

Association of Reports of Childhood Abuse and All-Cause Mortality Rates in Women

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IMPORTANCE Research has linked childhood abuse to a variety of adult psychiatric problems, but little is known about associations of child abuse with adult mortality.

OBJECTIVE To test associations of retrospective reports of physical and emotional abuse in childhood with all-cause mortality rates in adulthood.

DESIGN, SETTING, AND PARTICIPANTS National sample of 6285 adults (aged 25-74 years at baseline) from the survey of Midlife Development in the United States. Baseline psychosocial data were collected in 1995 and 1996, with follow-up mortality data collected through October 2015.

MAIN OUTCOMES AND MEASURES Participants completed questionnaires at baseline about self-report of childhood emotional abuse, moderate physical abuse, and severe physical abuse. Mortality data during the next 20 years was tracked using the National Death Index.

RESULTS Of the 6285 participants included in the study sample, 2987 were men (48%) and 5298 were women (85%). Of the women, 5581 were white (91%), with a mean (SD) age of 46.9 (12.95) years. Women who reported childhood emotional abuse (hazard ratio [HR], 1.22; 95% CI, 1.01-1.49; $P = .04$), moderate physical abuse (HR, 1.30; 95% CI, 1.05-1.60; $P = .02$), or severe physical abuse (HR, 1.58; 95% CI, 1.20-2.08; $P = .001$) were at increased risk for all-cause mortality during the follow-up period. Reports of more types of childhood abuse were also associated with a greater risk of all-cause mortality in women (all vs none HR, 1.68; 95% CI, 1.24-2.30; $P = .001$; some vs none HR, 1.24; 95% CI, 1.01-1.52; $P = .04$). These effects could not be accounted for by childhood socioeconomic status, personality traits, or adult depression. No associations were observed in men.

CONCLUSIONS AND RELEVANCE These results suggest that in addition to the established psychiatric consequences of abuse, women who report childhood abuse also remain vulnerable to premature mortality into adulthood. Thus, reported childhood abuse may have long-term ramifications for health and longevity in women.

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A large literature has documented long-term adverse effects of childhood abuse on an array of adult psychiatric problems including depression, substance abuse, and posttraumatic stress disorder.^{1,2} However, the physical health consequences of child abuse have been less well understood, particularly the consequences for later-life mortality risk.

Studies have demonstrated that broadly conceived adverse childhood experiences (including abuse, but also including other exposures such as parental divorce or parental substance abuse) are associated with a host of morbidity and mortality outcomes in adulthood, ranging from heart disease to cancer to pulmonary diseases.³⁻⁵ Research focused on child

abuse specifically has shown it to be associated with poorer self-reports of health, functional limitations, and chronic diseases, such as respiratory conditions and diabetes, in adulthood.⁶⁻¹⁰ Childhood abuse also has been associated with biomarkers related to disease risk in adults (eg, elevated cholesterol and blood pressure).¹¹⁻¹⁴ A meta-analysis confirmed that there is approximately a 0.5-SD increase in morbidity risk across multiple health conditions in adults abused as children compared with control groups of adults who were not abused.¹⁵

However, fewer studies have investigated the implications of child abuse for mortality risk. Previous studies tended to focus on childhood deaths,^{16,17} which are more likely to be

a direct consequence of the abuse. Previous research on adverse childhood experiences (including abuse) documented that a greater number of childhood adversities are associated with higher risk of all-cause mortality.^{18,19} The only previous study that we are aware of that focused on childhood abuse found no greater risk of mortality in adults abused as children; however, the sample was in their 20s and 30s at follow-up.¹³ To our knowledge, this study represents one of the first efforts to investigate the effects of reported childhood abuse on long-term risk of mortality (20 years) in a large sample of midlife adults (mean age of 47 years, with the oldest being 74 years at baseline).

This study also tested whether different types of reported childhood abuse would be associated with adult mortality. Previous research has been mixed, sometimes finding associations between physical abuse and health,¹¹ other times finding relationships for emotional abuse,¹⁵ or sometimes both.^{7,12} In this study, we tested associations with 3 different types of self-reports of abuse (emotional, moderate physical, and severe physical abuse) as well as whether the accumulation of types of reported abuse were associated with adult all-cause mortality.

Last, we investigated sex differences based on previous literature that observed abuse effects specifically in female samples.^{10,11,15,20} Sex differences in response to early-life stress are also evident in animal models.²¹ In addition, we tested whether our self-report measure of childhood abuse might simply be acting as a proxy for other factors also associated with early mortality, including low childhood socioeconomic status, personality variables (neuroticism or conscientiousness), or depression, by testing whether associations between reported childhood abuse and adult mortality risk remained after statistical adjustment for these variables.

Methods

Participants

Data for this study come from the national survey of Midlife Development in the United States,²² a national sample of 7108 noninstitutionalized, English-speaking adults (ages 25-74 years). Six thousand three hundred twenty-five participants completed the mail-in questionnaires in 1995 and 1996. Mortality data were then collected through October 2015. Institutional review board approval was obtained from Harvard Medical School and the University of Wisconsin, Madison, with participant consent obtained by telephone. This study uses data from 6285 participants who both completed the abuse questionnaire and had survival time data available. See eMethods in the [Supplement](#) for more details about the sample and measures discussed in the next section.

Measures

Self-report of Childhood Abuse

Child abuse questions came from a revised version of the Conflict Tactics Scale.^{23,24} Questions probed 3 categories of childhood abuse: emotional, moderate physical, and severe physical abuse.^{6,20} Consistent with previous studies, we focused on

Key Points

Question What is the association of self-reports of childhood abuse with adult all-cause mortality?

