Original Article

Effect of adverse childhood experiences on physical health in adulthood: Results of a study conducted in Baghdad city

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ABSTRACT

Background: Studies have revealed a powerful relationship between adverse childhood experiences (ACEs) and physical and mental health in adulthood. Literature documents the conversion of traumatic emotional experiences in childhood into organic disease later in life. **Objective:** The aim was to estimate the effect of childhood experiences on the physical health of adults in Baghdad city. **Subjects and Methods:** A cross-sectional study was conducted from January 2013 to January 2014. The study sample was drawn from Baghdad city. Multistage sampling techniques were used in choosing 13 primary health care centers and eight colleges of three universities in Baghdad. In addition, teachers of seven primary schools and two secondary schools were chosen by a convenient method. Childhood experiences were measured by applying a modified standardized ACEs-International Questionnaire form and with questions for bonding to family and parental monitoring. Physical health assessment was measured by a modified questionnaire derived from Health Appraisal Questionnaire of Centers for Disease Control and Prevention. The questionnaire includes questions on cerebrovascular diseases, diabetes mellitus, tumor, respiratory and gastrointestinal diseases. **Results:** Logistic regression model showed that a higher level of bonding to family (fourth quartile) is expected to reduce the risk of chronic physical diseases by almost the half (odds ratio = 0.57) and exposure to a high level of household dysfunction and abuse (fourth quartile) is expected to increase the risk of chronic physical diseases by 81%. **Conclusion:** Childhood experiences play a major role in the determination of health outcomes in adulthood, and early prevention of ACEs. Encouraging strong family bonding can promote physical health in later life.

Key words: Adverse childhood experiences, Baghdad, family bonding, physical health, violence

INTRODUCTION

Childhood years are vital for the development of life skills. Negative experiences at home, at school, or in the community have a damaging effect on the development of these core cognitive and emotional skills.[1]

Adverse childhood experiences (ACE) refer to some of the most intensive and frequently occurring sources of stress that children suffer early in life. Such experiences include multiple types of abuse, neglect, violence between parents or caregivers, other kinds of serious household dysfunction such as alcohol and substance abuse, and peer, community, and collective violence.[2]

The literature on ACEs show that exposure to multiple risk factors in childhood is associated with higher rates of tobacco use, alcoholism, illicit drug use, suicide attempt, sexually transmitted diseases, obesity, diabetes, ischemic heart disease, stroke, chronic obstructive pulmonary disease, gastrointestinal disorders, and cancer.[3-6]

On the other hand, positive childhood experiences such as strong family bonding can give protection against involvement in risk behaviors which in turn promotes good health later on in life. Family bonding is defined as a feeling of closeness and intimacy toward one's parents, reflected in

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perceived monitoring, communication, involvement, and joint activities in the family.[7,8]

The family is one of the most critical risk and resiliency variables for substance abuse in adolescence and young adult life.[9]

For more than three decades, the Iraqi nation as a whole has suffered from wars, sanctions and urban violence.[10-12]

Violence is a leading cause of death for Iraqi adults and was the main cause of death in men between the ages of 15 and 59 years during the 3 years after the 2003 invasion.[13] Iraqi children and youth have been so greatly affected by these dire conditions, that they face very real dangers of disease, starvation, psychological trauma, and death.[14,15] Published articles on the impact of violence on Iraqis are few.[16,17] The aim of this study was to estimate the effect of childhood experiences on the physical health of adults in Baghdad city.

SUBJECTS AND METHODS

This was a cross-sectional study conducted in Baghdad city, the capital of Iraq, the center of Baghdad governorate. Data was collected from January 2013 to January 2014. In order to widen the spectrum and increase the number of end points, the target population chosen was males and females aged between 18 and 59 years. Individuals aged 60 years or more were not included in the study to avoid the interference of other factors in the outcome, rendering any inferences of the study questionable. The source of data collection was mainly from primary health care centers (PHCCs) and universities as follows:

1. Primary health care centers (PHCCs): A multistage random sampling technique was used to choose a number of PHCCs in Baghdad (December 2012). Baghdad is divided into 16 health sectors, out of which five sectors were chosen by simple random sampling. The total number of PHCCs in these five sectors was 60 with a mean number of 12 PHCCs for each sector. Three PHCCs were then chosen from each large sector (with > 12 PHCCs) and two from each small sector (with < 12 PHCCs) through a simple random sampling technique to achieve equity of choosing PHCCs according to the density of distribution. Finally, 13 PHCCs from the two main parts of Baghdad city (Al Karkh and Al Russafa) were chosen to represent central and peripheral sectors
2. Each PHCC was visited for 2–3 weeks to collect data daily from those who attended, mostly mothers who brought their children for vaccination. This was done through a systematic random sampling technique by including every fourth person
3. Another sample source was the universities: A multistage random sampling technique was adopted by selecting three universities out of the five located in Baghdad through a simple random sampling technique: Technology, Al-Nahrain and Baghdad Universities were chosen. Some colleges were then selected from each university by a simple random sampling technique and one level from each college again by a simple random technique; all students of that level, who were available at the time of data collection, were included in the sample.

In addition, teachers of seven primary schools and two secondary schools were chosen by a convenient method.

The questionnaire consisted of the following items:

1. Sociodemographic information: Age (between 18 and 59 years), current education level, history of smoking habits (previous or current), history of alcohol drinking (previous or current), as well as a family history of chronic diseases
2. Adverse childhood experiences (at age 15 years and less) including household dysfunction and abuse (detailed below) and exposure to community and collective violence, were measured using a modified standardized ACEs-International Questionnaire (IQ) developed by WHO.[2] This includes:

Categories of household dysfunction and abuse such as psychological abuse, physical abuse, violence against mother or other household members, loss of one parent during childhood regardless of cause, living with members of household who were substance abusers, mentally ill or suicidal, been in prison.

Witnessing community violence includes: Seeing or hearing someone being beaten or stabbed or shot in real life. Exposure to collective violence including wars, terrorism, political or ethnic conflicts, repression, abduction and torture. This was measured through the following questions: If forced to go and live somewhere else , if a family member or a friend was kidnapped, killed or beaten up by soldiers, police, militia, or gangs.

Positive childhood experiences were indicated by bonding to family, and parental monitoring (when aged 15 years and less):

Bonding to family was measured by five modified items derived from an instrument by Langrange and white (1989)[18] and from questions about the relationship with parents, present in the ACE-IQ.[2] The subjects indicated how much they would like to be the kind of people their parents were, how much their parents made

them feel trusted, how much they depended on their parents for advice and guidance, and how much the parents understood their problems and worries.

Responses for questions of bonding to family ranged from "strongly disagree" to "strongly agree" on a four point Likert scale.

Three items for parental monitoring were put as indicators: Time spent talking about school, activities of the day, time spent playing with the subjects and knowing who were friends with the subject. Possible responses for parental monitoring items ranged from "almost never" to "often"[18]

The questionnaire was completed by a direct interview with the respondents after the aim of this study and some questions that might be difficult to comprehend were explained.

Physical health assessment was measured by a modified questionnaire derived from Health Appraisal Questionnaire of Centers for Disease Control and Prevention.[19] This had questions on hypertension, angina pectoris, myocardial infarction, diabetes mellitus (DM), tumor, cerebrovascular accident, respiratory symptoms and diseases (asthma, chronic bronchitis, shortness of breath) and gastrointestinal diseases (irritable bowel symptoms, duodenal or gastric ulcer).

As this subject is very sensitive in Iraqi culture, it was decided to avoid questions that dealt with offensive situations or caused social stigma such as sexual abuse during childhood. Before the interview, the researcher explained to the respondents the aim and concept of the research, assuring them that the information gathered from the questionnaire would be kept strictly confidential and would not be used for any purposes other than research. The questionnaire was anonymous, the subjects were given the option to participate or withdraw. The interview was conducted in a separate room for privacy.

Data entry followed by descriptive and analytic statistics were performed using the Statistical Package for Social Science (SPSS-version 21). Bonding to family and parental monitoring were calculated as a single score (considered as a single item of a positive childhood experience).

Standardization scores of household dysfunction-abuse and community-collective violence were calculated for each participant according to the following equation: Standardization score (/100) = (sum (Q1–Qn) × 100)/ (count valid × upper limit of scoring of the questions in the scale).

