JOURNAL OF PUBLIC HEALTH | Vol. 45, No. 2, pp. e332–e338 | https://doi.org/10.1093/pubmed/fdac063 | Advance Access Publication June 18, 2022

Childhood embedded: childhood abuse and chronic physical health conditions over a 10-year period

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ABSTRACT

Background Childhood abuse is linked to experiencing multiple chronic health problems in midlife adults. Research has seldom examined whether childhood abuse is associated with a greater number of chronic physical health issues over time. The current study was to examine the contributions of childhood abuse on the development of chronic health conditions over a 10-year period.

Participants and setting Data were taken from the study of Midlife Development in the United States. Using three waves of data, 661 married adults were included in the analysis.

Results Using hierarchical regression, we found that childhood abuse was uniquely associated with the development of a greater number of chronic physical health conditions over a 10-year period. Post-hoc analysis found that neither gender nor age moderated the associations.

Conclusions Findings of the study indicate that childhood abuse was uniquely associated with a greater number of chronic physical health conditions over a 10-year period. These findings suggest that abuse in childhood may speed up biological aging and erode adult's health over time leaving adults vulnerable to chronic health conditions. Prevention efforts should assess adults for childhood abuse and the impact of childhood abuse on adult health over time may be preventable or more manageable.

Keywords adult physical health, childhood abuse, chronic illness, chronic physical health conditions, longitudinal

Chronic health problems, defined as conditions that last >1 year, require ongoing medical attention, and/or limit activities of daily living, are common in the USA.[1] Approximately 60% of adults have at least one chronic health condition and 40% have two or more conditions.[1] Chronic health conditions have a substantial economic impact, costing an estimated 3.8 trillion dollars per year and 90% of those costs are directly allocated to treatment.[1] Thus, it is essential to understand factors that contribute to the development of physical health problems.

Scholars have argued that childhood adversity, and childhood abuse specifically, is a social risk factor for the development of health problems and may expedite biological aging.[2–4] Childhood adversity encompasses a variety of circumstances or events that pose a serious threat to a child's physical or psychological well-being,[5] whereas childhood abuse specifically entails an act or failure to act that presents imminent risk of harm to a child. Numerous studies have shown that childhood abuse is associated with physical health issues,[6–8] yet few have investigated whether childhood abuse is associated with the development of chronic health conditions over time despite theoretical support.[4]

Over the past several decades scholars have noted that social relationships have an impact on physical health with marriage being a central relationship.[9,10] More specifically, relationships can either have a health-enhancing effect (e.g. encouraging proper diet and exercise) or a health detracting effect (e.g. modeling health hindering behaviors). Further, marital relationships have been proposed to mediate child abuse and health outcomes.[11] To account for the influence marriage has on health, we utilized a sample of continuously married adults from the study of Midlife Development in the United States (MIDUS) to examine the longitudinal contributions of childhood abuse on the number of chronic physical health conditions over a 10-year period.

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Childhood abuse and adult physical health

Childhood abuse has been widely associated with physical health problems.[12–14] The seminal Adverse Childhood Experiences study[5] found a dose response relationship between childhood abuse and adult health conditions, suggesting that a greater 'dose' of early stress increased physical health problems in adulthood. The Biological Embedding of Childhood Adversity Model (BECAM)[4] offers a conceptual framework from which to understand how childhood abuse is linked to physical health. The BECAM model suggests that adversity during sensitive periods of development (e.g. childhood) shape how bodily system function. For example, early stressful experiences (e.g. abuse) potentiate an inflammatory response and more frequent abuse leads to a prolonged inflammatory response. In this way, the stress response from psychological trauma gets physically embedded in various organ systems that potentiate a myriad of physical health problems.[4] Supporting the BECAM model, research indicates that childhood abuse is associated with an enhanced likelihood of reporting arthritis, cardiovascular disease, high blood pressure, chronic bronchitis, back problems, migraines, bowel disease, stroke, cancer and chronic inflammation.[14,15] The relationship between childhood abuse and adult physical health outcomes has been suggested to occur on a gradient where more frequent and severe childhood abuse have worse health outcomes.[4,5,14–16] The study MIDUS has been a valuable data set for researchers to consider physical health outcomes among adults who were abused in childhood[17,18]; however, few studies have considered repeated measures of physical health using the MIDUS data.

