

The Relation Between Adverse Childhood Experiences and Adult Health: *Turning Gold into Lead*

Background

The Adverse Childhood Experiences (ACE) Study is a major research study that compares current adult health status to childhood experiences decades earlier. With the cooperation of 17,421 adult Health Plan members and with the ongoing collaboration of Dr Robert Anda at the Centers for Disease Control and Prevention (CDC), the study is being carried out in the Department of Preventive Medicine at Kaiser Permanente (KP) San Diego—where for many years we conducted detailed biomedical, psychological, and social (biopsychosocial) evaluations of more than 50,000 adult Kaiser Foundation Health Plan members per year.

The findings are important medically, socially, and economically: They provide remarkable insight into how we become what we are as individuals and as a nation. The ACE Study reveals a powerful relation between our emotional experiences as children and our adult emotional health, physical health, and major causes of mortality in the United States. Moreover, the time factors in the study make it clear that time does *not* heal some of the adverse experiences we found so common in the childhoods of a large population of middle-aged, middle-class Americans. One doesn't "just get over" some things.

Study Design

The ACE Study was triggered by observations we made in the mid 1980s in an obesity program at the KP San Diego Department of Preventive Medicine. This program then had a high dropout rate. The first of many counterintuitive discoveries was that the great majority of the dropouts actually were successfully losing weight. Detailed life interviews of almost 200 such individuals unexpectedly revealed that childhood abuse was remarkably common and antedated the onset of their obesity. Many patients spoke openly of an association between the two. The counterintuitive aspect was that, for many people, obesity was not their problem; it was their protective *solution* to problems that previously had never been discussed with anyone. An early insight was the memorable remark of a woman who was raped at age twenty-three and gained 105 pounds in the subsequent year: "Overweight is overlooked, and that's the way I need to be." The contrast was striking between this statement and her desire to lose weight. Similarly, two men who were guards at the State Penitentiary became anxious after losing more than 100

pounds each. They made it clear that they felt much safer going to work looking "big as a refrigerator" instead of normal size. Overall, we found the simultaneous presence of opposing forces to be common; many of our weight program patients were driving with one foot on the brakes and one on the gas, wanting to lose weight but fearful of change.

In 1990 in Atlanta, I presented information about the frequent relation between obesity and abusive childhood experiences to a largely skeptical audience at the North American Association for the Study of Obesity. Unexpectedly, this presentation led to contacts with researchers at the CDC, who recognized the importance of what had been reported. They proposed a large epidemiologic study to provide definitive evidence of our clinical observations. This was the beginning of the ACE Study at KP San Diego, where, each year, we could easily ask more than 26,000 consecutive adults seen in the Department of Preventive Medicine if they would be interested in helping us understand how childhood events might affect adult health status. Sixty-eight percent of this population agreed to participate and understood that the information they provided about their childhood would never be included in their medical records.

The ACE Study compared current adult health status of these participants with eight categories of adverse childhood experience that we had frequently identified in the weight program. Three categories pertained to personal abuse: recurrent physical abuse, recurrent emotional abuse, and sexual abuse. Four categories pertained to growing up in a dysfunctional household—ie, with an alcoholic person or a drug user; where someone was in prison; where someone was chronically depressed, mentally ill, or suicidal; where the mother was treated violently; and where the parents were separated, divorced, or in some way lost to the patient during childhood. In addition, we decided to monitor this large cohort for at least five years to compare childhood experiences prospectively against adult pharmacy costs, doctor office visits, emergency department use, hospitalization, and death. An ACE score was constructed to analyze the huge mass of information we gathered. A person exposed to none of the studied categories had an ACE Score of 0; an individual exposed to any four had an ACE Score of 4, etc.

Because the average study participant was 57 years old, we actually were measuring the effect of child-

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hood experiences on adult health status a half-century later. Dr Anda, my coprincipal investigator at CDC, designed the data management and retrospective and prospective components of the Study with great skill. Here, I will only touch upon some highlights of our findings; details may be sought in the anchor article of a series of publications deriving from the ACE Study. The initial article was published in May 1998 in the *American Journal of Preventive Medicine*, v 14: 245-258;¹ full text is at their Web site: www.meddevel.com/site.mash?left=/library.exe&m1=4&m2=1&right=/library.exe&action=search_form&search.mode=simple&site=AJPM&jcode=AMEPRE.