Sum (Q1–Qn) = summation of answers to questions for that scale.

Count valid = number of answered questions on that scale.

The aim of standardizing the scores was to bypass the effect of missed questions and to provide a unique way of analyzing (all scores started from 0 to 100).

Quartiles for household dysfunction-abuse, community-collective violence and family bonding scores were calculated (four quartiles for each score). Cronbach's alpha reliability of family bonding scale was 0.86.

Logistic regression was used to adjust for effects of demographic factors on the association between the cumulative number of categories of childhood exposure and risk factors for the leading causes of morbidity in adult life.

RESULTS

Of a total of 1040 subjects surveyed, 1000 responded giving a response rate of 96.2%. The respondents' ages ranged from 18 to 59 years, with a mean of 32.08 ± 11.169. Females constituted a higher proportion (58.3% of the study sample). Only 18.5% of the participants reported smoking, 4.2% had a history of drinking alcohol [Table 1].

Exposure to household dysfunction and abuse: Table 2 shows that for 104 (10.4%) participants the father died when the subject was aged <15 years, while the mothers of 21 (2.1%) participants died when they were < 15 years old. The parents of 30 (3%) of the subjects were separated. There were 469 (46.9%) reports in which the subjects saw or heard a parent or household member being yelled at, screamed at, sworn at, insulted or humiliated at home. There were 331 (33.1%) reports of seeing or hearing a parent or household member at home being slapped, kicked, punched or beaten up, 175 (17.5%) reported cases in which a parent or household member was hit or cut with an object, such as a stick (or cane), bottle, club, knife or whip. 387 (38.7%) reported having seen or heard a parent, guardian or another household member yelled at, screamed or sworn at, insulted or humiliated. A parent or another household member was seen spanked, slapped, kicked or punched by 335 (33.5%).

Exposure to community violence when aged below 15 years: As shown in Table 3 the most common traumatic event of community violence reported by participants was seeing or hearing someone being beaten up in real life (48.3%), or being threatened with a knife or gun as reported by 181 (18.1%). Reports of the kidnap of a family member or friend or beating by soldiers, police, militia, or gangs were made by 148 (14.8%), and for 172 (17.2%), a family member or friend was killed by soldiers, police,

Table 1: Sociodemographic characteristics of the study sample (*n*=1000)

Characteristics	*N* (%)
Gender	
Female	583 (58.3)
Male	417 (41.7)
Total	1000 (100.0)
Age group (years)	
<30	498 (49.9)
30-39	227 (22.7)
40-49	177 (17.7)
50-59	96 (9.6)
Total	998 (100.0)
Highest level of education completed	
Primary school	135 (13.5)
Intermediate	127 (12.7)
Secondary	122 (12.2)
University/diploma	603 (60.4)
Postgraduate	12 (1.2)
Total	999 (100.0)
Cigarettes smoking	
Nonsmoker	814 (81.5)
Ever smoked	185 (18.5)
Total	999 (100.0)
Alcohol drinking habit	
Never drank alcohol	949 (95.8)
Ever drank alcohol	42 (4.2)
Total	991 (100.0)
Family history of chronic diseases	
No	408 (41.3)
Yes	579 (58.7)
Total	987 (100.0)

militia, or gangs (all items in Table 3 represent response of sometimes and frequently).

Frequency of physical diseases and symptoms: As shown in Table 4 358 subjects (35.8%) had gastrointestinal tract diseases and symptoms, 231 (23.1%) complained of cardiovascular diseases and problems, 17.7% of the participants had respiratory complaints, 4.2% had DM and nine had cancer.

Multiple logistic regression model: As demonstrated in Table 5 the contribution of family bonding, community-collective violence exposure and household dysfunction and abuse to the risk of having any chronic physical disease is assessed in a multiple logistic regression after an adjustment was made of the cofounding effects of age, family history of chronic diseases, habit of smoking and the consumption of alcohol.

