

## PREVALENCE, IMPACT, AND APPROACHES TO PREVENTION FOR GLOBAL ADVERSE CHILDHOOD EVENTS

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*Aim:* This article identifies the prevalence of adverse child events (ACEs) and their health outcomes, discusses how they are measured, and presents approaches to prevent ACEs and reduce their societal burden.

*Methods:* Literature on the prevalence, outcomes, and prevention of ACEs was reviewed, including published peer-reviewed literature and ongoing research.

*Results:* ACEs are common around the world, with approximately half of the population experiencing at least one adverse childhood event and a third experiencing three or more. ACEs have been tied to the leading causes of death and chronic disease, many health risk behaviors, and other performance measures such as employment and crime. The BECAN study that included 9 Balkan countries identified ACEs as a prevalent and important health concern for the region. A growing number of prevention and intervention approaches are emerging, especially that focus on individual and family approaches in the tertiary phase.

*Conclusion:* Despite an increasing number of evidence-based interventions, critical gaps exist in foundational knowledge about the prevalence of ACEs, causal pathways to poor outcomes, and prevention approaches that focus on the primary phase and the societal level.

Descriptors: ADVERSE CHILD EVENTS, HEALTH OUTCOMES, PREVENTION

### INTRODUCTION

In 1998, the US Centers for Disease Control and Prevention released a sentinel study that tied adverse child experiences to a wide array of adverse health outcomes (1). Since then, a growing body of research has confirmed associations between childhood trauma and adverse outcomes throughout the lifespan. Adverse child events (ACE) can include many types of childhood trauma, ranging from abuse and neglect to family dysfunction. The objectives of this ar-

ticle are to identify the prevalence of adverse child events and their health outcomes, discuss how they are measured, and present approaches to prevent ACEs and reduce their societal burden.

#### WHAT ARE ACES AND HOW ARE THEY MEASURED?

Although many versions of ACE measurement tools have been used, ACEs typically measure the ten elements identified in Table 1 (2). Many versions of the surveys ask about the frequency of these experiences and also ask the responder to identify which household member was involved in the experience.

These ten experiences represent some of the most traumatic events a child can experience, but it is not intended to be an exhaustive list. This list was also developed in a high-income and politically stable country, so experiences such as political violence are not included.

Child abuse and neglect is a major component of the ACE surveys, and assessment of child abuse and neglect across different populations and cultures poses a challenge. With support from UNICEF, the International Society for Prevention of Child Abuse and Neglect and the World Health Organization Injury Prevention Program developed tools for population-based epidemiological studies to identify the prevalence and incidence of child abuse and neglect (2).

The goal was to develop tools that were sensitive to the responders; reliable and valid; comparable in context and prevalence across countries and cultures; and, that could be easily translated and applied in diverse settings (<http://www.ispcan.org/?page=ICAST>). The resulting ICAST tools measure physical, sexual and psychological violence, and neglect with three different tools for different respondents: a parent tool with 46 questions that ask about experiences

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Table 1  
Traumatic Experiences Generally Included In Adverse Child Event Surveys

Emotional Abuse
Physical Abuse
Sexual Abuse
Emotional Neglect
Physical Neglect
Household Violence
Household Substance Abuse
Household Mental Illness
Parental Separation or Divorce
Incarcerated Household Member

of children younger than 18; a retrospective tool with 26 questions that ask 18-24 year olds about their experiences prior to the age of 18, and, the child tool with 82 questions that ask children aged 12-17 about their lifetime experiences and experiences over the last year. ICAST tools have been widely used in countries ranging from low to high income, and results have been validated in multiple settings. Prevalence information in this article reports findings using the ACE and ICAST tools.

PREVALENCE OF ACES

The first ACE study was a 1995 mail survey of 9,508 members of a United States health system (1). More than half of respondents reported at least one ACE and nearly 25% reported two or more. Given a single ACE, the likelihood of having a second ACE was approximately 80%, indicating that ACE events are clustered within individuals. Household dysfunction was the most common ACE, in particular household substance use (reported by 23.5%) and household mental illness (reported by 17.5%). Sexual abuse, specifically being touched or fondled in a sexual way, was the most common form of abuse, reported by 19.3%, followed by psychological abuse reported by 10%.

