single process. Gross's process model distinguishes strategies that act at different points in the emotion-generative sequence, from situation selection to cognitive change and response modulation (Gross, 1998), and its extended form emphasises that regulation involves identifying the need to regulate, selecting a strategy, implementing it and monitoring the outcome (Gross, 2015). Neurocognitive work shows that effortful strategies such as reappraisal engage prefrontal control systems that modulate amygdala activity (Ochsner & Gross, 2005). Executive functions — inhibitory control, working memory and cognitive flexibility (Miyake et al., 2000; Diamond, 2013)—are therefore the cognitive machinery of deliberate regulation: inhibition interrupts a prepotent emotional response, working memory holds goals and reappraisals in mind under emotional load, and flexibility permits shifting to an alternative strategy or interpretation.

Executive processes can also be distinguished by the motivational and emotional significance of the situation. “Cool” executive function operates in abstract, low-emotion contexts, whereas “hot” executive function operates when affect and motivation are engaged (Zelazo & Carlson, 2012).

Emotion regulation difficulties are arguably a failure of hot executive function in particular, which is one reason why they may co-occur with, but not be reducible to, difficulties on cooler cognitive tasks or self-reports.

The mapping between the facets of the DERS-16 and executive components is not one-to-one, but a theoretically motivated alignment generates specific expectations and can guide future, more fine-grained work (Table 1).

**Table 1:** Theoretical alignment of DERS-16 facets with executive components and putative neural correlates. These are theoretical propositions derived from the literature, not findings of the present study

| DERS-16 facet                                  | Executive component most implicated                               | Regions commonly associated (theorised)                               |
|------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------------------------|
| Impulse control difficulties                   | Inhibitory control                                                | Lateral and orbitofrontal prefrontal cortex; fronto-striatal circuits |
| Difficulty engaging in goal-directed behaviour | Working memory; goal maintenance                                  | Dorsolateral prefrontal cortex                                        |
| Limited access to regulation strategies        | Cognitive flexibility; working memory                             | Dorsolateral and ventrolateral prefrontal cortex; anterior cingulate  |
| Non-acceptance of emotional responses          | Cognitive flexibility; appraisal                                  | Medial prefrontal regions; amygdala reactivity                        |
| Lack of emotional clarity                      | Metacognitive monitoring (partly distinct from executive control) | Insula; anterior cingulate                                            |

## 2.5 An integrative model and its propositions

Integrating the above, the model proposes that cumulative adversity alters stress physiology and the development of prefrontal–limbic circuitry. The resulting profile- heightened emotional reactivity coupled with reduced top-down control- is expected to appear at the psychological level as difficulties

in emotion regulation and in executive functioning. The two sets of difficulties are expected to be reciprocally related: effortful regulation consumes cognitive-control resources, while dysregulated affect in turn degrades concentration, inhibition and working memory, a feedback loop that may sustain difficulties over time (Figure 1).