Although prior research has documented prospective association between childhood abuse and the number of adult chronic health problems, it has seldom been considered whether childhood abuse is associated with a greater number of chronic physical health conditions over time. Preliminary research suggests that childhood abuse may indeed shape health trajectories. Renna and colleagues[16] found that childhood physical and emotional abuse were associated with increased inflammation over a 2-year period, which may leave adults at risk for future health problems.[4,19] The current study seeks to add to existing knowledge by considering the effects of child abuse and the number of chronic health problems over a 10-year period among midlife adults, which is a particularly important population to consider as chronic health conditions become increasingly common over the course of adult development.

Present study

The purpose of the current study was to determine if childhood abuse is a risk factor for the development of chronic health problems over time. It is hypothesized that childhood abuse will be associated with a greater number of chronic health conditions over a 10-year period while controlling for numerous psychosocial covariates including marital and familial relationships (e.g. support and strain),[20–22] negative health behavior,[23] and psychopathology.[15,24–27] Specifically, the current study controlled for cases of depression and anxiety, self-esteem, body mass index (BMI), smoking and problematic drinking. In addition, the current study controlled for sociodemographic characteristics including gender, age and income.[22] Finally, adult's prior number of chronic health conditions were controlled for, as to understand the impact of childhood abuse on chronic health conditions over time.

Method

Data for the current study are from the MIDUS study, a three-wave longitudinal study of adults in the USA.[28] The first wave of the MIDUS data (MIDUS 1) was collected in 1995–96 and comprised a national sample of 7108 adults. The data were collected in two ways: telephone interview and self-administered questionnaire (SAQ). Following MIDUS 1, there was a follow-up study (MIDUS 2) conducted from 2004 to 2006, which included 4963 participants from MIDUS1. MIDUS 2 mirrored data collection methods and questionnaires of MIDUS 1. More recently, in 2013–14, the third wave of the MIDUS data (MIDUS3) was collected from 3294 of the original 7108 participants. The current study used a subset of adults who were continuously married over the course of the MIDUS study (MIDUS 1, MIDUS 2, MIDUS3), completed both the telephone interview and SAQ at all three waves, and had no missing data. The sample included 661 adults. Those involved in the current study were predominantly white ($n = 608$; 92%), who were college educated ($n = 317$, 48% had completed at least a bachelor's degree), reported a mean age of 64.40 years old at MIDUS 3 [standard deviation (SD) = 10.35], and were 55.8% male ($n = 369$). In comparison to all married adults at MIDUS 3, the analytic sample of consistently married adults was largely the same. The only differences found were that participants were less likely to be female ($\chi^2 = 11.9$, $P = 0.001$), more likely to have an alcohol problem ($\chi^2 = 8.19$, $P = 0.004$), and were older ($t = 4.36$, $P < 0.001$). All other differences between independent, control and dependent variables were non-significant.

Measures

Child abuse

Childhood abuse was measured with two items assessing emotional abuse and four items assessing physical abuse. Participants responded to questions assessing how often their parents (three items for maternal abuse and three items for paternal abuse) engaged in a variety of emotional (e.g. name calling) and physically abusive acts (e.g. hitting). Response options ranged from 1 (*Often*) to 4 (*Never*). Items were reverse coded and summed to create a continuous variable with scores ranging from 6 to 24. Greater scores reflect greater experiences of abuse, which is consistent with the ACEs dose–response framework.[5] Child abuse variables were collected in MIDUS 1.

Chronic health conditions

The number of chronic health conditions was measured by summing the number of conditions endorsed by participants. The MIDUS study asked participants about the presence or absence of 29 health conditions (e.g. thyroid disease and varicose veins) and respondents responded either affirmatively or negatively. A composite variable was created by summing the number of health conditions endorsed by the respondents to identify the total number of chronic health conditions. Chronic health conditions were measured at both the MIDUS 2 (covariate) and MIDUS 3 (outcome variable).

Covariates

Detailed information on the covariates is available in the supplementary material. All continuous measures (including covariates) reported Cronbach alpha >0.70.

Statistical analysis

Hierarchical regression in IBM SPSS 27.0 was used to examine the associations between childhood abuse and the number of adult chronic health conditions across two waves of data. Prior to running the hierarchical regression, bivariate statistics were examined including correlations and running a paired samples *t*-test of health conditions at MIDUS 2 and MIDUS 3. For the hierarchical regression, a stepwise process was employed for entering in the variables. In the first step, control variables were entered. In the second step, childhood abuse was entered to determine whether childhood abuse accounts for a significant proportion of variance in the number of chronic health conditions at MIDUS 3 above and beyond the contributions of control variables.