Finding In this cohort study, the experience of retrospectively reported severe physical abuse, moderate physical abuse, or emotional abuse in childhood were all associated with a higher risk of all-cause mortality during a 20-year follow-up period in women but not in men.

Meaning In addition to its established psychiatric consequences, reports of childhood abuse may also have long-term ramifications for health and longevity among women.

reports of abuse from the participants' mother or father.^{6-9,25,26} We coded abuse as present if it was reported as happening frequently (when participants endorsed one of the items happening either sometimes or often during childhood), consistent with previous studies.^{6,7,26}

Accumulation of types of abuse was coded by summing the number of abuses that were reported during childhood, consistent with approaches in previous research.^{12,26} This variable was coded as none (no abuse reported), some (1-2 types of abuse reported), or all 3 types of abuse reported.

All-Cause Mortality

By the censor date of October 31, 2015, there were a total of 1091 confirmed deaths in the study sample (17.4%). Mortality data on participants were obtained from National Death Index reports. Survival time for decedents was the interval (in years) from the date when Midlife Development in the United States questionnaires were returned (1995-1996) to the date of their death. Participants who were still alive had survival times that equaled the length of the follow-up (censored at October 31, 2015).

Alternative Explanations

Childhood Socioeconomic Status | Participants were asked about their parents' highest educational degree. This variable was coded as either both parents having less than a high school diploma (0) or one or more parent having a high school diploma or higher (1).

Personality | Personality traits were assessed using Big 5 markers.^{27,28} We focused on neuroticism and conscientiousness as potential alternative explanations for study findings.

Depression | The presence of major depression in the previous 12 months was coded based on the definition and criteria specified in the American Psychiatric Association *DSM*.²⁹⁻³¹ Depression was coded as present or absent (1 or 0).

Covariates | Covariates included participants' age, race/ethnicity, current socioeconomic status (educational attainment), history of major chronic diseases (cancer or heart disease), and health behaviors (smoking or alcohol use).

Statistical Analyses

Cox proportional hazards regression models were estimated in SPSS, version 23 (IBM Corporation). Survival time in years was regressed onto childhood abuse variables. To test whether patterns differed by sex, we first regressed survival time onto the covariates described in the previous section (step 1), the main effects of sex and abuse (step 2), and then the sex \times abuse interaction (step 3). We then conducted regression analyses separately for men and women with different sets of covariates. In model 1, demographic variables of age, race/ethnicity, and current socioeconomic status were included. Model 2 added medical variables (history of cancer or heart disease). Model 3 added health behaviors (smoking or alcohol use). Model 4 added childhood socioeconomic status. Model 5 added personality variables (neuroticism and conscientiousness). Model 6 added depression.

Results

See eTable 1 in the Supplement for descriptive information about the sample. Men were more likely to report severe physical abuse ($\chi^2 = 4.87$; $P = .03$) and marginally more likely to report moderate physical abuse ($\chi^2 = 3.76$; $P = .05$), but were no different on emotional abuse from women ($\chi^2 = 0.16$; $P = .69$). Men also were more likely to die ($\chi^2 = 14.70$; $P < .001$) and had fewer years of survival than women (t test = 3.12; $P = .002$).

Sex \times Abuse Interactions

After controlling for demographic factors, medical conditions, and health behaviors, there was no significant main effect of severe reported physical abuse on all-cause mortality (HR, 1.16; 95% CI, 0.96-1.39; Wald statistic = 2.391; $P = .12$). There was a main effect of sex on mortality (HR, 1.16; 95% CI, 1.18-1.52; Wald statistic = 19.31; $P < .001$), but this was qualified by a sex \times abuse interaction (HR, 0.65; 95% CI, 0.45-0.94; Wald statistic = 5.26; $P = .02$).

With respect to moderate physical abuse, there was no significant main effect of reported moderate physical abuse on all-cause mortality (HR, 1.03; 95% CI, 0.90-1.19; Wald statistic = 0.199; $P = .66$). There was a main effect of sex (HR, 1.34; 95% CI, 1.18-1.53; Wald statistic = 19.52; $P < .001$), but this was qualified by a sex \times abuse interaction (HR, 0.74; 95% CI, 0.56-0.98; Wald statistic = 4.57; $P = .03$).

With respect to emotional abuse, there was no significant main effect of reported emotional abuse on mortality (HR, 1.00; 95% CI, 0.87-1.14; Wald statistic = 0.00; $P = .97$). There was a main effect of sex (HR 1.34; 95% CI, 1.18-1.53; Wald statistic = 19.85; $P < .001$), but this was qualified by a sex \times abuse interaction (HR, 0.76; 95% CI, 0.58-0.99; Wald statistic = 4.16; $P = .04$).

With respect to types of abuse, there was no effect of types of abuse on mortality (Wald statistic = 3.16; $P = .21$). There was a main effect of sex (HR, 1.35; 95% CI, 1.18-1.53; Wald statistic = 19.98; $P < .001$), but this was qualified by a sex \times abuse interaction (HR, 0.76; 95% CI, 0.64-0.92; Wald statistic = 8.35; $P = .004$). Given these interactions, we conducted follow-up analyses separately by sex.