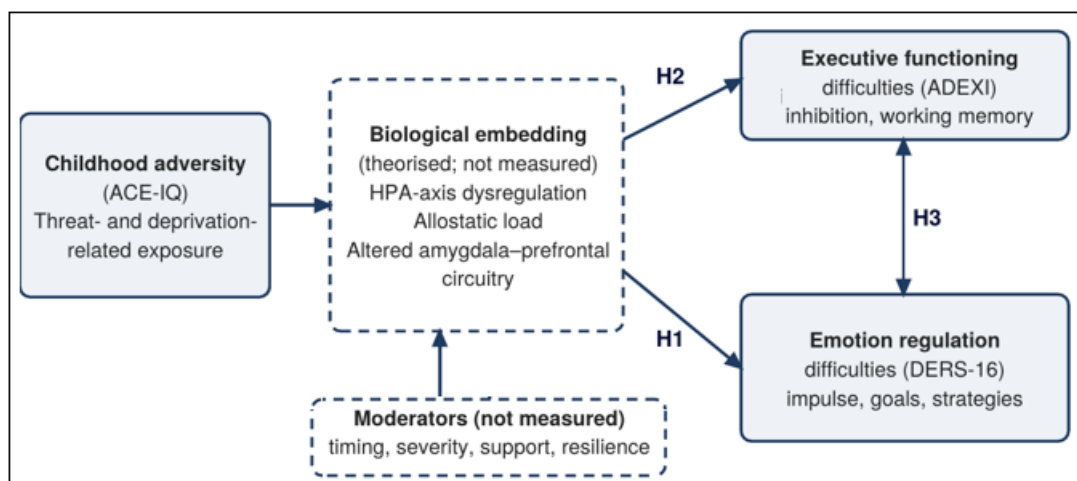


**Figure 1:** Proposed neurocognitive model. Solid boxes are measured constructs; dashed boxes are theorised and not measured. H1–H3 mark the psychological-level associations that the present study tests (adversity–emotion regulation, adversity–executive functioning, and emotion regulation–executive functioning).

The model yields three propositions that are directly testable in the present design, and one that requires different data:

- **Proposition 1 (H1).** Greater cumulative adversity is associated with greater emotion regulation difficulties, reflecting sensitised emotional reactivity and weaker regulatory control.
- **Proposition 2 (H2).** Greater cumulative adversity is associated with greater executive functioning difficulties, reflecting stress-related effects on prefrontal development.
- **Proposition 3 (H3).** Emotion regulation difficulties and executive functioning difficulties are positively associated, because effortful regulation depends on cognitive control and dysregulated affect impairs it.
- **Proposition 4 (not tested here).** Executive functioning partly *mediates* the association between adversity and emotion regulation difficulties. Testing mediation requires larger samples and, ideally, longitudinal or multi-method data, and is identified as a direction for future research.

## 2.6 Levels of inference

A rigorous neurocognitive account must be clear about the level at which its claims are supported. The mechanisms in Sections 2.1–2.4 are drawn largely from neuroimaging, endocrine and developmental research. The present study measures only behaviour as reported by participants. A pattern of positive correlations would be *consistent with* the model but could not confirm any neural pathway, because inferring neural processes from psychological scores (reverse inference) is logically weak and because several alternative explanations- shared genetic liability, current depression or anxiety, response style and recall bias- predict the same pattern. Likewise, self-reported executive difficulties show only modest correspondence with performance on objective tasks, and early adversity may dissociate across self-report, task and electrophysiological indices (Compton et al., 2024). The model is therefore best regarded as a source of

hypotheses and a framework for interpretation rather than as something the present design can prove.

### 3. Review of the Literature

#### 3.1 Childhood adversity and later functioning

Beyond establishing the prevalence of ACEs, research with young adults and university students has repeatedly linked cumulative adversity to depression, anxiety, stress, loneliness and lower well-being, often showing a dose–response pattern in which greater exposure is associated with poorer outcomes. This work has been replicated across continents, including large samples of young adults in India that used the same ACE-IQ instrument adopted here. Studies also indicate that adversity is heterogeneous: different types and combinations of adverse experiences are associated with different outcomes, which argues against treating adversity as a single uniform exposure. At the same time, adversity should not be regarded as deterministic; nature, severity and timing of exposure, social support and later experiences all shape outcomes, so that adversity is better understood as increasing vulnerability than as inevitably producing dysfunction.

#### 3.2 Childhood adversity and emotion regulation

Emotion regulation is increasingly proposed as a mechanism linking early adversity with later psychological and health outcomes. Research using the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004), a multidimensional measure covering non-acceptance of emotional responses, difficulty engaging in goal-directed behaviour, impulse-control difficulties, limited access to regulation strategies and lack of emotional awareness and clarity, has reported positive associations between ACEs and emotion regulation difficulties among undergraduate and young adult samples. Longitudinal evidence indicates that these associations extend from adolescence into young adulthood: in one recent study, childhood maltreatment predicted greater overall emotion regulation difficulties, although not the simple frequency with which particular strategies were used (Clinchard et al., 2026). Meta-analytic evidence on childhood emotional abuse points in the same direction. Together these findings suggest that overall difficulties in regulating emotion, rather than any single strategy, may be the more informative marker of the long-term emotional correlates of adversity.