A list of published peer reviewed publications from the ACE Study is provided at the end of this article.²⁻¹¹

Findings

A striking finding was that adverse childhood experiences are vastly more common than recognized or acknowledged. Of equal importance was our observation that they had a powerful correlation to adult health a half-century later. It is this combination that makes them so important. Slightly more than half of our middle-class population of Health Plan members experienced one or more of the categories we studied. One in four was exposed to two categories of abusive experience, one in 16 to four categories. Given an exposure to one category, there is 80% likelihood of exposure to another. All this, of course, is well shielded by social taboos against obtaining this information. Further, one may “miss the forest for the trees” if one studies these issues individually. They do not occur in isolation; for instance, a child does not grow up with an alcoholic person or with domestic violence in an otherwise well-functioning household. The question to ask is: How will these childhood experiences play out decades later in a doctor’s office? How does one perform reverse alchemy, going from a normal newborn with almost unlimited potential to a diseased, depressed adult? How does one turn gold into lead?

Smoking is a useful starting example to illustrate what we found; moreover, it allows us to start with a minimally threatening topic. In California, there are now profound social pressures against smoking; persistent smoking in the face of these is often attributed to “addiction.” But did you know that current smoking has a high degree of association with what happened decades ago in childhood? Figure 1 is a graphic illustration of how the ACE Score has a graded, dose-response effect on the probability of current

smoking. The higher the ACE Score, the greater the likelihood of current smoking. This graded, dose-response effect is present for all the associations we found, although I will only present three. All the relations have a p value of .001 or better. Further details of the ACE Study findings are published in a series of articles exploring our findings from the retrospective and prospective arms of the Study.

Lest one doubt the significance of smoking, we found that chronic obstructive pulmonary disease (COPD) has a strong relationship to the ACE Score. A person with a midrange ACE score of 4 is 390% more likely to have COPD than is a person with an ACE Score of 0. What does this do to the conventional concept of smoking that attributes addiction to characteristics that are intrinsic within nicotine? We instead found “addiction” attributable to characteristics that are intrinsic in early life experiences. If early emotional stress predicts COPD, is COPD properly understood as a psychosomatic condition? Are certain common, chronic, adult diseases the result of attempts at self-treatment of concealed problems that occurred in childhood?

When we looked at self-defined current depression, we found that a person with ACE score ≥ 4 was 460% more likely to be depressed than a person with ACE score of 0. Confirming the reliability of this conclusion, we found a 1220% historical increase in attempted suicide between these two groups. For groups with higher ACE scores, incidence of attempted suicide increases thirtyfold to fifty-one fold! Using the analytic technique of population attributable risk, we

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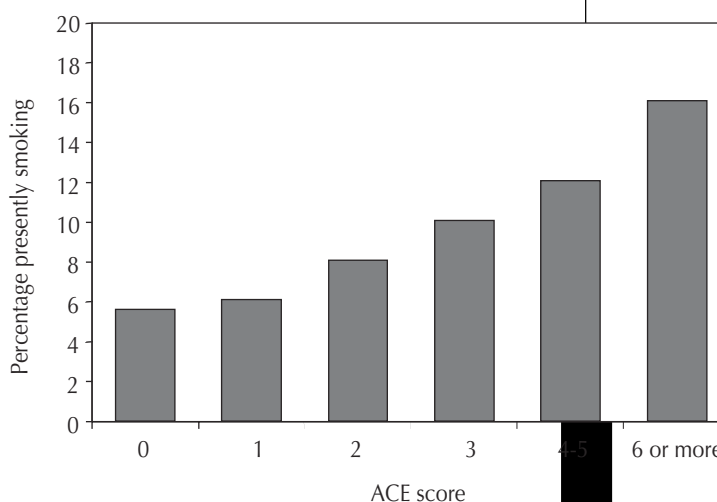


Figure 1. Graph shows relation between Adverse Childhood Experiences (ACE) Score and smoking status.

