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ORIGINAL ARTICLE

Adversity in childhood and young adulthood predicts young adult depression

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Abstract

Objectives Adversity experience, in both childhood and adulthood, has been associated with the development of depression. However, it is currently unclear how variation in timing and duration of adversity across childhood and young adulthood affects the extent of depression symptomology.

Methods Data were analyzed from 2610 individuals from the National Longitudinal Study of Adolescent to Adult Health in the USA. Adversity in childhood and adulthood was evaluated using instruments similar to the adverse childhood experiences questionnaire, and associations were assessed by Poisson regression.

Results Any adversity experience was associated with significantly elevated depression symptoms in young adulthood. Individuals who experienced adversity during both childhood and adulthood had significantly higher depression symptoms than those experiencing adversity during only childhood or adulthood, suggesting a potential dose–response relationship between duration of adversity experience and depression symptomology.

Conclusions These results suggest that any adversity experience increases depression symptoms in young adulthood and that cumulative adversity is particularly detrimental. While long-term interventions to reduce adversity exposure would be most efficacious, interventions to reduce adversity at any period would still be beneficial.

Keywords Adverse childhood experiences · Cumulative load · Developmental programming · Allostatic load · Mental health

Introduction

Adverse childhood experiences (ACEs) are known to contribute to poor health outcomes in later life (Choi et al. 2017; Felitti et al. 1998; Sheikh 2018a, b, c; Thayer et al. 2017). These adversities include distinct traumas such as abuse or the incarceration of a parent (Anda et al. 2004; Felitti et al. 1998) or can be part of everyday life, such as living in poverty or in an area of high neighborhood violence (Metzler et al. 2017; Wade et al. 2014). ACEs have been associated with the development of conditions ranging from diabetes mellitus (Sheikh 2018a, b, c) to autoimmune diseases (Dube et al. 2009) and frequent headaches (Anda et al. 2010), among others. One outcome that has been repeatedly associated with ACEs, and that is of potential interest from the perspective of public health, is depression (Chapman et al. 2004; Cheong et al. 2017; Kim 2017; Remigio-Baker et al. 2014). Factors that influence depression are important to understand because this condition often precedes the development of physical health conditions such as chronic pain (Currie and Wang 2005), ischemic heart disease (Hippisley-Cox et al. 1998), and type II diabetes (Engum 2007). Understanding how and why ACEs influence depression could therefore help to reduce not only depression symptomology, but other health conditions as well.

Importantly, those who experience ACEs may also be at risk for trauma exposure in later life (Burke et al. 2011). Individuals with high ACE scores are more likely to report

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unemployment, economic stress, psychological distress, and incompletion of high school than those with lower ACE scores, and these components can increase the risk of subsequent trauma exposure and adversity in adulthood (Metzler et al. 2017; Sheikh 2018a, b, c). The correlation between childhood and adult adversity exposure is important to consider because adult exposure to trauma has been independently associated with mental and physical health conditions that have been similarly reported in response to ACEs (Brumley et al. 2017; Cheval et al. 2019).

Accounting for experiences of adversity in both childhood and adulthood is therefore necessary in order to determine whether increased depression is the result of adversity experienced during early life, as suggested by ACE studies, or whether it instead results from cumulative exposure to adversity in both childhood and adulthood. The purpose of this study is therefore to determine how variation in timing and duration of adversity experience relates to depression symptomology in young adulthood using data from a nationally representative sample in the USA.

Methods

Data come from Wave I and Wave IV of the National Longitudinal Study of Adolescent to Adult Health (Add Health). Add Health participants (grades 7–12) were originally selected from 132 nationally representative schools across the USA. A classroom questionnaire was administered to an original set of 90,000 students between 1994 and 1995, and approximately 17 students from each school were randomly selected for an at-home interview, which occurred in 1995. The current study utilized the publicly available version of the data sets that includes 6504 individuals from Wave I (completed in 1998), Wave II, Wave III, and Wave IV. Of the Wave I respondents, 92.5% were contacted during Wave IV data collection; 80.3% of these participants completed the Wave IV questionnaire. Data for Wave IV, which includes 5114 individuals in the public data set, were collected in 2008 as an in-home survey. Data collection was carried out by RTI International, using computer-assisted self-interviewing instruments. The current secondary analysis of data from Add Health was approved by the Institutional Review Board of Dartmouth College (Study #30900).

Measures

Adverse childhood experiences

Following a coding scheme created by Brumley et al. (2017), the following variables extracted from Waves I and IV were coded to represent either the absence (0 = no exposure) or presence (1 = exposure) during childhood of: physical abuse (Wave IV), sexual abuse (Wave IV), parental incarceration (Wave IV), poverty status (Wave I), community violence (Wave I), neglect (Wave IV), and parental alcoholism (Wave I) (see Online Resource Table 1). Individuals were then categorized as having been exposed to none versus any of those adverse childhood experiences.

