# Trajectories of Adverse Childhood Experiences and Self-Reported Health at Age 18

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## ABSTRACT

***OBJECTIVE:*** Despite growing evidence of links between adverse childhood experiences (ACEs) and long-term health outcomes, there has been limited longitudinal investigation of such links in youth. The purpose of these analyses was to describe the patterns of exposure to ACEs over time and their links to youth health.

***METHODS:*** The current analyses used data from LONGSCAN, a prospective study of children at risk for or exposed to child maltreatment, who were followed from age 4 to age 18. The analyses focused on 802 youth with complete data. Cumulative exposure to ACEs between 4 and 16 was used to place participants in 3 trajectory-defined groups: chronic ACEs, early ACEs only, and limited ACEs. Links to self-reported health at age 18 were examined using linear mixed models after controlling for earlier health status and demographics.

***RESULTS:*** The chronic ACEs group had increased self-reported health concerns and use of medical care at 18 but not poorer self-rated health status. The early ACEs only group did not significantly differ from limited ACEs on outcomes.

***CONCLUSIONS:*** In addition to other negative outcomes, chronic ACEs appear to affect physical health in emerging adulthood. Interventions aimed at reducing exposure to ACEs and early mitigation of their effects may have lasting and widespread health benefits.

**KEYWORDS:** adolescent health; adverse childhood experiences; child abuse and neglect; childhood adversities; utilization

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## WHAT'S NEW

The study provides longitudinal evidence that chronic exposure to adversity over the course of childhood is associated with health worries and with consumption of medical care in 18-year-olds.

OVER THE PAST decade, the Centers for Disease Control and Prevention Adverse Childhood Experiences (CDC-ACE) study has demonstrated that adversities in childhood have a negative impact on numerous adult health outcomes and behaviors, including premature death, adolescent pregnancy, and illicit drug use.[1–7] These studies examining adverse childhood experiences (ACEs) and adult outcomes have found that ACEs have a long-term and enduring effect across the life span.[2]

As important as the CDC-ACE studies have been in helping to clarify the relationship between child abuse/neglect and other adverse experiences and adult outcomes, they rely on adult retrospective reports about experiences before age 18. Although retrospective recall of ACEs provide important information,[8] it is also important to assess these relationships with prospective, proximal reports.[9] In addition, it appears that whether the effects of ACEs follow a dose-related[1–2] or threshold effect[10] depends on the health outcome examined and the timing of exposures.[11]

Little is known about the impact of ACEs across different developmental stages. Examining the effects of timing of adverse experiences during childhood and adolescence may provide important information about pathways between ACEs and a variety of outcomes for children and young adults,[12] as well as guide intervention and prevention strategies. Three recent prospective studies from the Consortium for LONGitudinal Studies of Child Abuse and Neglect (LONGSCAN)[13] found that at-risk and/or maltreated children experience significant ACEs across developmental periods[10,11,14] and that ACEs predicted child health outcomes in early childhood,[14] middle childhood,[10]

and early adolescence.[11] Timing of exposure to ACEs also appears to influence child outcomes.[11]

Although these recent findings are important, questions about timing and continuity of ACEs and child/youth outcomes remain unanswered. The LONGSCAN studies provide a unique opportunity to examine prospective reports of ACEs across early and middle childhood and the relationship of these ACEs to health outcomes in late adolescence. Furthermore, the collection of data across childhood developmental periods provides an opportunity to examine whether trajectories (patterns of children's experiences of ACEs over time) are a useful approach in attempting to understand health outcomes in late adolescence.

## METHODS

### PARTICIPANTS AND STUDY DESIGN

These analyses used data collected by LONGSCAN, a consortium consisting of a coordinating center and 5 study sites, focused on children exposed to child maltreatment or at risk for it, based on potential risk factors such as demographics and family health concerns. Distributed in different regions of the country, each site collected data according to commonly shared age-specific data collection protocols.[13] The sites varied in criteria for recruitment. These children and their caregivers were enrolled onto the LONGSCAN study at age 4 or 6 and assessed at various age-keyed follow-up points: ages 6, 8,10, 12, 14, 16, and 18.