Since this sentinel study, ACE data have become an element of many state and national surveys in the United States, such as the Behavioral Risk Factor

Surveillance System conducted in each state and overseen by the Centers for Disease Control. These surveys indicate that from half to two-thirds of children experience at least one ACE and approximately 10-15% experience three or more (3, 4).

As ACE studies are conducted throughout the world, we are learning more about the global prevalence and range. Studies in high-income countries have found prevalence estimates similar to those in the United States (5). A study of eight primarily middle income countries in Eastern Europe found that the proportion of individuals experiencing at least one ACE ranged from 70% to 40%, and the proportion experiencing at least three ACEs ranged from 3.6% to 16.3% (5, 6). A study conducted in Saudi Arabia found that 82% of 931 participants had experienced at least one ACE, and 32% had been exposed to at least four (7).

Although specific ACE studies have not been published from Croatia, prevalence of child abuse and neglect (CAN) has been estimated through the Balkan Epidemiological Study on Child Abuse & Neglect (BECAN) (<http://www.becan.eu/>) (8, 9). The BECAN study began in 2009 under the leadership of the Institute of Child Health, Department of Mental Health and Social Welfare, Center for the study and Prevention of Child Abuse

and Neglect in Athens, Greece. Partner countries included Greece, Bulgaria, Romania, Albania, Macedonia, Turkey, Croatia, Serbia, and Bosnia & Herzegovina. The study, funded through the EU's 7th Framework Program, used surveys, case studies, and agency reports to identify the prevalence and characteristics of CAN among 11- to 16-year olds in the partner countries. This project has created many documents that focus on instruments and training, ethical issues, and dissemination strategies, as well as publication of study results.

Efforts in Croatia were led by the Department of Social Work, Faculty of Law at the University of Zagreb under the leadership of Dr. Marina Ajdukovic (8). After permission was received for the conduct of research with students, a probabilistic stratified cluster sample was drawn from school students aged 11, 13, and 16. Surveys used a modified version of the ICAST surveys for youth, with the addition of a scale on positive and non-violent parenting for normalization (2).

More than 97% of Croatian students reported experiencing positive, non-violent parenting during their lifetime (Figure 1). Psychological violence was reported by 73% of students and physical violence by 66.7%. Sexual violence was reported by 10.2% and sexual con-

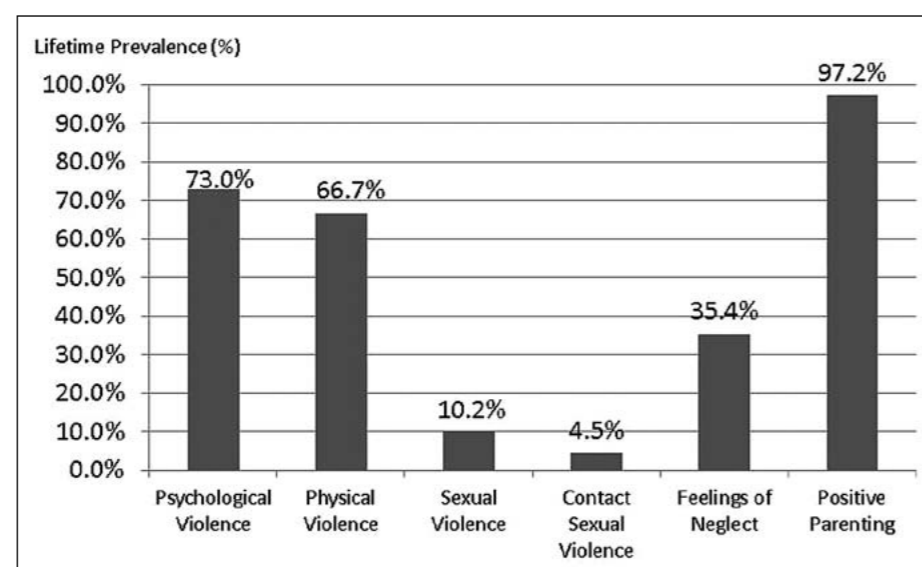


Figure 1  
Lifetime prevalence of different forms of abuse and maltreatment among school children in Croatia, from The BECAN Study in Croatia (<http://www.becan.eu/>)