Women

Table 1 presents analyses with different sets of covariates (models 1-3). Across demographic, medical, and health behavior covariates, reports of severe childhood physical abuse were associated with a greater risk of all-cause mortality in women (HR, 1.58; 95% CI, 1.20-2.08; Wald statistic = 10.483; $P = .001$). We then tested alternative explanations for this finding. To examine whether childhood socioeconomic status might better account for the results, we included parent education (model 4) but found that reported severe childhood physical abuse was still associated with mortality risk (Wald statistic = 10.638; $P = .001$). Because of concerns about the veridicality of abuse reports, we then tested whether personality traits (neuroticism and conscientiousness) might better account for the findings. Even with these variables included (model 5), reported severe childhood physical abuse continued to be associated with mortality (Wald statistic = 11.074; $P = .001$). Lastly, we tested whether depression might play a role, but after including depression (model 6), reported severe childhood physical abuse continued to be associated with women's mortality (Wald statistic = 10.380; $P = .001$) (Figure).

Reported moderate physical abuse in childhood was associated with an increased risk of all-cause mortality in women (Table 2). After controlling for demographic, medical, and health behavior covariates, reported moderate physical abuse was associated with greater mortality (HR, 1.30; 95% CI, 1.05-1.60; Wald statistic = 5.776; $P = .02$) (model 3). When we tested alternative explanations, we found that with parent education (model 4) and personality traits (model 5) included, reported moderate physical abuse was still associated with mortality risk (Wald statistics, 5.949 and 5.983; $P = .02$ and $P = .01$, respectively). Lastly, with depression included (model 6), reported moderate physical abuse continued to be associated with mortality risk in women (Wald statistic = 5.366; $P = .02$).

Women who reported emotional abuse in childhood were at greater risk of all-cause mortality (Table 3). After controlling for demographic, medical, and health behavior covariates, reported childhood emotional abuse was associated with greater risk of mortality (HR, 1.22; 95% CI, 1.00-1.49; Wald statistic = 4.038; $P = .04$) (model 3). With parent education and personality traits included as covariates (models 4 and 5), reported emotional abuse was still associated with mortality risk (Wald statistics, 4.553 and 4.132; $P = .03$ and $P = .04$, respectively). With depression included (model 6), reported emotional abuse became marginally significant (Wald statistic = 3.657; $P = .06$).

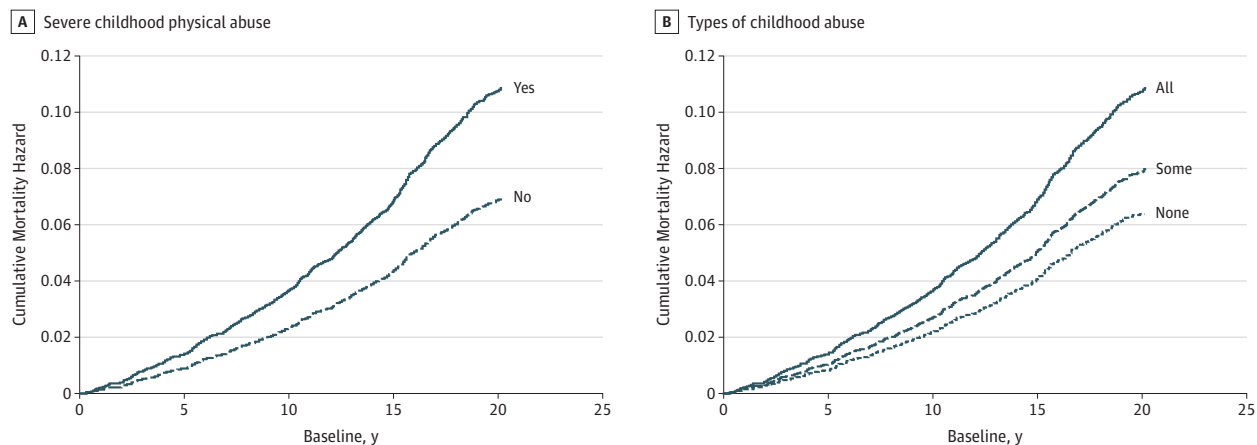
The accumulation of types of abuse was also associated with mortality in women (Table 4). After controlling for demographic, medical, and health behavior covariates, those who reported a higher number of abuse types were at greater risk of mortality (Wald statistic = 12.514; $P = .002$) (model 3). With parent education, personality traits, and depression included (models 4-6), types of abuse were still associated with mortality risk (Wald statistic = 13.123; $P = .001$; Wald statistic = 12.974; $P = .002$; and Wald statistic = 12.014; $P = .002$, respectively) (Figure).

Table 1. Results of Models Predicting Adult All-Cause Mortality From the Experience of Severe Childhood Physical Abuse in Women

