

The Origins of Addiction:
Evidence from the Adverse Childhood Experiences Study

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"In my beginning is my end."

T.S. Eliot, "Four Quartets" ¹

ABSTRACT:

A population-based analysis of over 17,000 middle-class American adults undergoing comprehensive, biopsychosocial medical evaluation indicates that three common categories of addiction are strongly related in a proportionate manner to several specific categories of adverse experiences during childhood. This, coupled with related information, suggests that the basic cause of addiction is predominantly experience-dependent during childhood and not substance-dependent. This challenge to the usual concept of the cause of addictions has significant implications for medical practice and for treatment programs.

Purpose:

My intent is to challenge the usual concept of addiction with new evidence from a population-based clinical study of over 17,000 adult, middle-class Americans. The usual concept of addiction essentially states that the compulsive use of 'addictive' substances is in some way caused by properties intrinsic to their molecular structure. This view confuses mechanism with cause. Because any accepted explanation of addiction has social, medical, therapeutic, and legal implications, the way one understands addiction is important. Confusing mechanism with basic cause quickly leads one down a path that is misleading. Here, new data is presented to stimulate rethinking the basis of addiction.

Background:

The information I present comes from the Adverse Childhood Experiences (ACE) Study.² The ACE Study deals with the basic causes underlying the 10 most common causes of death in America; addiction is only one of several outcomes studied.

In the mid-1980s, physicians in Kaiser Permanente's Department of Preventive Medicine in San Diego discovered that patients successfully losing weight in the Weight Program were the most likely to drop out. This unexpected observation led to our discovery that overeating and obesity were often being used unconsciously as protective solutions to unrecognized problems dating back to childhood.^{3,4} Counterintuitively, obesity provided hidden benefits: it often was sexually, physically, or emotionally protective.

Our discovery that public health problems like obesity could also be personal solutions, and our finding an unexpectedly high prevalence of adverse childhood experiences in our middle class adult population, led to collaboration with the Centers for Disease Control (CDC) to document their prevalence and to study the implications of these unexpected clinical observations. I am deeply indebted to my colleague, Robert F. Anda MD, who skillfully designed the Adverse Childhood Experiences (ACE) Study in an epidemiologically sound manner, and whose group at CDC analyzed several hundred thousand pages of patient data to produce the data we have published.

Many of our obese patients had previously been heavy drinkers, heavy smokers, or users of illicit drugs. Of what relevance are these observations; do they imply some unspecified innate tendency to addiction? Is addiction genetic, as some have proposed for alcoholism? Is addiction a biomedical disease, a personality disorder, or something different? Are diseases and personality disorders separable, or are they ultimately related? What does one make of the dramatic recent findings in neurobiology that seem to promise a neurochemical explanation for addiction? Why does only a small percent of persons exposed to addictive substances become compulsive users?

Although the problem of narcotic addiction has led to extensive legislative attempts at eradication, its prevalence has not abated over the past century. However, the distribution pattern of narcotic use within the population has radically changed, attracting significant political attention and governmental action.⁵ The inability to control addiction by these major, well-intended governmental efforts has drawn thoughtful and challenging commentary from a number of different viewpoints.^{6,7}

In our detailed study of over 17,000 middle-class American adults of diverse ethnicity, we found that the compulsive use of nicotine, alcohol, and injected street drugs increases proportionally in a strong, graded, dose-response manner that closely parallels the intensity of adverse life experiences during childhood. This of course supports old psychoanalytic views and is at odds with current concepts, including those of biological psychiatry, drug-treatment programs, and drug-eradication programs. Our findings are disturbing to some because they imply that the basic causes of addiction lie within *us* and the way we treat each other, not in drug dealers or dangerous chemicals. They suggest that billions of dollars have been spent everywhere except where the answer is to be found.