The initial LONGSCAN sample included 1354 subjects recruited at the age 4/6 baseline. As a result of attrition and the premature ending of funding for the study, 912 youth (67.4%) had outcome data available at age 18. Of these, 802 (87.9%) had data on exposure to ACEs at all of the key points of assessment: ages 6, 12, 14, and 18. There were no demographic differences between those included in the analyses and those not included. The description of the analysis sample is presented in the Results section.

### HUMAN SUBJECTS

Each participating study site, as well as the coordinating center, obtained independent approval from its local institutional review board for each age assessment. Caregivers provided informed consent, while youth provided assent for their participation for all interviews from age 8 through 16. At the age 18 interview, youth provided informed consent.

### VARIABLES AND THEIR MEASUREMENT

#### *Adverse Childhood Experiences*

As described in previous studies,[11] age-appropriate measures were selected from among the available instruments administered to the LONGSCAN sample to assess ACEs over time. Prior research had identified 3 periods that corresponded with these assessments: early childhood (birth to age 6), later childhood (age 6 to age 12) and teenage years (age 12 to age 16).[11] The adversities were selected to parallel those identified in the CDC-ACE studies.[1] There was some variation of the time frame used in each question because some measures asked about events in the prior year, while others asked about events in the prior 6 months. These data were collected during face-to-face or telephone assessment interviews at ages 4, 6, 8, 10, 12, 14, and 16 years. For several variables indicating ACEs, somewhat different measures were used to assess the variable at different ages. To construct a longitudinal profile of ACEs, predictor variables were dichotomized, and each was assessed at 3 developmental periods (birth to 6, over 6 to 12, and over 12 to 16). The ACEs examined included 2 broad categories of childhood experiences: child maltreatment and family dysfunction.

#### *Child Maltreatment*

Each site reviewed child protective service administrative records for allegations of child maltreatment at least every 2 years. Rather than rely on child protective services labels, the allegation texts were reviewed by staff trained to high reliability and coded according to types of alleged maltreatment and linked to the age of the participant. For each of the 3 time periods, the following 4 types of child maltreatment were dichotomized, based on the Modified Maltreatment Coding System (MMCS), as follows[15,16]: 1) physical abuse (any blows or injury to the body; violent handling, choking, burning, shaking, or nondescript injury); 2) sexual abuse (any sexual exposure, exploitation, molestation, or penetration); 3) psychological maltreatment (any threats to psychological safety and security, lack of acceptance and threats to self-esteem, or failure to allow age-appropriate autonomy); and 4) neglect (any failure to provide for a child's physical needs, or supervision so inadequate as to put the child's safety at risk).

#### *Family Dysfunction*

Family dysfunction included caregiver substance use, caregiver depressive symptoms, intimate partner violence in the home, and criminal activity in the home. The assessment of each of these is briefly described.

#### *Caregiver Substance Use*

Caregiver substance abuse was assessed at age 4 using the CAGE,[17] a commonly used 4-item screening measure of problem alcohol use. Endorsement of any of the screening items was considered indicative of substance use by the parent.[18] The Caregiver Substance Use measure, developed by LONGSCAN,[19] was administered to caregivers when children were aged 8, 12, 14, and 16 years. It asked a series of yes or no questions about the caregiver's use of common substances, both legal and illegal.

#### *Caregiver Depressive Symptoms*

Caregiver depressive symptoms were measured using 2 scales, depending on the time frame. The Center for Epidemiological Studies Depression Scale (CES-D),[20] which measures symptoms associated with depression in the past week, was administered to caregivers of children at the ages of 4, 6, 12, 14, and 16 years. The Brief Symptom Inventory (BSI), administered at the child's age 8 interview, is a valid, reliable measure of a broader range of psychological symptoms in the last week including depression.[21,22] In both cases, scores were dichotomized