Adverse adulthood experiences

In order to make a direct comparison between adversities in childhood and adulthood, a similar metric for adverse adulthood experiences was developed for the Add Health data set using data from Wave IV (Brumley et al. 2017). Like ACEs, the following variables were coded to represent either the absence (0 = no exposure) or presence (1 = exposure) of: physical abuse, sexual abuse, incarceration, poverty status, community violence, neglect, and alcoholism. Individuals were then categorized as having been exposed to none versus any of those adverse adulthood experiences (see Online Resource Table 1).

Depression

Add Health assesses depression symptoms using a modified version (9 questions) of the Center for Epidemiological Studies Depression Scale (CES-D). The CES-D is widely used to measure depression symptoms in population-based studies. It has been demonstrated to be both consistent and reliable (Radloff 1977; Zhang et al. 2012). The CES-D version used in Add Health Wave IV asked individuals to report the frequency of particular sentiments over a given period of time (either a month or a week). Each item ranged from 1 (never) to 4 (always/everyday). These statements included: "You felt depressed", "You felt sad", "You felt that people disliked you", "You could not shake off the blues, even with the help of your family and friends", "You felt that you were too tired to do things", "You had trouble keeping your mind on what you were doing," and "You were bothered by things that don't usually bother you". In addition, scores for the following statements were reverse-scored and added to the composite depressive score: "You enjoyed life" and "You felt you were just as good as other people". As this study looked at depression as an outcome in adulthood, only depressive symptoms from Wave IV were included in this study (mean participant age 27.7 years). Each depressive symptom was given a dichotomous score (0 = never, 1 = once or more than once), and these scores were summed to yield a depression scale ranging from 0 to 9.

Covariates

Previous research has found significant associations between depression and age, sex, self-reported ethnicity, and education level (Riolo et al. 2005). Thus, these variables were considered as possible covariates in our model. Ages (years), sex (male/female), and race/ethnicity (White, Hispanic, Black, or African-American, American Indian or Native American, Asian or Pacific Islander, or other) were extracted from Wave I of the survey. Education level (college/no college) was assessed during Wave IV.

Data analysis

Statistical analysis was performed in STATA 15.0. We first investigated bivariate associations between participant characteristics and exposure to ACEs with Chi-squared tests (categorical variables) and t-tests (continuous variables). Adversity categories were then constructed by separating individuals into four groups: those that had experienced adversity in neither childhood nor adulthood, those that experienced adversity only in childhood, those that experienced adversity only in adulthood, and those that experienced adversity in both childhood and adulthood. We then used Poisson regression to predict depression scores for the adversity categories, with no adversity experience as the reference group. We calculated both unadjusted and adjusted models, with the adjusted model controlling for age, sex, self-reported ethnicity, and education level. Conventional statistical thresholds were observed ($p < 0.05$).

Results

Sample characteristics and bivariate analysis results are provided in Table 1. Among individuals included in the sample, approximately half were female, two-thirds were White, and approximately one-third had a college degree by time of the Wave IV questionnaire. Men and college graduates were significantly less likely to experience ACEs. Those who experienced ACEs were significantly more likely to experience adversity in adulthood, and to have higher depression symptomology. African-Americans, American Indians, and Asian Americans were significantly more likely to experience ACEs than Whites.

Individuals who experienced adversity in childhood only, adulthood only, or who experienced cumulative adversity, had significantly higher depression scores than those who experienced no adversity at both time points (Table 2). When comparing differences in depression scores among the three adversity groups, we found that individuals in the cumulative adversity group had significantly higher depression symptoms relative to childhood- and adulthood-only adversity groups (Online Resource Table 2). Although members of the childhood-only adversity group appeared to have higher depression symptoms than members of the adulthood-only adversity group, this difference was not statistically significant (Online Resource Table 3).

Discussion

Here, we have assessed whether timing or duration of adversity exposure in childhood and early adulthood predicts depression symptoms among young adults from a nationally representative sample in the USA. Individuals who experienced adversity in childhood were significantly more likely to experience adversity in adulthood. Consistent with prior ACEs research, we found that childhood adversity was associated with significantly higher depression symptoms in adulthood (Chapman et al. 2004; Cheong et al. 2017; Honkalampi et al. 2005; Remigio-Baker et al. 2014). However, this work adds to these prior studies by also assessing adverse experiences in young adulthood. Similar to those experiencing adversity only in childhood, those individuals who experienced adversity only in adulthood had higher depression symptoms than those who experienced no adversity. Finally, we found that individuals that experienced cumulative adversity had the highest depression scores, suggesting a potential dose–response relationship between duration of adversity experience and depression symptoms.