Study design:

Kaiser Permanente (KP) is the largest prepaid, non-profit, healthcare delivery system in the United States; there are 500,000 KP members in San Diego, approximately 30% of the greater metropolitan population. We invited 26,000 consecutive adults voluntarily seeking comprehensive medical evaluation in the Department of Preventive Medicine to help us understand how events in childhood might later affect health status in adult life. Seventy percent agreed, understanding the information obtained was anonymous and would not become part of their medical records. Our cohort population was 80% white including Hispanic, 10% black, and 10% Asian. Their average age was 57 years; 74% had been to college, 44% had graduated college; 49.5% were men. In any four-year period, 81% of all adult Kaiser Health Plan members seek such medical

evaluation; there is no reason to believe that selection bias is a significant factor in the Study. The Study was carried out in two waves, to allow mid point correction if necessary. Further details of Study design are described in our initial publication.²

The ACE Study compares adverse childhood experiences against adult health status, on average a half-century later. The experiences studied were eight categories of adverse childhood experience commonly observed in the Weight Program. The prevalence of each category is stated in parentheses. The categories are:

- recurrent and severe physical abuse (11%)
- recurrent and severe emotional abuse (11%)
- contact sexual abuse (22%)
- growing up in a household with:
 - an alcoholic or drug-user (25%)
 - a member being imprisoned (3%)
 - a mentally ill, chronically depressed, or institutionalized member (19%)
 - the mother being treated violently (12%)
 - both biological parents *not* being present (22%)

The scoring system is simple: exposure during childhood or adolescence to any category of ACE was scored as one point. Multiple exposures within a category were not scored: one alcoholic within a household counted the same as an alcoholic and a drug user; if anything, this tends to understate our findings. The ACE Score therefore can range from 0 to 8. Less than half of this middle-class population had an ACE Score of 0; one in fourteen had an ACE Score of 4 or more.

In retrospect, an initial design flaw was not scoring subtle issues like low-level neglect and lack of interest in a child who is otherwise the recipient of adequate physical care. This omission will not affect the interpretation of our First Wave findings, and may explain the presence of some unexpected outcomes in persons having ACE Score zero. Emotional neglect was studied in the Second Wave.

The ACE Study contains a prospective arm: the starting cohort is being followed forward in time to match adverse childhood experiences against current doctor office visits, emergency department visits, pharmacy costs, hospitalizations, and death. Publication of these analyses soon will begin.

Findings:

Our overall findings, presented extensively in the American literature, demonstrate that:

- Adverse childhood experiences are surprisingly common, although typically concealed and unrecognized.
- ACEs still have a profound effect 50 years later, although now transformed from psychosocial experience into organic disease, social malfunction, and mental illness.
- Adverse childhood experiences are the main determinant of the health and social well-being of the nation.

Our overall findings challenge conventional views, some of which are clearly defensive. They also provide opportunities for new approaches to some of our most difficult public health problems. Findings from the ACE Study provide insights into changes that are needed in pediatrics and adult medicine, which expectedly will have a significant impact on the cost and effectiveness of medical care.

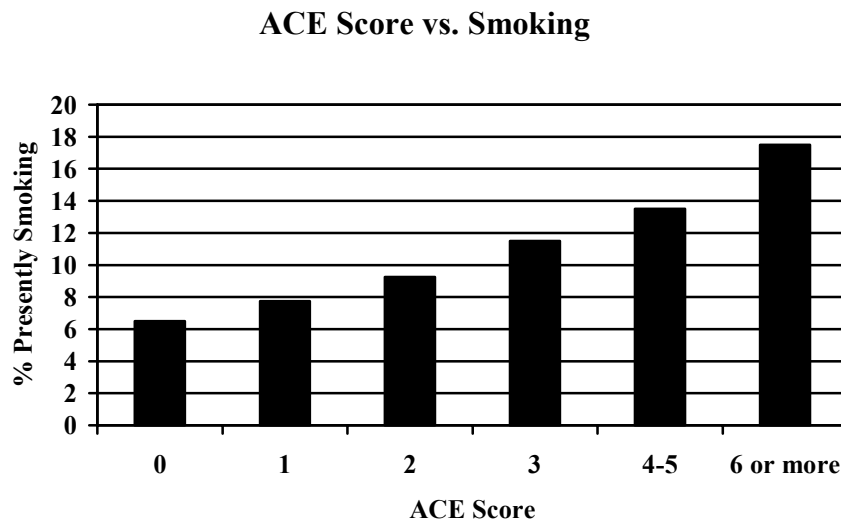
Our intent here is to present our findings only as they relate to the problem of addiction, using nicotine, alcohol, and injected illicit drugs as examples of substances that are commonly viewed as ‘addicting’. If we know *why* things happen and *how*, then we may have a new basis for prevention.