Having a higher level of family bonding (fourth quartile) is related to lower risk of having a chronic physical disease by almost half (odds ratio [OR] =0.57), compared to those with low level of family bonding (first quartile). On the other hand, a high level of exposure to community violence, and household dysfunction and abuse (fourth quartile) was related to increased the risk of a chronic physical disease 98% and 81%, respectively, compared to those with a low level of exposure to community violence, household dysfunction and abuse (first quartile). Smoking habits significantly increased the risk of a chronic disease by 61%. Male gender significantly reduced the risk of a chronic disease compared to the female gender (OR = 0.58). There was no statistically significant association of a positive family history of chronic diseases and history of alcoholism with the risk of the outcome.

These risk estimates represent the pure contribution of each item to the overall risk of having a chronic physical disease after possible confounding effects of other explanatory variables included in the model have been adjusted. The model is statistically significant and has an overall predictive accuracy (66.7%). In addition, the predictive accuracy of a positive outcome is high (74.4%).

DISCUSSION

A high proportion of the sample was female as the PHCC clients are usually female. Besides, females formed a larger proportion of both college students and school teachers than males. This could be attributed to the demographic changes in the country caused by violence, a leading cause of death in men.[13] In addition, many men especially from Baghdad[20] have emigrated abroad for many reasons particularly of security.

The experiences ranged from unpleasant acts of conflict such as, being yelled at or spanked, being insulted, threatened, to physical or emotional neglect as reported in other studies,[21,22]

The results revealed that 10% of the participants lost their fathers when they were <15 years old while 2% of them lost their mothers when they were younger . This finding might be the result of long periods of exposure of the Iraqi population to wars and widespread violence,[23,24] and death, the majority of which were of men.[13]

The prevalence of emotional abuse (38.7%), physical abuse (33.5%) and exposure of mother or a household member to violence through verbal (46.9%) or physical punishment (33.1%) was higher than what was reported in ACE study of USA population (10.6%), (28.3%) and (12.7) respectively[25] and is lower than what was reported in Albania,[26] in Peru and in Bangladesh.[27] These differences might be attributed such differences in culture as the level of education, personality types, economic status, presence

Table 2: Frequency distribution of household dysfunction and abuse items

Household dysfunction and abuse items (age below 15 years) (*n*=1000)	*N* (%)
Father died when the subject was <15 years old	104 (10.4)
Mother died when the subject was <15 years old	21 (2.1)
Parents separated when the subject was <15 years of age	30 (3.0)
Live with a household member who was a problem drinker, alcoholic, or misused street or prescription drugs	133 (13.3)
Lived with a household member who was depressed, mentally ill or suicidal	83 (8.3)
Lived with a household member who was ever sent to jail or prison	105 (10.5)
Saw or heard a parent or household member at home being yelled at, screamed at, sworn at, insulted or humiliated	469 (46.9)
Saw or heard a parent or household member at home being slapped, kicked, punched or beaten up	331 (33.1)
Saw or heard a parent or household member at home being hit or cut with an object (stick, bottle, club, knife, whip, etc.)	175 (17.5)
Did a parent, guardian or other household member threaten to, or actually, abandon you or throw you out of the house	137 (13.7)
If a parent, guardian or other household member yelled, screamed, at you, insulted or humiliated you	387 (38.7)
If a parent, guardian or other household member did spank, slap, kick, punch or beat you up	335 (33.5)
If a parent, guardian or other household member hit or cut you with an object, such (stick, bottle, club, knife, whip,.etc.)	162 (16.2)
If bad treatment resulted in injury	33 (3.3)

All items in Table 2 represent the response of sometimes and frequently

Table 3: Frequency distribution of exposure to community and collective violence items

Community and collective violence (age below 15 years) (*n*=1000)	*N* (%)
Exposed to bullying?	176 (17.6)
Saw or heard someone being beaten up in real life	483 (48.3)
Saw or heard someone being threatened with a knife or gun in real life	181 (18.1)
Forced to go and live in another place	107 (10.7)
Beaten up by soldiers, police, militia, or gangs	27 (2.7)
A family member or friend kidnapped or beaten up by soldiers, police, militia, or gangs	148 (14.8)
A family member or friend killed by soldiers, police, militia, or gangs	172 (17.2)

Table 4: Frequency of physical disease or complaints

Physical disease or complaints (*n*=1000)	*N* (%)
GIT diseases	358 (35.8)
Cardiovascular diseases	231 (23.1)
Respiratory diseases	177 (17.7)
DM	42 (4.2)
Tumour	9 (0 9)

GIT: Gastrointestinal tract; DM: Diabetes mellitus

or absence of facilities in addition to differences in the methodology of the researches.