Predictor	HR (95% CI)					
	Model 1	P Value	Model 2	P Value	Model 3	P Value
Age	1.105 (1.096-1.115)	<.001	1.099 (1.090-1.109)	<.001	1.111 (1.100-1.121)	<.001
Race/ethnicity						
White	1.197 (0.685-2.090)	.53	1.320 (0.753-2.313)	.33	1.481 (0.826-2.655)	.19
African American	1.849 (0.969-3.528)	.06	2.298 (1.197-4.413)	.01	2.895 (1.475-5.678)	.002
Education	0.862 (0.784-0.948)	.002	0.863 (0.785-0.949)	.002	0.938 (0.851-1.034)	.20
Heart disease	NA	NA	2.715 (1.703-2.778)	<.001	2.304 (1.801-2.947)	<.001
Cancer	NA	NA	1.630 (1.290-2.058)	<.001	1.586 (1.255-2.006)	<.001
Alcohol use	NA	NA	NA	NA	0.930 (0.755-1.144)	.49
Smoking	NA	NA	NA	NA	2.870 (2.330-3.533)	<.001
Abuse	1.525 (1.162-2.003)	.002	1.489 (1.133-1.957)	.004	1.576 (1.197-2.075)	.001
Model 4						
Age	1.111 (1.100-1.121)	<.001	Model 5		1.112 (1.101-1.123)	<.001
Race/ethnicity						
White	1.836 (0.937-3.595)	.08	1.933 (0.985-3.794)	.06	1.933 (0.986-3.793)	.06
African American	3.987 (1.861-8.541)	<.001	4.219 (1.946-9.146)	<.001	4.223 (1.949-9.151)	<.001
Education	0.929 (0.836-1.033)	.18	0.938 (0.842-1.046)	.25	0.939 (0.843-1.047)	.26
Heart disease	2.363 (1.828-3.055)	<.001	2.340 (1.805-3.034)	<.001	2.351 (1.813-3.047)	<.001
Cancer	1.633 (1.282-2.081)	<.001	1.630 (1.279-2.077)	<.001	1.611 (1.263-2.055)	<.001
Alcohol use	0.931 (0.751-1.156)	.52	0.927 (0.746-1.152)	.49	0.920 (0.740-1.143)	.45
Smoking	2.859 (2.303-3.550)	<.001	2.865 (2.304-3.563)	<.001	2.841 (2.284-3.534)	<.001
Parent education	1.030 (0.843-1.257)	.77	1.054 (0.862-1.289)	.61	1.052 (0.860-1.286)	.62
Neuroticism	NA	NA	1.020 (0.878-1.187)	.79	0.991 (0.848-1.158)	.91
Conscientious	NA	NA	0.842 (0.678-1.044)	.12	0.843 (0.680-1.046)	.12
Depression	NA	NA	NA	NA	1.248 (0.935-1.665)	.13
Abuse	1.601 (1.207-2.125)	.001	1.627 (1.221-2.167)	.001	1.603 (1.203-2.136)	.001

Abbreviations: HR, hazard ratio; NA, not applicable.

Figure. Cumulative Hazard Plots by Abuse Group



A, Plot of cumulative mortality hazard by years since study entry for women with and without reported severe childhood physical abuse. B, Cumulative mortality hazard for women with all types of reported childhood abuse (emotional, moderate physical, and severe physical), some types of reported abuse, and no reported abuse. Analyses control for age, race/ethnicity, education, history of heart disease, history of cancer, alcohol use, and smoking.

Men

In covariate-adjusted models for men, there were no associations of reported severe physical abuse, moderate physical abuse, emotional abuse, or types of abuse with risk of mortality (eTables 2-5 in the Supplement).

Role of Race/Ethnicity

We reconducted analyses restricting the sample to only white participants to test whether minority participants might be driving study findings (we were not able to conduct analyses in African American participants only owing

Table 2. Results of Models Predicting Adult All-Cause Mortality From the Experience of Moderate Childhood Physical Abuse in Women

Predictor	HR (95% CI)												
	Model 1	P Value	Model 2	P Value	Model 3	P Value							
Age	1.105 (1.095-1.115)	<.001	1.099 (1.090-1.109)	<.001	1.110 (1.100-1.121)	<.001							
Race/ethnicity													
White	1.159 (0.665-2.021)	.60	1.285 (0.734-2.250)	.38	1.400 (0.784-2.501)	.26							
African American	1.823 (0.957-3.476)	.07	2.275 (1.186-4.367)	.01	2.731 (1.398-5.335)	.003							
Education	0.861 (0.783-0.946)	.002	0.863 (0.785-0.949)	.002	0.939 (0.852-1.036)	.21							
Heart disease	NA	NA	2.179 (1.705-2.783)	<.001	2.304 (1.800-2.947)	<.001							
Cancer	NA	NA	1.639 (1.298-2.070)	<.001	1.587 (1.256-2.007)	<.001							
Alcohol use	NA	NA	NA	NA	0.929 (0.755-1.144)	.49							
Smoking	NA	NA	NA	NA	2.818 (2.289-3.469)	<.001							
Abuse	1.275 (1.034-1.571)	.02	1.266 (1.027-1.562)	.03	1.296 (1.049-1.601)	.02							
<table border="0" style="width:100%; text-align:center;"> <tr> <td></td> <td>Model 4</td> <td></td> <td>Model 5</td> <td></td> <td>Model 6</td> <td></td> </tr> </table>								Model 4		Model 5		Model 6	
	Model 4		Model 5		Model 6								
Age	1.110 (1.099-1.121)	<.001	1.111 (1.100-1.122)	<.001	1.112 (1.101-1.123)	<.001							
Race/ethnicity													
White	1.715 (0.879-3.345)	.11	1.813 (0.926-3.548)	.08	1.830 (0.934-3.584)	.08							
African American	3.730 (1.749-7.956)	.001	3.917 (1.815-8.451)	.001	3.955 (1.831-8.540)	<.001							
Education	0.931 (0.838-1.035)	.19	0.941 (0.845-1.048)	.27	0.942 (0.846-1.049)	.28							
Heart disease	2.360 (1.825-3.052)	<.001	2.333 (1.799-3.026)	<.001	2.341 (1.805-3.036)	<.001							
Cancer	1.642 (1.289-2.091)	<.001	1.645 (1.291-2.097)	<.001	1.627 (1.276-2.075)	<.001							
Alcohol use	0.934 (0.753-1.160)	.54	0.929 (0.747-1.154)	.50	0.923 (0.742-1.147)	.47							
Smoking	2.813 (2.266-3.491)	<.001	2.819 (2.268-3.504)	<.001	2.797 (2.249-3.479)	<.001							
Parent education	0.998 (0.819-1.217)	.99	1.021 (0.836-1.247)	.84	1.019 (0.834-1.243)	.86							
Neuroticism	NA	NA	1.029 (0.885-1.197)	.71	1.002 (0.857-1.171)	.98							
Conscientious	NA	NA	0.845 (0.682-1.048)	.13	0.847 (0.683-1.050)	.13							
Depression	NA	NA	NA	NA	1.233 (0.924-1.647)	.16							
Abuse	1.313 (1.055-1.633)	.02	1.318 (1.056-1.644)	.01	1.300 (1.041-1.624)	.02							