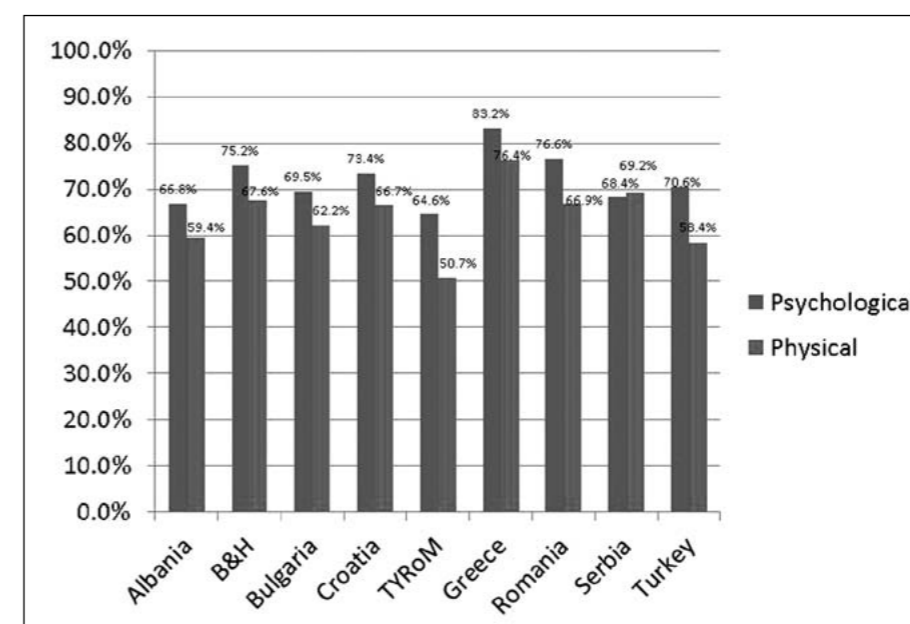


Figure 2  
Lifetime prevalence of psychological and physical violence reported by school children in the 9 BECAN partner countries (<http://www.becan.eu/>)

tact by 4.5%. Approximately 35% reported feelings of neglect. Overall, 14.7% of students reporting no experiences and 38.9% experienced three or more. Surveys of adults in Croatia conducted by the same team found that parents reported higher prevalence of the items on the ICAST scale than reported by their children. However, since these results are reported by children and by parents about their children, they may not be comparable to surveys of adults asked to recall their ACE experiences as children (which comprise a large proportion of the published literature).

Figure 2 shows the results from the 9 BECAN partner countries (9). Comparisons should consider differences in cultural interpretation of scales and differences in resulting samples (studies used a similar protocol, but some differences will occur in any multi-site study). Lifetime prevalence of psychological violence ranged from 66% to 83% and lifetime prevalence of physical violence ranged from 51% to 76%. In an analysis of these data focused on child sexual violence, Ajdukovic and colleagues found that child sexual violence had a relatively low prevalence when compared with results from other countries (10). The authors of the BECAN Croatia study concluded

that increased efforts to protect children from adverse experiences are needed, and that data collection systems to monitor progress will be an essential part of progress.

ACES AND ADVERSE HEALTH OUTCOMES

The wide range of adverse health effects associated with ACEs and the strength of these associations is compelling. The original study by Felitti et al., tied ACEs to the leading causes of death, including ischemic heart disease, cancer, chronic lung disease, skeletal fractures, and liver disease (1). Studies of this same cohort have since linked ACEs to many types of cancers, autoimmune diseases, sexually transmitted diseases, and many mental health outcomes including depression, suicidality, memory disturbances, and sleep disturbances (11-14). Subsequent studies have also tied ACEs to major risk behaviors including promiscuity, alcohol and substance use, and smoking, as well as to performance measures such as school performance, work absenteeism and unemployment (15-18). The Centers for Disease Control and Prevention maintain a compendium of research studies that have tied ACEs to health outcomes that can be found at: <http://www.cdc.gov/violenceprevention/acestudy/outcomes.html>.