#### 3.3 Childhood adversity and executive functioning

Evidence for an association between childhood maltreatment and poorer executive functioning in adulthood is substantial but not uniform. Studies of adults and emerging adults have reported poorer working memory, inhibitory control and cognitive flexibility among those with a history of maltreatment, in some cases even after accounting for current symptoms of depression and anxiety, and in non-clinical samples (Victor et al., 2024). Reviews of emerging adults, however, suggest that effects differ across executive-function domains and may be stronger for cognitive flexibility and inhibitory control than for working memory. Findings also vary according to how executive functioning is measured: a study of undergraduates examining early adversity found

dissociations among self-report, task performance and EEG indices (Compton et al., 2024). This variability is important when interpreting self-report measures, which capture perceived everyday difficulties and may diverge from performance on objective tasks.

#### 3.4 Research gap

Several gaps motivate the present study. First, much adversity research has focused on psychopathology and clinical samples, leaving emotional and cognitive functioning in non-clinical young adults comparatively less explored. Second, childhood adversity, emotion regulation and executive functioning are often examined singly or in pairs, and fewer studies consider all three within a single sample. Third, findings on executive functioning are inconsistent across domains and measurement methods, so further evidence on self-perceived executive difficulties is warranted. Finally, research integrating these constructs among young adults in India remains limited.

### 4. The Present Study

The aim of the study is to examine, at the psychological level, the relationships among childhood adversity, emotion regulation difficulties and self-reported executive functioning difficulties in young adults, as predicted by the neurocognitive model in Section 2. Specifically, the study will (a) describe the levels of each construct in the sample and (b) test the following hypotheses, which correspond to Propositions 1–3:

- **H1.** Childhood adversity will be positively related to emotion regulation difficulties.
- **H2.** Childhood adversity will be positively related to executive functioning difficulties.
- **H3.** Emotion regulation difficulties will be positively related to executive functioning difficulties.

Childhood adversity is treated as the primary predictor, and emotion regulation and executive functioning difficulties as the principal outcome variables. Because the design is correlational, the hypotheses are framed as associations; the model's directional and mechanistic claims (including Proposition 4) are not tested.

### 5. Method

#### 5.1 Design

The study adopts a quantitative, non-experimental, cross-sectional correlational design. Data are collected at a single time point, no variable is manipulated, and the analysis addresses the direction, strength and significance of associations rather than causation.

#### 5.2 Participants and sampling

The target sample is approximately 50 young adults aged 18–30 years, of any gender, recruited through convenience sampling via online platforms and personal and academic networks. Eligible participants must be able to understand the language of the questionnaires, have access to the online survey and complete it independently, provide informed

consent, and complete all required measures. Individuals outside the age range, those without consent, those who cannot adequately understand the questionnaires, and those submitting substantially incomplete, duplicate or evidently careless responses are excluded from analysis.

### 5.3 Measures

- 1) **Socio-demographic sheet:** Collects basic information (age, gender, educational and occupational status) to describe the sample.
- 2) **Adverse Childhood Experiences International Questionnaire (ACE-IQ):** Developed by the World Health Organization (2018), the ACE-IQ assesses exposure to adverse experiences before the age of 18, including abuse, neglect, violence and household dysfunction. Higher scores indicate greater cumulative exposure.
- 3) **Difficulties in Emotion Regulation Scale-16 (DERS-16):** A 16-item brief version of the DERS (Bjureberg et al., 2016) that retains the conceptual coverage of the original scale- including non-acceptance, impulse control, goal-directed behaviour, emotional clarity and access to regulation strategies- while reducing participant burden. It has shown good internal consistency and convergent and discriminant validity. Higher scores indicate greater difficulty.
- 4) **Adult Executive Functioning Inventory (ADEXI):** A 14-item self-report measure developed by Holst and Thorell (2018) that focuses on working memory and inhibitory control. Higher scores indicate greater perceived executive functioning difficulties. Because ADEXI scores tend to correlate only modestly with performance-based neuropsychological tests, the instrument is interpreted as an index of everyday, perceived executive functioning rather than as a substitute for objective assessment.