Abbreviations: HR, hazard ratio; NA, not applicable.

to their small number). Across demographic, medical, and health behavior covariates, all patterns remained the same. That is, in women, reported severe physical abuse (HR, 1.65; 95% CI, 1.23-2.22; Wald statistic = 11.28; $P = .001$); moderate physical abuse (HR, 1.38; 95% CI, 1.11-1.73; Wald statistic = 8.16; $P = .004$); emotional abuse (HR, 1.23; 95% CI, 1.00-1.52; Wald statistic = 3.89; $P = .05$); and types of abuse (Wald statistic = 15.78; $P < .001$) all remained associated with all-cause mortality. In contrast, in men, reported severe physical abuse (HR, 0.92; 95% CI, 0.70-1.20; Wald statistic = 0.40; $P = .53$); moderate physical abuse (HR, 0.89; 95% CI, 0.70-1.20; Wald statistic = 1.39; $P = .24$); emotional abuse (HR, 0.85; 0.70-1.03; Wald statistic = 2.76; $P = .10$); and types of abuse (Wald statistic = 4.997; $P = .08$) were not significantly associated with all-cause mortality.

Discussion

This is the first study that we are aware of to link self-reports of childhood abuse to mortality in adult women. Women who reported experiencing severe physical abuse, moderate physical abuse, or emotional abuse from a parent were at increased risk for all-cause mortality during the 20-year

follow-up period, compared with women who did not report such experiences. These associations did not appear to be specific to any type of reported abuse, although an accumulation of more types of abuse was associated with a greater risk of all-cause mortality in women. Furthermore, these findings could not be explained by childhood socioeconomic status, adult depression, or personality traits. There were no associations between reports of abuse and mortality in men.

This study's findings are consistent with previous literature that has demonstrated links between childhood physical and emotional abuse and morbidity outcomes,^{7,9,11-13,15,20} but extends this pattern to all-cause mortality. Because of the older age of our sample, if these reports are accurate, they suggest that mortality effects may be less likely to be a direct result of the abuse itself or suicide (more common in adolescents and young adults) and instead more likely owing to chronic diseases (the leading causes of death in midlife and older adults, <http://www.cdc.gov/injury/wisqars/leadingcauses.html>).

Why would abuse during childhood continue to have long-term effects into adulthood that culminate in greater mortality risk? One explanation is that abuse heightens vulnerability to psychiatric conditions (eg, depression) that in turn contribute to disease morbidity and mortality.^{32,33}

Table 3. Results of Models Predicting Adult All-Cause Mortality From the Experience of Childhood Emotional Abuse in Women

Variable	HR (95% CI)					
	Model 1	P Value	Model 2	P Value	Model 3	P Value
Age	1.105 (1.096-1.115)	<.001	1.100 (1.090-1.110)	<.001	1.110 (1.100-1.121)	<.001
Race/ethnicity						
White	1.125 (0.647-1.957)	.68	1.245 (0.714-2.171)	.44	1.340 (0.752-2.386)	.32
African American	1.756 (0.922-3.343)	.09	2.183 (1.140-4.179)	.02	2.618 (1.342-5.107)	.005
Education	0.862 (0.784-0.948)	.002	0.863 (0.785-0.948)	.002	0.936 (0.850-1.032)	.19
Heart disease	NA	NA	2.184 (1.708-2.792)	<.001	2.307 (1.801-2.955)	<.001
Cancer	NA	NA	1.637 (1.296-2.067)	<.001	1.585 (1.253-2.003)	<.001
Alcohol use	NA	NA	NA	NA	0.918 (0.745-1.132)	.42
Smoking	NA	NA	NA	NA	2.803 (2.277-3.450)	<.001
Abuse	1.235 (1.017-1.500)	.03	1.245 (1.025-1.513)	.03	1.224 (1.005-1.491)	.04
	Model 4		Model 5		Model 6	
Age	1.110 (1.099-1.121)	<.001	1.111 (1.100-1.122)	<.001	1.112 (1.101-1.123)	<.001
Race/ethnicity						
White	1.637 (0.842-3.181)	.15	1.720 (0.882-3.351)	.11	1.732 (0.889-3.377)	.11
African American	3.541 (1.663-7.541)	.001	3.690 (1.715-7.940)	.001	3.711 (1.724-7.987)	.001
Education	0.929 (0.836-1.033)	.17	0.940 (0.844-1.047)	.26	0.942 (0.846-1.049)	.28
Heart disease	2.362 (1.825-3.058)	<.001	2.333 (1.797-3.029)	<.001	2.342 (1.804-3.041)	<.001
Cancer	1.633 (1.282-2.080)	<.001	1.636 (1.284-2.085)	<.001	1.618 (1.269-2.064)	<.001
Alcohol use	0.920 (0.741-1.144)	.45	0.915 (0.735-1.139)	.43	0.910 (0.731-1.133)	.40
Smoking	2.792 (2.250-3.464)	<.001	2.800 (2.253-3.478)	<.001	2.783 (2.239-3.459)	<.001
Parent education	0.999 (0.820-1.218)	.99	1.021 (0.837-1.247)	.84	1.019 (0.835-1.244)	.85
Neuroticism	NA	NA	1.035 (0.890-1.205)	.65	1.008 (0.862-1.179)	.92
Conscientious	NA	NA	0.840 (0.677-1.041)	.11	0.841 (0.678-1.043)	.11
Depression	NA	NA	NA	NA	1.222 (0.916-1.631)	.17
Abuse	1.248 (1.018-1.529)	.03	1.238 (1.008-1.522)	.04	1.224 (0.995-1.505)	.06