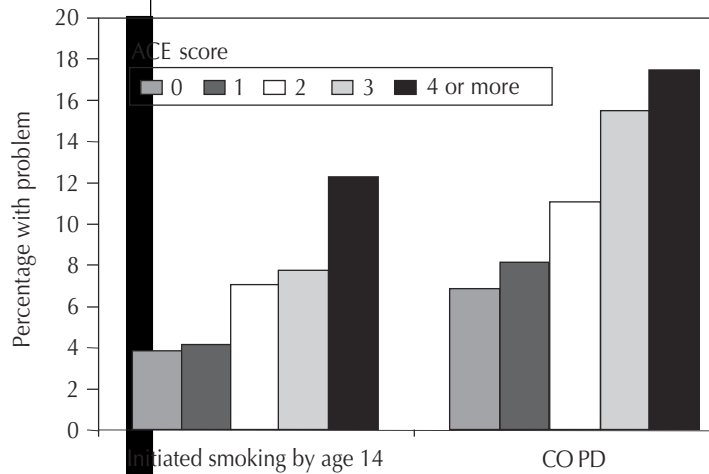


Figure 2. Graph shows relation between longtime smoking, chronic obstructive pulmonary disease (COPD), and ACE Score.

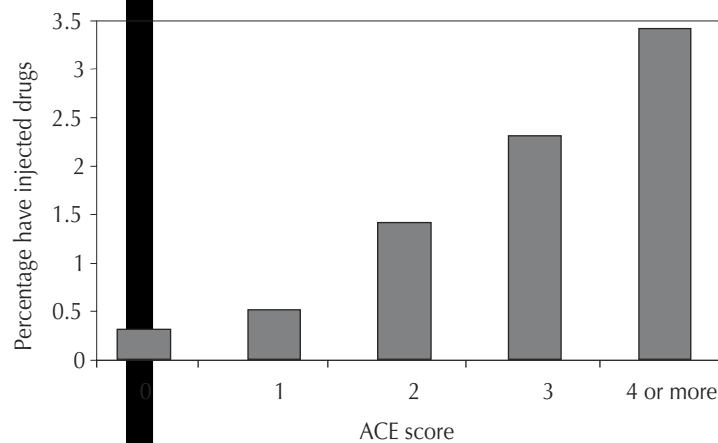


Figure 3. Graph shows relation between ACE Score and illicit use of injected drugs.

found that more than two thirds of suicide attempts could be attributed to adverse childhood experiences.

Intravenous drug use is a major public health problem. In spite of massive efforts to curtail it, little progress has been made. We found that IV drug use may properly be viewed as a personal solution to problems that are well concealed by social niceties and convention. For example, a male child with an ACE score of 6 has a 4600% increase in the likelihood of later using intravenous drugs. This relation to adverse childhood experiences is powerful and is graded at every step; it provides a perfect dose-response curve; and epidemiologically, these outcomes are nearly unique in magnitude. Because no one shoots heroin to get endocarditis or AIDS, might heroin then be used for relief of profound anguish dating back to childhood experiences? Might it be

the best coping device a person can find? If so, is this phenomenon a public health problem or a personal solution? How often are public health problems personal solutions? Is drug abuse self-destructive, or is it a desperate attempt at self-healing, albeit at a significant future risk? This point is important because primary prevention is far more difficult than anticipated—possibly because incomplete understanding of the benefits of so-called health risk behaviors causes these behaviors to be viewed as irrational acts that have only negative consequences. Does this incomplete view of drug abuse leave us mouthing cautionary platitudes instead of understanding the cause of our intractable public health problems?

Beyond these few illustrations, we found many other measures of adult health to have a strong, graded relation to what happened in childhood: hepatitis, heart disease, fractures, diabetes, obesity, alcoholism, occupational health, and job performance. These findings are detailed in the original and subsequent articles and will further be reported in publications of the yet-to-be-analyzed prospective arm of the ACE Study.

Discussion

What do these findings mean for medical practice and for society? Clearly, we have shown that adverse childhood experiences are both common and destructive. This combination makes them one of the most important, if not the most important, determinants of the health and well-being of the nation. Unfortunately, these problems are both painful to recognize and difficult to cope with. Most physicians would far rather deal with traditional organic disease. Certainly, it is easier to do so, but that approach also leads to troubling treatment failure and to the frustration of expensive diagnostic quandaries where everything is ruled out but nothing is ruled in.

Our usual approach to many common adult chronic diseases reminds one of the relation between smoke and fire. A person unfamiliar with fires would initially be tempted to treat the smoke—ie, the most visible aspect of the problem. What we have learned in the ACE Study represents the underlying fire. Fortunately, fire departments learned to distinguish cause from effect long ago; if they had not, they would use fans instead of water hoses.