This study is notable for assessing adversity in both childhood and early adulthood in relation to depression, rather than evaluating adversity during childhood or early adulthood in isolation. In addition, it was conducted among a nationally representative sample from the USA. Nonetheless, there are several limitations that must be acknowledged. First, the included sample size is relatively small ($N = 2610$), compared to the entire Add Health study ($N = 5114$). There are also several potential issues with a secondary data analysis. The questions that assessed adversity during childhood were not entirely consistent in wording with those assessed during adulthood. That said, the manner in which ACE questions were paired with similar, although not always identical, adult adversity questions is consistent with prior studies that looked at both childhood and adulthood adversities in this data set (Brumley et al. 2017). In addition, some variables that would ideally be controlled for, including parental depression and childhood depression, were not collected. Individuals surveyed in Wave IV are young adults (mean age 27.7 years), and therefore, different patterns of

Table 1 Sample characteristics of study participants, comparing those who did and did not have adverse childhood experiences. (United States 2018)

Variables	Total sample (N = 2610)	No ACE (N = 1595)	ACE (N = 1015)	p value
Age (at Wave I); mean (standard deviation)	14.69 (1.76)	14.66 (1.78)	14.74 (1.74)	0.27
Female; n (%)	1462 (56%)	925 (58%)	528 (52%)	0.001
College graduates; n (%)	940 (36%)	702 (44%)	254 (25%)	< 0.001
Ethnicity				
White; n (%)	1723 (66%)	1117 (70%)	619 (61%)	Reference
African-American; n (%)	548 (21%)	287 (18%)	254 (25%)	< 0.001
American Indian; n (%)	104 (4%)	48 (3%)	51 (5%)	0.001
Asian; n (%)	78 (3%)	64 (4%)	30 (3%)	< 0.001
Other; n (%)	131 (5%)	80 (5%)	61 (6%)	0.008
Experienced adversity in adulthood; n (%)	1253 (48%)	622 (39%)	619 (61%)	< 0.001
Adult depression score (Center for Epidemiologic Studies Depression Scale); mean (standard deviation)	5.31 (3.86)	4.76 (3.46)	6.17 (4.27)	< 0.001

Mean (standard deviation) values reported for continuous variables, while percentages are presented for categorical variables. Two-tailed t-tests (continuous variables) and Pearson Chi-squared tests (categorical variables) were used to evaluate differences between individuals with and without adverse childhood experiences

Table 2 Poisson regression model predicting depression score in adulthood among participants varying in timing and duration of exposure to adversity. (United States 2018)

	Unadjusted model coefficients	Unadjusted model 95% confidence intervals	Adjusted model coefficients	Adjusted model 95% confidence intervals
No adversity	Reference		Reference	
Childhood adversity only	**0.311**	0.259, 0.362	**0.292**	0.240, 0.344
Adulthood adversity only	**0.250**	0.205, 0.295	**0.242**	0.195, 0.289
Cumulative adversity	**0.426**	0.382, 0.469	**0.400**	0.355, 0.446
Female			**0.229**	0.195, 0.263
Age			− 0.004	− 0.034, 0.005
College graduate			**− 0.137**	− 0.175, − 0.099
Hispanic			0.054	− 0.332, 0.456
African-American			**0.103**	0.062, 0.144
American Indian			**0.130**	0.040, 0.212
Asian			**0.249**	0.163, 0.334
Other ethnicity			**0.106**	0.036, 0.180
Adjusted model R^2	0.0234		0.0401	

Adjusted model controls for gender, age, education level, and ethnicity, with White, male, and no college graduation used as reference categories for categorical variables. Bold = $p < 0.01$

depression could manifest at older ages. However, depression scores are often correlated across time (Nolen-Hoeksema and Ahrens 2002), suggesting that individuals with high depression scores in young adulthood are likely to exhibit higher depression scores in later life as well.

Finally, our ACE measure is based on one that was previously published and developed specifically for assessing ACEs in the Add Health study (Brumley et al. 2017). In this measure, four ACE variables were collected in Wave IV, simultaneously with adult adversity and

depression scores, as opposed to during Wave I. These cross-sectionally obtained data are therefore potentially subject to both recall and mood congruency bias (Zupan et al. 2017). Mood congruency bias suggests that a participant's current mood will determine the affective memory being recalled (Elliott et al. 2004). However, the ACE questions that were asked retrospectively involved explicit recall, such as parental incarceration, physical abuse, and sexual abuse, potentially minimizing bias. Experimental evidence also suggests that individuals with depression are not more prone to mood congruency (Cheng et al. 2015). Additional research from an older sample is needed to verify these results, ideally with questions that were asked prospectively and identically over multiple waves.

Conclusions

Studies that assess adversity in both childhood and adulthood are needed in order to understand whether timing and duration of adversity are important in predicting the development of adverse health outcomes. In this analysis, we found that individuals who experienced adversity in childhood, in early adulthood, or at both time points had significantly higher depression scores in adulthood compared to those who never experienced adversity. In addition, there was a dose–response relationship between duration of adversity experience and depression symptomology, with those experiencing adversity in both childhood and young adulthood having significantly higher depression symptoms than those who experienced adversity at only one time point. Additional research among a sample including middle-aged and elderly adults is needed to fully understand the effects that adverse experiences across the life course have on depression.

Compliance with ethical standards

Conflict of interest The authors declare no conflict of interest.

Informed consent Written informed consent was obtained from all individuals included in this study.

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