Abbreviations: HR, hazard ratio; NA, not applicable.

Although we did not find support for this hypothesis, a study with more regular and thorough assessments of psychopathology is needed to definitively address this issue. Another explanation is that children who experience abuse may develop negative health behaviors (eg, drug use) as a way of coping with stress, and these detrimental behaviors may then contribute to preventable disease morbidity and mortality.^{5,33,34} Obesity and its sequelae (eg, diabetes) could be another possible pathway between childhood abuse and mortality. Another possibility is that childhood adversities become biologically embedded, calibrating how biological systems operate across the lifespan. For example, adverse childhood experiences may program the response tendencies of immune cells in ways that perpetuate chronic inflammatory states that in turn heighten risk for cardiovascular and other chronic diseases of aging.³⁵

Our findings further indicate that both reports of physical and emotional childhood abuse are associated with all-cause mortality later in life. These findings are consistent with previous studies^{7,12} that suggest that both the physical harm that comes from abuse as well as the emotional harm that comes from abuse that is psychological in nature can have implications for health outcomes.

In addition, the more types of abuse reported in childhood, the greater a woman's risk of all-cause mortality is as an adult. This finding is consistent with previous literature on adverse childhood experiences, where a greater number

of childhood adversities (eg, parent divorce and/or parent mental illness) is associated with both morbidity (eg, heart disease and/or respiratory diseases) and mortality outcomes in adulthood.^{3-5,18,19}

Findings in this study were evident for women but not men. This pattern is consistent with other research that has observed associations in all-women samples.^{6,11,15,20} It is unclear why women might be more vulnerable to the effects of abuse than men. One biological explanation could be that characteristics that are differentially prevalent in women vs men (eg, excessive release of steroid hormones in response to stress²¹) and that are also linked to health outcomes may help explain sex differences in abuse-mortality relationships. Psychologically, it may also be that men and women have different coping strategies for dealing with adversities such as abuse and that men's, on average, may be more protective for their long-term health.

A major limitation of this study is the retrospective assessment of childhood abuse. While we have interpreted these findings as indicative of an effect of childhood abuse exposure on later-life mortality, we must caution that the retrospective and self-reported nature of the abuse measure means that other explanations are always possible and that these reports may not necessarily be an accurate representation of what happened in these participants' childhoods. For example, there have been questions raised about the validity of retrospective reports^{36,37} based on observations

Table 4. Results of Models Predicting Adult All-Cause Mortality From Accumulation of Types of Childhood Abuse in Women

Predictor	HR (95% CI)					
	Model 1	P Value	Model 2	P Value	Model 3	P Value
Age	1.106 (1.096-1.116)	<.001	1.100 (1.091-1.110)	<.001	1.112 (1.101-1.122)	<.001
Race/ethnicity						
White	1.213 (0.694-2.119)	.50	1.364 (0.777-2.396)	.28	1.499 (0.835-2.689)	.18
African American	1.872 (0.981-3.574)	.06	2.375 (1.234-4.571)	.01	2.904 (1.480-5.699)	.002
Education	0.865 (0.787-0.951)	.003	0.865 (0.787-0.951)	.003	0.940 (0.853-1.036)	.21
Heart disease	NA	NA	2.190 (1.715-2.798)	<.001	2.319 (1.813-2.966)	<.001
Cancer	NA	NA	1.637 (1.296-2.066)	<.001	1.579 (1.250-1.996)	<.001
Alcohol use	NA	NA	NA	NA	0.919 (0.747-1.132)	.43
Smoking	NA	NA	NA	NA	2.833 (2.300-3.489)	<.001
Types of abuse						
Some vs none	1.252 (1.022-1.533)	.03	1.260 (1.028-1.544)	.03	1.238 (1.008-1.520)	.04
All vs none	1.634 (1.203-2.218)	.002	1.611 (1.185-2.191)	.002	1.684 (1.236-2.295)	.001
	Model 4		Model 5		Model 6	
Age	1.112 (1.101-1.123)	<.001	1.113 (1.101-1.124)	<.001	1.113 (1.102-1.124)	<.001
Race/ethnicity						
White	1.858 (0.948-3.641)	.07	1.960 (0.997-3.851)	.05	1.964 (1.000-3.859)	.05
African American	3.977 (1.855-8.526)	<.001	4.216 (1.942-9.152)	<.001	4.225 (1.947-9.171)	<.001
Education	0.930 (0.837-1.034)	.18	0.938 (0.842-1.045)	.24	0.939 (0.844-1.046)	.26
Heart disease	2.374 (1.836-3.068)	<.001	2.347 (1.810-3.043)	<.001	2.354 (1.816-3.052)	<.001
Cancer	1.627 (1.277-2.072)	<.001	1.630 (1.279-2.078)	<.001	1.616 (1.268-2.061)	<.001
Alcohol use	0.919 (0.740-1.142)	.45	0.915 (0.736-1.138)	.42	0.911 (0.732-1.133)	.40
Smoking	2.828 (2.277-3.511)	<.001	2.837 (2.282-3.528)	<.001	2.819 (2.266-3.507)	<.001
Parent education	1.027 (0.842-1.254)	.79	1.051 (0.860-1.284)	.63	1.048 (0.857-1.281)	.65
Neuroticism	NA	NA	1.015 (0.873-1.181)	.84	0.992 (0.848-1.159)	.92
Conscientious	NA	NA	0.840 (0.677-1.042)	.11	0.841 (0.678-1.043)	.12
Depression	NA	NA	NA	NA	1.195 (0.895-1.597)	.23
Types of abuse ^a						
Some vs none	1.264 (1.022-1.564)	.03	1.252 (1.010-1.551)	.04	1.238 (0.998-1.535)	.05
All vs none	1.726 (1.256-2.374)	.001	1.755 (1.269-2.429)	.001	1.727 (1.247-2.392)	.001