Smoking:

Smoking tobacco has come under heavy opposition in the United States, particularly in southern California where the ACE Study was carried out. Whereas at one time most men and many women smoked, only a minority does so now; it is illegal to smoke in office buildings, public transportation, restaurants, bars, and in most areas of hotels.

When we studied current smokers, we found that smoking had a strong, graded relationship to adverse childhood experiences. Figure 1 illustrates this clearly. The *p* value for this and all other data displays is .001 or better.

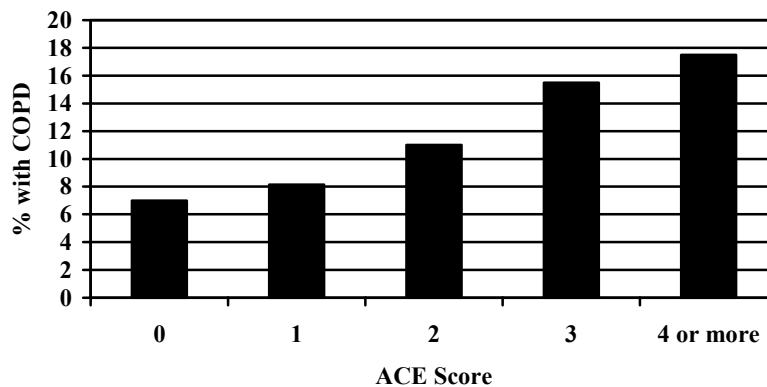
This stepwise 250% increase in the likelihood of an ACE Score 6 child being a



current smoker, compared to an ACE Score 0 child, is generally not known.⁸ This simple observation has profound implications that illustrate the psychoactive *benefits* of nicotine⁹; this information has largely been lost in the public health onslaught against smoking, but is important in understanding the intractable nature of smoking in many people.^{10, 11, 12, 13}

When we match the prevalence of adult chronic bronchitis and emphysema against ACEs, we again see a strong dose-response relationship. We thereby proceed from the relationship of adverse childhood experiences to a health-risk behavior to their relationship with an organic disease. In other words, Figure 2 illustrates the conversion of emotional stressors into an organic disease, through the intermediary mechanism of an emotionally beneficial (although medically unsafe) behavior.

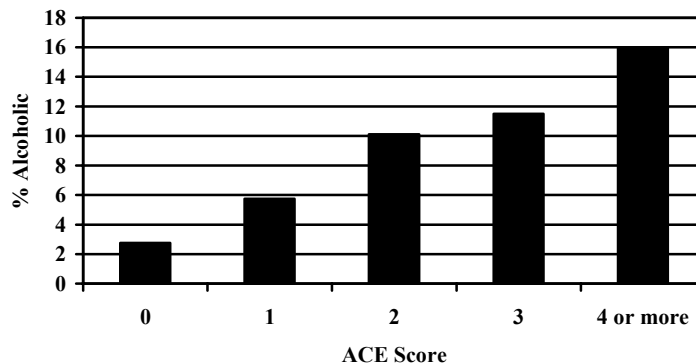
ACE Score vs. COPD



Alcoholism:

One's own alcoholism is not easily or comfortably acknowledged; therefore, when we asked our Study cohort if they had ever considered themselves to be alcoholic, we felt that *Yes* answers probably understated the truth, making the effect even stronger than is shown. The relationship of self-acknowledged alcoholism to adverse childhood experiences is depicted in Figure 3. Here we see that more than a 500% increase in adult alcoholism is related in a strong, graded manner to adverse childhood experiences.¹⁴

