Adverse Childhood Experiences and Disability in U.S. Adults

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Objective: To assess relationships between adverse childhood experiences and self-reported disabilities in adult life.

Design: Cross-sectional, random-digit-dialed, state-population-based survey (Behavioral Risk Factor Surveillance System).

Setting: Fourteen states and the District of Columbia.

Participants: Noninstitutionalized adults ages ≥18 years surveyed in 2009 and/or in 2010 (n = 81,184).

Methods: The Behavioral Risk Factor Surveillance System Adverse Childhood Experience (ACE) Module asks about abuse (physical, sexual, emotional), family dysfunction (exposures to domestic violence, living with mentally ill, substance abusing, or incarcerated family member(s), and/or parental separation and/or divorce) that occurred before age 18 years. The ACE score sums affirmed ACE categories (range, 0-8). We controlled for demographic characteristics (age, race, education, income, and marital status) and self-reported physical health conditions (stroke, myocardial infarction, diabetes, coronary heart disease, asthma). Five states asked participants about mental health conditions (anxiety, depression). A subset analysis of participants in these states evaluated the effect of adjusting for these conditions.

Main Outcome Measurements: The primary outcome was disability (self-reported activity limitation and/or assistive device use).

Results: More than half of participants (57%) reported at least 1 adverse childhood experience category, and 23.2% reported disability. The odds ratio (95% confidence interval) of disability increased in a graded fashion from odds ratio 1.3 (95% confidence interval, 1.2-1.4) among those who experienced 1 adverse experience to odds ratio 5.8 (95% confidence interval, 4.6-7.5) among those with 7-8 adverse experiences compared with those with no such experiences when adjusting for demographic factors. The relationship between adverse experiences and disability remained strong after adjusting for physical and mental health conditions.

Conclusions: There is a strong graded relationship between childhood exposure to abuse and household dysfunction and self-reported disability in adulthood, even after adjusting for potentially mediating health conditions. Greater clinician, researcher, and policymaker awareness of the impact of childhood adversity on disability is crucial to help those affected by childhood adversity lead more functional lives.

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Adverse childhood experiences (ACE), including abuse and family dysfunction, impact more than 50% of the U.S. population [1-3] and are increasingly recognized to have powerful adverse effects on health at all life stages. ACE exposure can increase the prevalence of childhood somatic symptoms [4]. There also is a dose-response effect of the number of ACE categories on the prevalence of adolescent and adult health risk behaviors [5-11]. Effects of ACEs last well into adulthood [1,12,13], which increases the prevalence of somatic symptoms [14], chronic health conditions [1-3,15], and premature mortality [16]. Less is known about their effects on disability or how they affect functional recovery from potentially disabling conditions.

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The paucity of research that focused on disability and disparities in health outcomes has recently been recognized by several national health organizations, which have called for more research on disability and health disparities [17-19]. Recognizing the need for a common conceptual framework of disability, the Institute of Medicine advocated adopting concepts from the International Classification of Functioning, Disability and Health [20], which distinguishes among health conditions, negative changes in body structure and function (impairments), activity limitations, and participation restrictions [21,22]. The original ACE conceptual model was a pyramid that illustrated the life course with ACEs at the foundation adversely affecting later stages of life. Disease and disability (and social problems) are combined in the same higher layer just below premature death (Figure 1) [1]. Yet, not all disease leads to disability, and, therefore, understanding how ACEs influence the development and/or effects of disability is vital for designing effective clinical interventions to improve function in those persons affected by childhood adversity. Thus, we wished to expand this ACE model by recognizing distinctions between health conditions and subsequent disabilities, which allows evaluation of the relationship between childhood adversity and later onset of disability.

Analysis of mounting evidence suggests that ACEs can affect neurodevelopment through epigenetic mechanisms. Thus, an early adverse environment can lead to changes in gene expression, which cause functional and structural changes to brain, neuroendocrine, autonomic, and immune functions that may affect the way individuals respond to stress later in life [12,23-28]. Although disease and health conditions are often analyzed as outcomes, they can also be stressors. Beyond affecting the biologic response to adult stressors, childhood adversity increases the likelihood of engaging in health-risk behaviors in adolescence and adulthood [1,8-10,29] and may adversely affect adult-life social resources [30], coping skills, and emotional functioning and/or distress [31]. All such factors may affect the disablement process. We hypothesized that ACEs would be associated with increased rates of disability even after controlling for health conditions, and that, as the number of ACE categories experienced increases, the rates of disability would increase. We further anticipated that different types of abuse may have differential effects on disability.

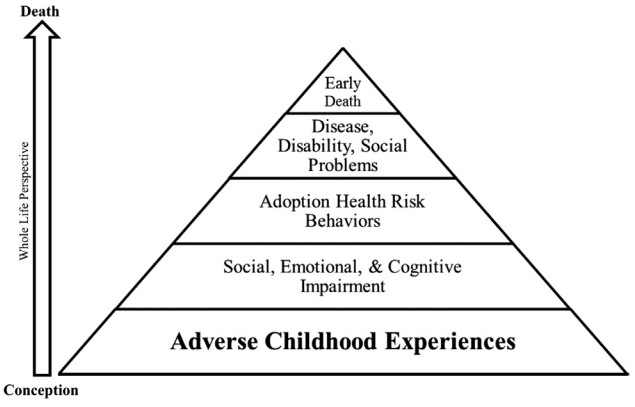

Figure 1. Kaiser–Centers for Disease Control and Prevention (CDC) Adverse Childhood Experience (ACE) Study conceptual model (70). CDC ACE pyramid, which illustrates potential effects of ACEs throughout the life course.

METHODS

Study Design and Sample

We analyzed data from the Behavioral Risk Factor Surveillance System (BRFSS), a population-based cross-sectional survey. The BRFSS uses a disproportionate stratified sampling technique to obtain state-specific probability samples of households with telephones. Because it is not practical to survey every resident of a state, the goal of probability sampling to is to obtain a sample that is representative of that state. The BRFSS also uses survey weights to ensure that the weighted sample represents the known proportions of age, gender, and race or ethnicity within a state or geographic region [32]. Fourteen states and the District of Columbia administered the ACE module in 2009 and/or 2010 (Table 1) [33]. The state-specific cooperation rates (the proportion of completed interviews of those contacted) ranged from 68.9-82.4. The Council of American Survey Research Organizations response rates (proportion of completed interviews of the estimated eligible) ranged from 47.0-68.7 [34,35]. Of 89,810 participants, we excluded 7278 (8.1%) because of missing ACE data and 1348 (1.5%) because of missing disability, demographic, or health condition data, which resulted in a final sample size of 81,184 (90.4% of the total original sample).

Study Variables

The ACE Module adapted questions from the Kaiser–Centers for Disease Control (CDC) ACE Study to assess childhood (that occurred before age 18 years old) abuse (sexual, physical, emotional) and family dysfunction (experienced parental domestic violence, parental divorce or separation, family member incarceration, substance abuse [36], mental illness) [1,10]. The adapted questions were tested by using focus groups and cognitive testing [10,37]. The individual abuse and domestic violence questions contain a measure of self-reported frequency (once, more than once). The 3 sexual abuse questions are about different kinds of sexual contact (being touched, forced to touch, and forced to have sex). We followed the reported method of the CDC to group the 11 ACE questions into 8 ACE categories (Table 2). In addition, we used the same criteria for inclusion in each of the ACE categories (Table 2), and the same approach of coding answers of "do not know" as a negative