Most of these studies have found that the number and severity of poor health outcomes exhibits a dose response with the number of ACEs, which lends validity to the strength of the association and contributes to a causal interpret of these associations. However, the vast majority of studies have been conducted with the original ACE cohort and the US Behavioral Risk Factor Surveillance System, and additional studies are primarily from high income countries. For example, Bellis et al. found among a nationally representative sample of residents of England that ACEs were associated with smoking, binge drinking, violence perpetration, and unintended pregnancy, and Almuneeff et al. found that ACE exposure was associated with increased risk of chronic disease and risky health behaviors (5, 7). Although these studies suggest consistency in the association between ACEs and poor health outcomes in high income countries with different cultures and political structures, research from different countries and cultures is needed to help elucidate the consistency and strength of the relationship between ACEs and outcomes.

The causal pathways that lead from ACEs to adult poor health are being explained through studies in neurodevelopment and neurobehavior, assisted by enhanced brain imaging techniques. These studies suggest that chronic stress in early childhood has the potential to alter patterns of brain biochemistry, metabolism, and neuronal organization, and that these effects have implications for all areas of the developing brain (19). As the brain develops in a stacked pattern from the brain stem to the frontal cortex, chronic levels of stress create persistent state of "fight or flight", which impacts the baseline state of systems ranging from heart rate to immune function to emotional regulation.

This causal theory explains why ACEs can impact such a wide range of health outcomes. Increasing evidence suggests that there are genomic risk factors that can predispose some individuals to poorer ACE outcomes, that ACEs can alter DNA methylation of genes, and that these changes could be passed from generation to generation (20).

Despite the compelling strength of association between ACEs and adverse health outcomes, this pathway is not deterministic. Adverse health outcomes are common among many people who have not experienced ACEs, and many people who have experienced ACEs not only thrive, but find a source of resilience in overcoming them. Understanding the causal connection and complex interplay between genetic predisposition, ACEs, and the moderating effect of family and community support systems will be essential in progress towards effective prevention and intervention programs.

#### SCREENING FOR ACES

With several tools that help identify ACEs now in widespread use, efforts need to focus on the most appropriate methods to screen and provide services for those affected. While it is clear that screening is an essential step in providing targeted resources and services, the best approach for accurate, effective, and sensitive screening of ACEs is not clear. Precedent for the routine integration of screening exists - one example is the adoption of routine screening for intimate partner violence in healthcare settings (21). However, this recommendation has come after years of research to evaluate the best questions, protocols, and follow-up links to services, and this research is in its early stages for ACE screening.

Some researchers and practitioners are proponents of screening for the same 13 ACE events used in prevalence studies, and this approach has both merit and drawbacks. The ACE survey used as a screener provides a relatively short list of questions that have been directly tied to health outcomes. These questions can be used to identify present or past experiences with ACEs, and with programs put in place to provide services for those who screen positive. This approach, however, has several potential challenges. First, responding to the ACE questions could be traumatic, especially for individuals who have not processed their experience or who haven't received support or resources to deal with the traumatic experiences. Questions must be asked by a trusted individual who can address any issues that arise, and pro-