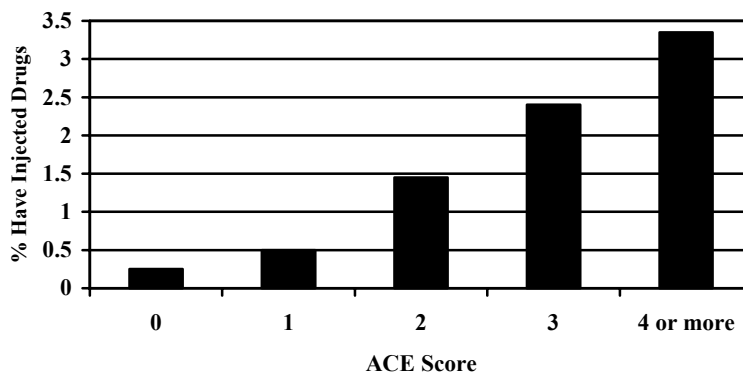
ACE Score vs. Adult Alcoholism



Injection of illegal drugs:

In the United States, the most commonly injected street drugs are heroin and methamphetamine. Methamphetamine has the interesting property of being closely related to amphetamine, the first anti-depressant introduced by Ciba Pharmaceuticals in 1932. When we studied the relation of injecting illicit drugs to adverse childhood experiences, we again found a similar dose-response pattern; the likelihood of injection of street drugs increases strongly and in a graded fashion as the ACE Score increases. (Figure 4) At the extremes of ACE Score, the figures for injected drug use are even more powerful. For instance, a male child with an ACE Score of 6, when compared to a male child with an ACE Score of 0, has a 46-fold (4,600%) increase in the likelihood of becoming an injection drug user sometime later in life.

ACE Score vs. Injected Drug Use



Discussion:

Although awareness of the hazards of smoking is now near universal, and has caused a significant reduction in smoking, in recent years the prevalence of smoking has remained largely unchanged. In fact, the association between ACE Score and smoking is stronger in age cohorts born after the Surgeon General's Report on Smoking. Do current smokers now represent a core of individuals who have a more profound need for the psychoactive benefits of nicotine than those who have given up smoking? Our clinical experience¹² and data from the ACE Study suggest this as a likely possibility. Certainly, there is good evidence of the psychoactive benefits of nicotine for moderating anger, anxiety, and hunger.⁹⁻¹²

Alcohol is well accepted as a psychoactive agent. This obvious explanation of alcoholism is now sometimes rejected in favor of a proposed genetic causality. Certainly, alcoholism may be familial, as is language spoken. Our findings support an experiential and psychodynamic explanation for alcoholism, although this may well be moderated by genetic and metabolic differences between races and individuals.

Analysis of our Study data for injected drug use shows a powerful relation to ACEs. Population Attributable Risk* (PAR) analysis shows that 78% of drug injection by

women can be attributed to adverse childhood experiences. For men and women combined, the PAR is 67%. Moreover, this PAR has been constant in four age cohorts whose birth dates span a century; this indicates that the relation of adverse childhood experiences to illicit drug use has been constant in spite of major changes in drug availability and in social customs, and in the introduction of drug eradication programs.¹⁷

American soldiers in Vietnam provided an important although overlooked observation. Many enlisted men in Vietnam regularly used heroin. However, only 5% of those considered addicted were still using it 10 months after their return to the US.^{15, 16} Treatment did not account for this high recovery rate. Why does not everyone become addicted when they repeatedly inject a substance reputedly as addicting as heroin? If a substance like heroin is not inherently addicting to everyone, but only to a small minority of human users, what determines this selectivity? Is it the substance that is intrinsically addicting, or do life experiences actually determine its compulsive use? Surely its chemical structure remains constant. Our findings indicate that the major factor underlying addiction is adverse childhood experiences that have not healed with time and that are overwhelmingly concealed from awareness by shame, secrecy, and social taboo. The compulsive user appears to be one who, not having other resolutions available, unconsciously seeks relief by using materials with known psychoactive benefit, accepting the known long-term risk of injecting illicit, impure chemicals. The ACE Study provides population-based clinical evidence that unrecognized adverse childhood experiences are a major, if not the major, determinant of who turns to psychoactive materials and becomes 'addicted'.

