



## Adverse childhood experiences, chronic diseases, and risky health behaviors in Saudi Arabian adults: A pilot study



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### ABSTRACT

Adverse childhood experiences (ACEs) have been linked with risky health behaviors and the development of chronic diseases in adulthood. This study examined associations between ACEs, chronic diseases, and risky behaviors in adults living in Riyadh, Saudi Arabia in 2012 using the ACE International Questionnaire (ACE-IQ). A cross-sectional design was used, and adults who were at least 18 years of age were eligible to participate. ACEs event scores were measured for neglect, household dysfunction, abuse (physical, sexual, and emotional), and peer and community violence. The ACE-IQ was supplemented with questions on risky health behaviors, chronic diseases, and mood. A total of 931 subjects completed the questionnaire (a completion rate of 88%); 57% of the sample was female, 90% was younger than 45 years, 86% had at least a college education, 80% were Saudi nationals, and 58% were married. One-third of the participants (32%) had been exposed to 4 or more ACEs, and 10%, 17%, and 23% had been exposed to 3, 2, or 1 ACEs respectively. Only 18% did not have an ACE. The prevalence of risky health behaviors ranged between 4% and 22%. The prevalence of self-reported chronic diseases ranged between 6% and 17%. Being exposed to 4 or more ACEs increased the risk of having chronic diseases by 2–11 fold, and increased risky health behaviors by 8–21 fold. The findings of this study will contribute to the planning and development of programs to prevent child maltreatment and to alleviate the burden of chronic diseases in adults.

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Adverse childhood experiences (ACEs) are common in all countries and across the socio-demographic spectrum. It is well known that children exposed to ACEs have varied mental health and social consequences later in life. The relationship between ACEs and physical health in adulthood has attracted researchers, public health practitioners, and child maltreatment prevention advocates since the late 1990s (Felitti et al., 1998; Felitti & Anda, 2010). Recently, a large number of studies from many countries have linked chronic-disease risk factors to ACEs. This research has resulted in a new perspective in the practice of medicine, shifting from the current symptom-reactive style to a more comprehensive disease-prevention approach.

In the past, public health studies have focused on the risk factors related to the development of chronic diseases, but not on what determines these risk factors. The ACE literature offers an explanation as to how an ACE transforms into organic disease later in life. Stressful or traumatic childhood experiences, such as abuse, neglect, family dysfunction, and community and peer violence, are common pathways to social, emotional, and cognitive impairment that can lead to an increased risk of

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unhealthy behaviors, violence or re-victimization, disease, disability, and premature mortality (Anda et al., 1999; Chartier, Walker, & Naimark, 2010). Moreover, ACEs disrupt neurodevelopment and can have a lasting effect on brain structure and function (Edwards, Holden, Felitti, & Anda, 2003). Many studies have linked risky health behaviors, chronic diseases, and mental illnesses to ACEs (Dong et al., 2004; Felitti, 2001). Some states in the United States (US) have added an ACE module in the Behavioral Risk Factor Surveillance System (BRFSS) survey, which signifies the importance of the relationship between these variables (Center for Disease Control, 2009).

Most ACE studies that have measured the prevalence of specific child maltreatment events and their associations with adverse adult health were conducted in developed countries (Anda, Butchart, Felitti, & Brown, 2010; Brown et al., 2009; Dube, Felitti, Dong, Giles, & Anda, 2003). However, limited research has been conducted in developing countries. This is problematic because ACEs are more prevalent in developing countries due to limited resources and poor social protection (Ramiro, Madrid, & Brown, 2010). The aim of this study was to assess the relationship between exposure to ACEs and the development of risky health behaviors and diseases in adults living in Saudi Arabia. Although one would expect that the long-term consequences of ACEs in Saudi Arabia would be similar to that in other parts of the world, there lacks clear data or documentation to verify that assumption (Almuneeef & Aleissa, 2011).

## Methods

### *Study population and design*

This study was conducted in Riyadh, the capital city of Saudi Arabia, during 2012. A cross-sectional design was used, and adults 18 years or older were eligible to participate. Various public venues were chosen in four geographical areas of the city (northern, southern, eastern, and western) to ensure representation from the various socio-economic groups. The research team set up booths at shopping centers, public parks, primary care clinics, and other public venues in the four geographical areas. The booths presented awareness material and information about the study.

Adults were approached and invited to participate in the study by responding to a self-administered questionnaire, the Adverse Childhood Experiences International Questionnaire (ACE-IQ). Each adult who agreed to participate signed a written consent form. The participants were not offered any incentives to participate in the study. The questionnaires were anonymous, and completed forms were placed in a closed box at the booth. The study design was approved by the Institutional Ethical Review Board (IRB) of King Abdullah International Medical Research Center (KAIMRC).

### *Tool development: Adverse Childhood Experiences-International Questionnaire (ACE-IQ)*

In 2009, the Center for Disease Control and Prevention (CDC) and the World Health Organization (WHO) convened a meeting in Geneva, Switzerland to build a framework for global ACE surveillance. Meeting attendees comprised public-health workers from different countries and ACE experts. The meeting attendees formed a research team that developed an ACE international questionnaire (ACE-IQ) so that there would be a standardized means to produce comparable estimates across countries, irrespective of a country's level of development. The ACE-IQ was tested in Saudi Arabia with 200 participants to ensure the cultural/social adaptability and acceptability of the questionnaire; in addition, it was tested with participants in Canada, China, South Africa, the Former Yugoslav Republic of Macedonia, the Philippines, Switzerland, and Thailand. A second meeting was held in Geneva, Switzerland, and the questionnaire was modified based on the results of the pilot study. The final ACE-IQ questionnaire was approved by the research team, checked for internal validity, and posted on the WHO website: [http://www.who.int/violence\\_injury\\_prevention/violence/activities/adverse\\_childhood\\_experiences/en/index.html](http://www.who.int/violence_injury_prevention/violence/activities/adverse_childhood_experiences/en/index.html)

The ACE-IQ contains eight domains: marriage and family demographics, protection, neglect, household dysfunction, abuse (emotional, physical, and sexual), peer violence, community violence, and collective violence (world health organization 2012). The individual questions for each category are listed in Table 1. The questionnaire was translated into Arabic, back translated (into English), and modified for cultural adaptability.

### *ACE score measurement*

To calculate the ACE score, we used the five domains that represent major ACEs in Saudi Arabia: 4 questions on neglect, 8 questions on abuse (physical, sexual, and emotional), 8 questions on family dysfunction/domestic violence, 1 question on peer violence, and 3 questions on community violence. We excluded the domain of collective violence because it rarely occurs in Saudi Arabia due to political stability and the absence of military groups and the domain of protection because it is quite common among families from Saudi Arabia and behavior that falls under this domain is not considered wrong.

Participants had the option of answering “yes,” “no,” or “refuse” to some questions and “many times,” “a few times,” and “never” to other questions. For each participant, we calculated a total event score that represents total exposure to ACEs. The response to each item (question) represents an exposure to an ACE and was counted as one event when the participant responded “yes,” “many times,” or “a few times” on a question. The total ACE event score was calculated by summing the number of events to which a participant was exposed. The ACE score was then categorized into 0, 1, 2, 3, or  $\geq 4$  exposures.

We supplemented the ACE-IQ with questions assessing the presence of physician-diagnosed chronic disease conditions (i.e., diabetes, hypertension, coronary heart diseases, chronic respiratory diseases, liver diseases, cancer, and venereal

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