### 5.4 Procedure and ethical considerations

Eligible participants are approached online and informed of the purpose and nature of the study. Informed consent is obtained before any questionnaire is displayed; participation is voluntary and participants may withdraw at any stage without disadvantage. Because the ACE-IQ asks about potentially distressing experiences, participants are told about the nature of the questions in advance, are not required to disclose more than the instruments request, and may discontinue if they feel discomfort. Identifying information is minimised, data are used solely for academic purposes and results are reported in aggregate form. Responses are screened for completeness and eligibility before being entered for analysis.

### 5.5 Planned data analysis

Descriptive statistics (means, standard deviations, frequencies and percentages) will summarise the sample and the distribution of scores. Pearson's product-moment correlation coefficients will be computed among the three study variables to evaluate H1-H3, with direction, strength and statistical significance interpreted against a pre-specified significance level. Additional analyses may be undertaken

where the final sample size and the assumptions of the data permit. Given the modest planned sample, effect sizes and confidence intervals will be emphasised alongside p-values, and null results will be interpreted in light of limited statistical power.

## 6. Anticipated Contribution

- 1) **Clinical relevance:** Clarifying how developmental history relates to current emotional and cognitive functioning may support trauma-informed assessment and case formulation for young adults who present with emotional dysregulation, impulsivity, poor concentration or difficulty sustaining goal-directed behaviour.
- 2) **Psychological and research relevance:** By examining three constructs within one sample and using brief, accessible self-report instruments, the study supports a dimensional view of psychological difficulty and can inform the design of larger studies that combine self-report with objective neuropsychological and neurobiological measures.
- 3) **Relevance to young adults in India:** The study adds to a small but growing body of Indian research using the ACE-IQ in young adults and extends it to cognitive-emotional functioning.

## 7. Limitations and Scope

Several limitations should be acknowledged in advance. The planned sample is small and obtained by convenience sampling, which limits statistical power and generalisability. The cross-sectional design precludes causal inference, and the study cannot establish that adversity leads to later emotional or cognitive difficulties. All measures are self-report and the ACE-IQ is retrospective, so responses may be affected by recall bias, self-awareness and social desirability. Executive functioning is assessed through perceived everyday difficulties rather than performance tasks. A cumulative ACE-IQ score treats all adverse experiences as equivalent and therefore cannot distinguish threat-related from deprivation-related adversity, a distinction central to dimensional models. Concurrent psychological symptoms, which are not measured, may confound or account for associations. Finally, no neurobiological measures are included, so the neurocognitive model remains an interpretive framework rather than a direct test of neural mechanisms, and any support from the data would be indirect (Section 2.6).

## 8. Directions for Future Research

- Larger and more diverse samples recruited with random or stratified procedures, drawn from varied geographical, educational and socioeconomic backgrounds.
- Longitudinal designs that trace emotion regulation and executive functioning across development.
- Combining self-report with objective neuropsychological tests, and where feasible EEG, neuroimaging or cortisol measures, to examine the proposed neural and endocrine mechanisms directly, and testing Proposition 4 (executive functioning as a mediator) in adequately powered, longitudinal designs.

- Analysing threat- and deprivation-related adversity separately, as dimensional models predict distinct pathways to emotional and cognitive outcomes.
- Examining protective factors such as resilience, social support, coping strategies and positive childhood experiences.

## 9. Conclusion

Childhood adversity is a common developmental exposure with potential long-term implications for emotional and cognitive functioning. This article has set out a neurocognitive framework in which early stress becomes biologically embedded, alters prefrontal–limbic development and, through the cognitive control of emotion, is expressed in young adulthood as difficulties in both emotion regulation and executive functioning. It has also specified the limits of what a cross-sectional, self-report study can say about that framework. Any associations identified will be interpreted as correlations consistent with, but not proof of, the proposed mechanisms, and as a foundation for more rigorous longitudinal and multi-method research.

## Declarations

**Ethics and consent:** Participation is voluntary and based on informed consent; confidentiality is maintained and data are reported in aggregate.

**Acknowledgements:** The author thanks Prof. Chethana R. Acharya, Department of Psychology, Jain (Deemed-to-be University), Bengaluru, for guidance and support throughout the project.

**Conflict of interest:** The author declares no conflict of interest.

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