Given that the conventional concept of addiction is seriously flawed, and that we have presented strong evidence for an alternative explanation, we propose giving up our old mechanistic explanation of addiction in favor of one that explains it in terms of its psychodynamics: unconscious although understandable decisions being made to seek chemical relief from the ongoing effects of old trauma, often at the cost of accepting future health risk. Expressions like 'self-destructive behavior' are misleading and should be dropped because, while describing the acceptance of long-term risk, they overlook the importance of the obvious short-term benefits that drive the use of these substances.

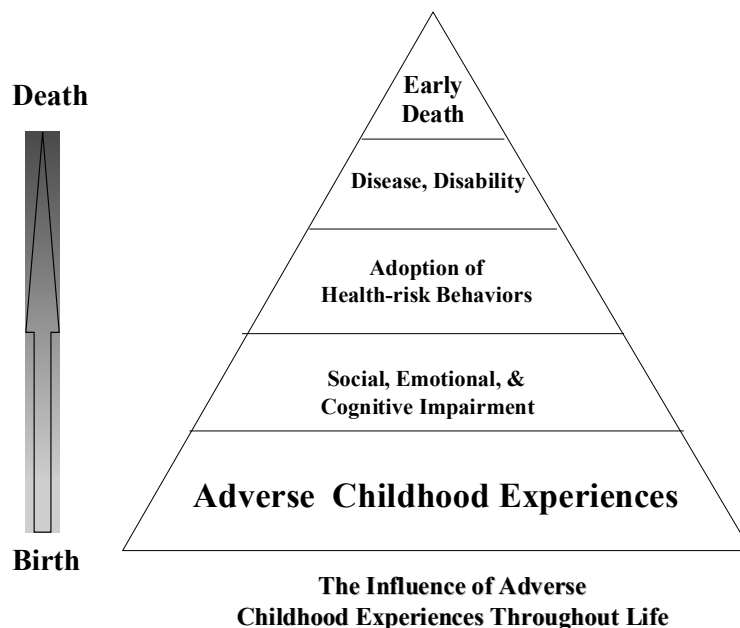
This revised concept of addiction suggests new approaches to primary prevention and treatment. The current public health approach of repeated cautionary warnings has demonstrated its limitations, perhaps because the cautions do not respect the individual when they exhort change without understanding. Adverse childhood experiences are widespread and typically unrecognized. These experiences produce neurodevelopmental and emotional damage, and impair social and school performance. By adolescence, children have a sufficient skill and independence to seek relief through a small number of mechanisms, many of which have been in use since biblical times: drinking alcohol, sexual promiscuity, smoking tobacco, using psychoactive materials, and overeating. These coping devices are manifestly effective for their users, presumably through their ability to modulate the activity of various neurotransmitters. Nicotine, for instance, is a

** Population Attributable Risk is a simple concept, although a complex calculation, that describes in a population that portion of a risk factor that can be attributed to a particular cause.*

powerful substitute for the neurotransmitter acetylcholine. Not surprisingly, the level of some neurotransmitters varies genetically between individuals¹⁸.

It is these coping devices, with their short-term emotional benefits, that often pose long-term risks leading to chronic disease; many lead to premature death. This sequence is depicted in the ACE Pyramid (Figure 5). The sequence is slow, often unstoppable, and is generally obscured by time, secrecy, and social taboo. Time does not heal in most of these instances. Because cause and effect usually lie within a family, it is understandably more comforting to demonize a chemical than to look within. We find that addiction overwhelmingly implies prior adverse life experiences.

The sequence in the ACE Pyramid supports psychoanalytic observations that addiction is primarily a consequence of adverse childhood experiences. Moreover, it does so by a population-based study, thereby escaping the potential selection bias of individual case reports. Addiction is not a brain disease, nor is it caused by chemical imbalance or genetics. Addiction is best viewed as an understandable, unconscious, compulsive use of psychoactive materials in response to abnormal prior life experiences, most of which are concealed by shame, secrecy, and social taboo.