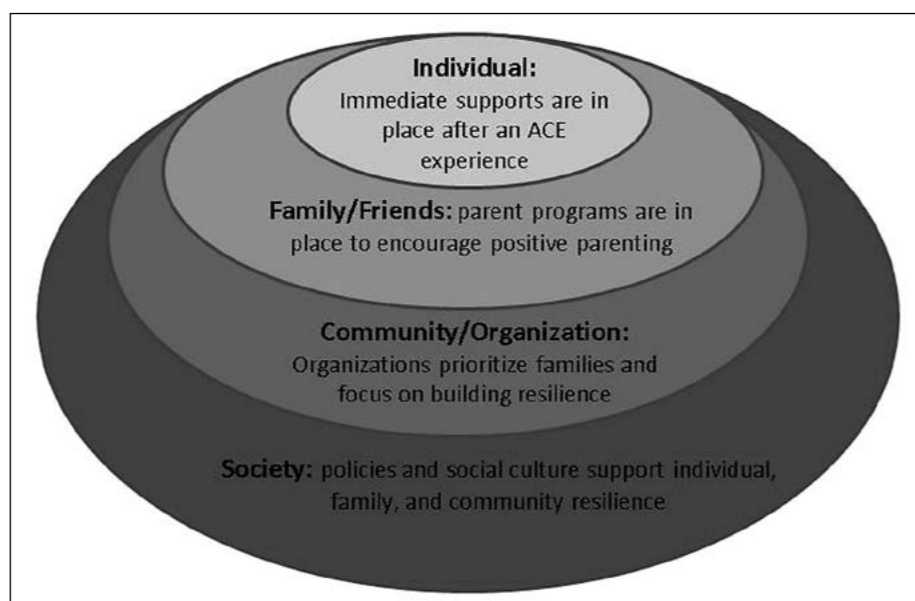


Figure 3  
Socioecologic Model with ACE prevention goals

ocols for ACE screening have not been widely evaluated. Second, since the goal of screening is to address related health outcomes, it will be important to ask questions in a manner that does not lead to "blaming the victim". Finally, many types of traumatic experiences can lead to poor health outcomes, and identifying a comprehensive yet succinct screening tool to identify high-risk individuals will be a challenge.

One method to avoid the challenges of asking directly about the history of traumatic experiences is to screen instead for the psychological symptoms of these events, such as depression, anxiety, or post-traumatic stress disorder. While this screening approach identifies symptoms related to traumatic experiences and does not require these experiences to be specifically listed, psychological symptoms are not specific to ACEs and may not be present in all individuals who have experienced ACEs. As interest in addressing ACE outcomes increases, effective protocols and validated tools for screening are needed.

Different types of screening approaches are likely to be needed in different types of settings and for different populations.

#### APPROACHES TO REDUCING THE BURDEN OF ACES

Existing knowledge on the prevalence and consequences of ACEs supports the prioritization of ACE prevention: individuals, families, and communities will benefit by reducing the burden of ACEs. Given the complex interplay between the individual, the family, the community, and the larger sociopolitical structure, the socioecological model provides a good conceptual framework to guide prevention. Figure 3 depicts the model with examples of ACE goals at each level. To have the desired multi-level effect, strategies to both prevent and intervene on the consequences of ACEs are needed at every level.

For the purposes of this manuscript, defining several approaches to intervention will be helpful. Following the general public health approach, primary prevention includes efforts to reduce the occurrence of ACEs, so that children grow up with fewer ACE experiences and, hopefully, reduce ACE experiences throughout generations. Secondary prevention includes efforts immediately after an ACE event to reduce the immediate and acute consequences. Tertiary prevention includes efforts to treat and reduce long-term consequences of ACEs, such as through their association

with risky lifestyle behaviors and chronic diseases.

Understanding ACE prevalence and risk factors is a critical element in a comprehensive approach to prevention. Identifying individuals who have experienced ACEs and providing resources is also a critical component. However, a focus on primary prevention of ACEs, in which the incidence of ACE events is reduced at the population level, will likely have the greatest individual and societal impact. In order to reduce the burden of ACEs at the community and societal levels, the goals may better focus on strengthening resilience rather than identifying and responding to ACEs.

Although evidence-based programs at every level are needed, an increasing number of prevention and intervention approaches are becoming available. At the individual and family level, primary prevention programs that target good parenting practices can reduce ACE experiences. Programs such as Circle of Security increase parenting skill with the goal of increased and improved parent-child attachment, and this program has been evaluated in a number of high risk populations (22). Other programs, such as the Period of Purple Crying, teaches parents about child development and behavior with the goal of preventing specific types of abuse, such as shaken baby syndrome (23). Primary prevention programs at the community and social levels are rare. A systematic review of universal campaigns found studies of only 15 campaigns conducted in five countries. Only three of 17 studies evaluating these campaigns measured child abuse as an outcome, and of these, two of the three found significant decreases (24). One example of a universal strategy is the Triple-P - Positive Parenting Program, which supports positive parenting at the individual, family, community, and societal levels through targeted education and social campaigns (25). Triple P has been adapted in several countries.