If the treatment implications of what we found in the ACE Study are far-reaching, the prevention aspects are positively daunting. The very nature of the material is such as to make one uncomfortable. Why would one want to leave the relative comfort of tra-

ditional organic disease and enter this area of threatening uncertainty that none of us has been trained to deal with? And yet, as I write these words, I am interrupted to consult on a 70-year-old woman who is diabetic and hypertensive. The initial description given to me omitted the fact that she is morbidly obese (one doesn't go out of one's way to identify what one can't handle). Review of her chart shows her to be chronically depressed, never married, and, because we ask the question of 57,000 adults a year, to have been raped by her elder brother six decades ago when she was ten. The same brother also molested her sister, who also is said to be leading a troubled life.

We found that 22% of our Health Plan members were sexually abused as children. How does that affect a person later in life? What does it mean that early sexual abuse is never spoken of? We find it useful routinely to ask all patients acknowledging this experience, "How did that affect you later in life?"

What, then, is this woman's diagnosis? Is she just another hypertensive, diabetic old woman, or is there more to the practice of medicine? Here is the way we conceptualized her problems:

Childhood sexual abuse

Chronic depression

Morbid obesity

Diabetes mellitus

Hypertension

Hyperlipidemia

Coronary artery disease

Macular degeneration

Psoriasis

This is not a comfortable diagnostic formulation; it points out that our attention is comfortably focused on tertiary consequences far downstream. The diagnosis shows that the primary issues are well protected by social convention and taboo and points out that we have limited ourselves to the smallest part of the problem: the part where we are comfortable as mere prescribers of medication. Which diagnostic choice shall we make? Who shall make it? And if not now, when? ❖

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Acknowledgments

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Selected ACE Study Publications

1. Felitti VJ, Anda RF, Nordenberg D, et al. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) Study. *Am J Prev Med* 1998 May;14(4):245-58.
2. Foege WH. Adverse childhood experiences: A public health perspective. *Am J Prev Med* 1998 May;14(4):354-5.
3. Weiss MJ, Wagner SH. What explains the negative consequences of adverse childhood experiences on adult health? Insights from cognitive and neuroscience research. *Am J Prev Med* 1998 May;14(4):356-60.
4. Anda RF, Croft JB, Felitti VJ, et al. Adverse childhood experiences and smoking during adolescence and adulthood. *JAMA* 1999 Nov 3;282(17):1652-8.
5. Dietz PM, Spitz AM, Anda RF, et al. Unintended pregnancy among adult women exposed to abuse or household dysfunction during their childhood. *JAMA* 1999 Oct 13;282(14):1359-64.
6. Hillis SD, Anda RF, Felitti VJ, et al. Adverse childhood experiences and sexually transmitted diseases in men and women: a retrospective study. *Pediatrics* 2000 Jul;106(1):E11.
7. Edwards VJ, Anda RF, Nordenberg DF, et al. Bias assessment for child abuse survey: factors affecting probability of response to a survey about childhood abuse. *Child Abuse Negl* 2001 Feb;25(2):307-12.
8. Edwards VJ, Fivush R, Anda RF, et al. Autobiographical memory disturbances in childhood abuse survivors. In: Freyd JJ, DePrince AP, editors. *Trauma and cognitive science: a meeting of minds, science, and human experience*. Binghamton (NY): Haworth Press; 2001. Published simultaneously as a single-topic issue of *J Aggression Maltreatment Trauma* Vol 4(2), No. 8.
9. Anda RF, Felitti VJ, Chapman DP, et al. Abused boys, battered mothers, and male involvement in teen pregnancy. *Pediatrics* 2001 Feb;107(2):E19.
10. Dube SR, Anda RF, Felitti VJ, et al. Adverse childhood experiences and personal alcohol abuse as an adult. *Addict Behav*. In press 2002.
11. Dube SR, Anda RF, Felitti VJ, et al. Exposure to abuse, neglect and household dysfunction among adults who witnessed intimate partner violence as children: implications for integrated health and social services. *Violence Vict*. In press 2002.
12. Dube SR, Anda RF, Felitti VJ, et al. Childhood Abuse, Household dysfunction, and the risk of attempted suicide throughout the life span. Findings from the Adverse Childhood Experiences Study. *JAMA* 2001;286:3089-3096.

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