Our findings show that childhood experiences profoundly and causally shape adult life. 'Chemical imbalances', whether genetically modulated or not, are the necessary intermediary mechanisms by which these causal life experiences are translated into manifest effect. It is important to distinguish between cause and mechanism. Uncertainty and confusion between the two will lead to needless polemics and misdirected efforts for preventing or treating addiction, whether on a social or an

individual scale. Our findings also make it clear that studying any one category of adverse experience, be it domestic violence, childhood sexual abuse, or other forms of family dysfunction is a conceptual error. None occur *in vacuo*; they are part of a complex systems failure: one does not grow up with an alcoholic where everything else in the household is fine.

Treatment:

If we are to improve the current unhappy situation, we must in medical settings routinely screen at the earliest possible point for adverse childhood experiences. It is feasible and acceptable to carry out mass screening for ACEs in the context of comprehensive medical evaluation. This identifies cases early and allows treatment of basic causes rather than vainly treating the symptom of the moment. We have screened over 450,000 adult members of Kaiser Health Plan for these eight categories of adverse childhood experiences. Our initial screening is by an expanded Review of Systems questionnaire; patients certainly do not spontaneously volunteer this information. ‘Yes’ answers then are pursued with conventional history taking: “I see that you were molested as a child. *Tell me how that has affected you later in your life.*”

Such screening has demonstrable value. Before we screened for adverse childhood experiences, our standardized comprehensive medical evaluation led to a 12% reduction in medical visits during the subsequent year. Later, in a pilot study, an on-site psychoanalyst conducted a one-time interview of depressed patients; this produced a 50% reduction in the utilization of this subset during the subsequent year. However, the reduction occurred only in those depressed patients who were high utilizers of medical care because of somatization disorders. Recently, we evaluated our current approach by a neural net analysis of the records of 135,000 patients who were screened for adverse childhood experiences as part of our redesigned comprehensive medical evaluation. This entire cohort showed an overall reduction of 35% in doctor office visits during the year subsequent to evaluation.¹⁹

Our experience asking these questions indicates that the magnitude of the ACE problem is so great that primary prevention is ultimately the only realistic solution. Primary prevention requires the development of a beneficial and acceptable intrusion into the closed realm of personal and family experience. Techniques for accomplishing such change *en masse* are yet to be developed because each of us, fearing the new and unknown as a potential crisis in self-esteem, often adjusts to the status quo. However, one possible approach to primary prevention lies in the mass media: the story lines of movies and television serials present a major therapeutic opportunity, unexploited thus far, for contrasting desirable and undesirable parenting skills in various life situations.

Because addiction is experience-dependent and not substance-dependent, and because compulsive use of only one substance is actually uncommon, one also might restructure treatment programs to deal with underlying causes rather than to focus on substance withdrawal. We have begun using this approach with benefit in our Obesity Program, and plan to do so with some of the more conventionally accepted addictions.

Conclusion:

The current concept of addiction is ill founded. Our study of the relationship of adverse childhood experiences to adult health status in over 17,000 persons shows addiction to be a readily understandable although largely unconscious attempt to gain relief from well-concealed prior life traumas by using psychoactive materials. Because it is difficult to get enough of something that doesn't quite work, the attempt is ultimately unsuccessful, apart from its risks. What we have shown will not surprise most psychoanalysts, although the magnitude of our observations is new, and our conclusions are sometimes vigorously challenged by other disciplines.

The evidence supporting our conclusions about the basic cause of addiction is powerful and its implications are daunting. The prevalence of adverse childhood experiences and their long-term effects are clearly a major determinant of the health and social well being of the nation. This is true whether looked at from the standpoint of social costs, the economics of health care, the quality of human existence, the focus of medical treatment, or the effects of public policy. Adverse childhood experiences are difficult issues, made more so because they strike close to home for many of us. Taking them on will create an ordeal of change, but will also provide for many the opportunity to have a better life.

Footnote:

Abstracts of all past and future ACE Study articles may be found by searching under the author name (Felitti VJ) at the web site for the US National Library of Medicine:

<http://www.ncbi.nlm.nih.gov/entrez/query.fcgi>

Free subscription is available to an electronic newsletter dealing with various aspects of the ACE Study. Contact: editor@acestudy.org

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