Secondary strategies have been primarily focused at the individual and family levels, and have been housed predominantly in medical settings and with government agencies. Efforts of child

protective service agencies, which are widespread but vary markedly in different countries, are the most prevalent example of secondary prevention. Child protective services address the most severe cases of abuse. New programs that attempt to identify and respond to adverse experiences earlier and before they are severe enough to require hospital treatment or official agency response, are growing in priority. One example is psychological first aid, which identifies and provides support to children immediately after a life stressor, and shows promise in reducing psychological sequelae (26). Psychological first aid can be developed for multiple settings and can include many types of professionals. In addition to providing immediate support to children, they can also provide an infrastructure to identify and refer children who need them to professional services.

Tertiary approaches are increasingly being implemented with growing evidence that ties ACEs to health outcomes, and these approaches are also found predominantly in medical settings and at the individual level. Trauma informed care, in which health and service providers are trained in the effects of ACEs and how to integrate compassionate care, are a growing approach to tertiary prevention. Trauma informed care is being integrated in settings such as healthcare, service agencies for high-risk families, and in correctional facilities, but few outcome evaluation studies have been conducted (27-29).

#### CONCLUSION

Critical gaps exist in the evidence base for responding to ACEs. Gaps in approaches to primary prevention, especially at the community and sociopolitical levels, are particularly large. Foundational gaps in our knowledge about the global prevalence and cultural differences in response to ACEs also exist.

Authors of the original ACE study call for a focus on primary prevention, a need for effective but not "perfect" global surveillance strategies, and for the role of child adversity on poor health outcomes to be prioritized at the societal level (30). Pediatricians, who, outside of

the family setting, have substantial interaction with our youngest children, will play an essential role in advocating for and integrating ACE prevention and intervention programs.

Autori izjavljuju da nisu bili u sukobu interesa.  
Authors declare no conflict of interest.

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## Sažetak

### UČESTALOST, UTJECAJ I METODE PREVENCIJE NEPOVOLJNIH DOGAĐAJA U DJETINJSTVU

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*Cilj: Ovaj članak istražuje učestalost nepovoljnih događaja u djetinjstvu (NDD) i njihov utjecaj na zdravlje, govori o tome kako mjeriti NDD te predstavlja metode prevencije i smanjenja bremena koje uzrokuju.*

*Metode: Istražena je znanstvena literatura o učestalosti, ishodima i prevenciji NDD.*

*Rezultati: NDD su učestali diljem svijeta, polovica stanovništva doživi barem jedan NDD, a trećina tri ili više. NDD su povezani sa vodećim uzrocima smrti i kroničnim bolestima, mnogim zdravstveno rizičnim ponašanjima i drugim pokazateljima kao što su npr zaposlenost i kriminal. BECAN istraživanje koje je uključivalo 9 zemalja jugoistočne Europe (uključivo Hrvatsku) nalazi visoku učestalost NDD te ukazuje na značajan utjecaj NDD na život i zdravlje. Razvija se sve veći broj preventivnih i interventnih mjera, posebno usmjerenih na pojedince i obitelji u tercijarnoj prevenciji.*

*Zaključak: Unatoč rastućem broju intervencija temeljenih na dokazima, još uvijek je prisutno neznanje o učestalosti NDD, uzročno posljedičnoj vezi sa nepovoljnim ishodima i preventivnim pristupima usmjerenim na primarnu prevenciju u cijelom društvu.*

Deskriptori: NEPOVOLJNI DOGAĐAJI U DJETINJSTVU, DIJETE, ZDRAVSTVENI ISHODI, PREVENCIJA

*Primljeno/Received: 26. 3. 2015.*

*Prihvaćeno/Accepted: 31. 3. 2015.*