Community violence exposure: The most common traumatic event of exposure to community violence reported by the participants was seeing or hearing someone being beaten up in real life. This indicates that about half of the participants had lived in a violent environment in their childhood.

The results revealed that family bonding seemed an important protective factor against physical diseases. A higher level of family bonding is expected to reduce the risk of a chronic physical disease to half; this finding indicates the essential role of family bonding in building resilience and the ability to adapt later in life.[9] It has been reported that the family is one of the most resilient variables for normal development. Skodol's study[28] demonstrated that positive achievement experiences and positive interpersonal relationships during childhood or adolescence were significantly associated with remission from personality disorder in early adulthood. On the other hand, poor bonding can lead to adverse health outcomes in adulthood. A study by Agostini[29] revealed an association between inadequate parenting and a chronic physical illness.

Logistic regression showed that exposure to high levels of community-collective violence and household dysfunction-abuse during childhood have serious consequences on the health of adults, as it increased the risk of a chronic disease by about double compared to those with lower levels of exposure. This indicates that early stress during childhood could be converted to pathological changes during adulthood. Literature demonstrates that children who are exposed to violence suffer from physical and emotional harm.[30] An underlying thesis of the ACE study is that stressful or traumatic childhood experiences have negative neurodevelopmental impacts that persist over a lifespan and increase the risk of physical and social problems.[31]

Male gender significantly related to reduced risk of having a chronic disease to about the half that of the female. This finding could be partly explained by the physiological, psychological, social, and economic differences between males and females (Davidson *et. al* 2006). In any case, females tend to report physical disorders more than males. This result is important in building resilience programs by taking into consideration the vulnerability and risk factors.

Smoking habits were shown to significantly increase the risk of getting a chronic disease. This is consistent with reports in the literature since smoking behavior

Table 5: Multiple logistic regression model with risk of having a chronic physical disease as the outcome (dependent variable) and selected explanatory variables

Certain items of childhood experiences	Partial OR	*P* value
Bonding to family score		
Fourth quartile compared to first (lowest) quartile	0.57	0.01
Third quartile compared to first (lowest) quartile	1.03	0.88 (NS)
Second quartile compared to first (lowest) quartile	0.67	0.039
Community violence score		
Fourth quartile compared to first (lowest) quartile	1.98	0.002
Third quartile compared to first (lowest) quartile	1.79	0.007
Second quartile compared to first (lowest) quartile	1.00	1 (NS)
Household dysfunction and abuse score		
Fourth quartile compared to first (lowest) quartile	1.81	0.007
Third quartile compared to first (lowest) quartile	1.25	0.22 (NS)
Second quartile compared to first (lowest) quartile	0.89	0.63 (NS)
Age in years	1.05	<0.001
Ever smoked compared to nonsmokers	1.67	0.015
Ever consumed alcohol compared to nonconsumers	0.62	0.19 (NS)
Positive family history of chronic disease compared to negative history	1.15	0.33 (NS)
Male gender compared to females	0.58	<0.001
Constant	0.21	<0.001

P (model) <0.001; Overall predictive accuracy=66.7%; Predictive accuracy of positive outcome=74.4%. OR: Odds ratio; NS: Nonsignificant

is one of the most important risk factors to health. Smoking is responsible for about 80% of deaths from chronic obstructive pulmonary disease as well as early cardiovascular disease and deaths.[31]

Limitations of the study

Unfavorable general security conditions precluded a house to house survey, which is essential in such studies. ACEs may require asking embarrassing questions, which arouse some unpleasant memories the subjects may not want to disclose. In addition, some participants were hesitant even to answer questions on smoking and consumption of alcohol.

CONCLUSION

Adverse childhood experiences increase the risk of a chronic physical illness in adult life. Family bonding appears an important protective factor against physical diseases. This finding indicates the essential role of family bonding in building resilience and the subject's ability to adapt to life's changing circumstances later in life.

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