Abbreviation: HR, hazard ratio.

^a Types of abuse refers to the experience of severe physical abuse, moderate physical abuse, and emotional abuse.

that (1) the concordance between objectively verified abuse and self-reports of abuse are not that high; (2) there is instability in self-reports of abuse over time; and (3) people may be hesitant to endorse sensitive experiences such as abuse in self-report questionnaires, leading to underreporting. These are important limitations to acknowledge and certainly apply to this study. That said, there are a number of reasons why we believe that this study still makes an important contribution to the literature. First, in studies interested in mortality during midlife to later life, it would be very difficult to have an assessment of abuse during childhood because this would require a longitudinal sample followed up for more than half a century. While there are some impressive cohorts that have been following up children who experienced abuse for decades,^{13,38} until these samples reach older adulthood, we may need to rely on retrospective reports of childhood abuse in mortality studies. Second, issues of bias are large in studies where participants are also self-reporting on outcomes (eg, psychiatric conditions) because the potential for these outcomes to influence reports of abuse cannot be overlooked. However, this study's focus was mortality that was verified by the

National Death Index, an outcome not subject to reporting biases. Third, people's memories of whether an event has occurred is typically better than their recall of the timing of that event,³⁷ and our study focused on occurrence rather than timing of childhood abuse. Fourth, a review of the literature on recall of childhood adversities found that positive reports of abuse having happened are likely to be correct (the major validity concern is about not reporting), that reports are more likely to be accurate if they do not rely on judgment or interpretation, and that a rejection of all studies that involve retrospective recall of childhood abuse is unwarranted.³⁷ Other limitations of this study include the fact that the Midlife Development in the United States survey did not contain information about sexual abuse or about the age at which child abuse happened, both of which would be important in future studies. Also, we note that the occurrence of different types of abuse may overlap substantially with one another, creating difficulties statistically with detecting the unique effects of any particular type of abuse. Finally, another limitation is that the Midlife Development in the United States study does not contain information about cause-specific mortality.

Conclusions

This study documented that self-reports of childhood physical and emotional abuse were associated with increased risk for all-cause mortality in women. These find-

ings suggest that women who report child abuse continue to be vulnerable to premature mortality and perhaps should receive greater attention in interventions aimed at promoting health.

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REFERENCES

- Neumann D, Houskamp B, Pollock V, Briere J. The long-term sequelae of childhood sexual abuse in women: a meta-analytic review. *Child Maltreat*. 1996;1:6-16. doi:10.1177/1077559596001001002.
- Paolucci EO, Genuis ML, Violato C. A meta-analysis of the published research on the effects of child sexual abuse. *J Psychol*. 2001;135(1):17-36.
- Anda RF, Dong M, Brown DW, et al. The relationship of adverse childhood experiences to a history of premature death of family members. *BMC Public Health*. 2009;9:106.
- Dong M, Giles WH, Felitti VJ, et al. Insights into causal pathways for ischemic heart disease: adverse childhood experiences study. *Circulation*. 2004;110(13):1761-1766.
- Felitti VJ, Anda RF, Nordenberg D, et al. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: the Adverse Childhood Experiences (ACE) Study. *Am J Prev Med*. 1998;14(4):245-258.
- Irving SM, Ferraro KF. Reports of abusive experiences during childhood and adult health ratings: personal control as a pathway? *J Aging Health*. 2006;18(3):458-485.
- Greenfield EA, Marks NF. Profiles of physical and psychological violence in childhood as a risk factor for poorer adult health: evidence from the 1995-2005 National Survey of Midlife in the United States. *J Aging Health*. 2009;21(7):943-966.
- Goodwin RD, Hoven CW, Murison R, Hotopf M. Association between childhood physical abuse and gastrointestinal disorders and migraine in adulthood. *Am J Public Health*. 2003;93(7):1065-1067.
- Goodwin RD, Wamboldt FS. Childhood physical abuse and respiratory disease in the community: the role of mental health and cigarette smoking. *Nicotine Tob Res*. 2012;14(1):91-97.
- Romans S, Belaise C, Martin J, Morris E, Raffi A. Childhood abuse and later medical disorders in women. An epidemiological study. *Psychother Psychosom*. 2002;71(3):141-150.
- Midei AJ, Matthews KA, Chang YF, Bromberger JT. Childhood physical abuse is associated with incident metabolic syndrome in mid-life women. *Health Psychol*. 2013;32(2):121-127.
- Lee C, Tsenkova V, Carr D. Childhood trauma and metabolic syndrome in men and women. *Soc Sci Med*. 2014;105:122-130.
- Widom CS, Czaja SJ, Bentley T, Johnson MS. A prospective investigation of physical health outcomes in abused and neglected children: new findings from a 30-year follow-up. *Am J Public Health*. 2012;102(6):1135-1144.
- Danese A, Pariante CM, Caspi A, Taylor A, Poulton R. Childhood maltreatment predicts adult inflammation in a life-course study. *Proc Natl Acad Sci U S A*. 2007;104(4):1319-1324.
- Wegman HL, Stetler C. A meta-analytic review of the effects of childhood abuse on medical outcomes in adulthood. *Psychosom Med*. 2009;71(8):805-812.
- Roberts J, Lynch MA, Golding J. Postneonatal mortality in children from abusing families. *Br Med J*. 1980;281(6233):102-104.
- Sabotta EE, Davis RL. Fatality after report to a child abuse registry in Washington State, 1973-1986. *Child Abuse Negl*. 1992;16(5):627-635.
- Brown DW, Anda RF, Tiemeier H, et al. Adverse childhood experiences and the risk of premature mortality. *Am J Prev Med*. 2009;37(5):389-396.
- Kelly-Irving M, Lepage B, Dedieu D, et al. Adverse childhood experiences and premature all-cause mortality. *Eur J Epidemiol*. 2013;28(9):721-734.
- Rich-Edwards JW, Spiegelman D, Lividoti Hibert EN, et al. Abuse in childhood and adolescence as a predictor of type 2 diabetes in adult women. *Am J Prev Med*. 2010;39(6):529-536.
- Bale TL, Epperson CN. Sex differences and stress across the lifespan. *Nat Neurosci*. 2015;18(10):1413-1420.
- Brim JOG, Ryff CD, Kessler RC. *How Healthy Are We? A National Study of Well-Being at Midlife*. Chicago, IL: University of Chicago Press; 2004.
- Straus MA, Hamby SL, Boney-McCoy S, Sugarman DB. The Revised Conflict Tactics Scale (CTS2): Development and preliminary psychometric data. *J Fam Issues*. 1996;17:283-316. doi:10.1177/019251396017003001.
- Straus MA. Measuring intrafamily conflict and violence: the Conflict Tactics (CT) Scales. *J Marriage Fam*. 1979;41:75-88. doi:10.2307/351733.
- Pitzer LM, Fingerman KL. Psychosocial resources and associations between childhood physical abuse and adult well-being. *J Gerontol B Psychol Sci Soc Sci*. 2010;65(4):425-433.
- Greenfield EA, Marks NF. Identifying experiences of physical and psychological violence in childhood that jeopardize mental health in adulthood. *Child Abuse Negl*. 2010;34(3):161-171.
- Prenda KM, Lachman ME. Planning for the future: a life management strategy for increasing control and life satisfaction in adulthood. *Psychol Aging*. 2001;16(2):206-216.
- Mroczek DK, Kolarz CM. The effect of age on positive and negative affect: a developmental perspective on happiness. *J Pers Soc Psychol*. 1998;75(5):1333-1349.
- Organization WH. *Composite International Diagnostic Interview, CIDI, Version 10*. Geneva, Switzerland: World Health Organization; 1990.
- Kessler RC, Andrews A, Mroczek D, Ustun B, Wittchen HU. The World Health Organization Composite International Diagnostic Interview Short-Form (CIDI-SF). *Int J Methods Psychiatr Res*. 1998;7:171-185. doi:10.1002/mpr.47.
- Wang PS, Berglund P, Kessler RC. Recent care of common mental disorders in the United States: prevalence and conformance with evidence-based recommendations. *J Gen Intern Med*. 2000;15(5):284-292.
- Gump BB, Matthews KA, Eberly LE, Chang YF; MRFIT Research Group. Depressive symptoms and mortality in men: results from the Multiple Risk Factor Intervention Trial. *Stroke*. 2005;36(1):98-102.
- Kendall-Tackett K. The health effects of childhood abuse: four pathways by which abuse can influence health. *Child Abuse Negl*. 2002;26(6-7):715-729.
- Public HS. *Health People 2000: National Health Promotion and Disease Prevention Objectives*. Washington, DC: Department of Health and Human Services; 1990.
- Miller GE, Chen E, Parker KJ. Psychological stress in childhood and susceptibility to the chronic diseases of aging: moving toward a model of behavioral and biological mechanisms. *Psychol Bull*. 2011;137(6):959-997.
- Susser E, Widom CS. Still searching for lost truths about the bitter sorrows of childhood. *Schizophr Bull*. 2012;38(4):672-675.
- Hardt J, Rutter M. Validity of adult retrospective reports of adverse childhood experiences: review of the evidence. *J Child Psychol Psychiatry*. 2004;45(2):260-273.
- White HR, Widom CS. Does childhood victimization increase the risk of early death? a 25-year prospective study. *Child Abuse Negl*. 2003;27(7):841-853.