Results

Correlations, means and SDs are presented in Table 1. Bivariate statistics revealed that childhood abuse was significantly associated with the number of chronic health conditions at MIDUS 3 ($r = .10$, $P < 0.001$). Childhood abuse was common in the current sample as 75.6% of adults reported at least some parental physical or emotional abuse (scores equal to or greater than 7). Just over half of the entire sample (51.2%) reported mild to moderate abuse (scores between 7 and 11) and 24.4% of adults in the sample reported more severe levels of abuse (scores between 13 and 24). At MIDUS 2, adults reported an average of 1.91 (SD = 1.90) chronic physical health conditions and at MIDUS 3 reported an average number of 2.34 (SD = 2.10) chronic physical health conditions. Result of a paired samples *t*-test indicated that adults reported significantly more chronic physical health problems at MIDUS 3 than at MIDUS 2 ($t = 5.861$, $P < 0.001$).

Hierarchical regression

Next, the hierarchical regression was implemented to examine whether childhood abuse was associated with chronic health conditions (Table 2). The control variables were entered into the first step and accounted for a significant amount of variance (35%) in the number of chronic physical health conditions at MIDUS 3. Among the covariates, the number of health conditions at MIDUS2 (ß = 0.47, $P < 0.001$), BMI (ß = 0.12, $P < 0.001$), gender (ß = 0.10, $P < 0.01$) and age (ß = 0.15, $P < 0.001$) were significant. These results suggest that women, the number of chronic health conditions at MIDUS 2, a greater BMI and older adults reported a greater number of chronic health conditions ∼10 years later. Childhood abuse severity was entered into step 2, and it accounted for an additional one percent of the variance ($P = 0.033$) in the number of MIDUS 3 health outcomes beyond what was accounted for by the covariates. Childhood abuse was a significant predictor such that higher scores on the childhood abuse variable were associated with a greater number of MIDUS3 chronic physical health outcomes (ß = 0.05, $P < 0.05$). Overall, the model accounted for 36% of variance in the number of MIDUS 3 chronic physical health conditions.

Post-hoc moderation analysis

Both age and gender demonstrated main effects on the number of chronic health conditions in the regression model; thus, we considered whether there was an interaction with child abuse using interaction terms in the third step of the regression. For both gender ($b = 0.41$, $P = 0.51$) and age ($b = 0.00$, $P = 0.95$) the interaction terms were non-significant, suggesting that the effects of childhood abuse on the number of chronic physical health conditions at MIDUS 3 did not vary across participant gender or age.

Table 1 Correlations, means and SDs among study variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	*M (SD)*
1. Childhood abuse	—													9.41 (3.28)
2. Chronic health conditions M3	0.09*	—												2.33 (2.10)
3. Chronic health conditions M2	0.05	0.56***	—											1.91 (1.82)
4. Income	0.05	−0.16***	−0.14**	—										48,662 (44,094)
5. Education	−.09*	−0.14***	−0.12***	0.31***	—									7.75 (2.42)
6. BMI	0.11**	0.22***	0.22***	−0.01	−0.16***	—								27.82 (5.12)
7. Familial support	−0.11*	−0.03	−0.08*	−0.08	−0.07	−0.07*	—							3.58 (0.51)
8. Familial strain	0.18***	0.07	0.12***	0.01	−0.02	0.14***	−0.31***	—						2.02 (0.57)
9. Partner support	−0.11**	−0.06	−0.08*	0.03	−0.02	−0.05	0.31***	−0.21***	—					3.67 (0.45)
10. Partner strain	0.13***	.05	0.08*	0.02	0.02	0.01	−0.21***	.36***	−0.61***	—				2.16 (0.54)
11. Self-esteem	−0.07	−0.17***	−0.17***	0.09*	0.12***	−0.09*	0.30***	−0.25***	0.29***	−0.30***	—			38.31 (7.32)
12. Alcohol problems	0.06	0.02	−0.01	0.06	0.01	−0.07	−0.02	0.05	−0.10**	0.11**	−0.06	—		0.05 (0.21)
13. Smoking	−0.08*	−0.12**	−0.11*	0.10**	0.22***	−0.04	−0.10*	0.03	−0.05	−0.01	0.04	−0.07	—	1.46 (0.50)
14. Age	−0.10*	0.23***	0.23***	−0.12**	−0.13**	−0.01	0.15***	−0.21***	0.16***	−0.12***	0.15***	−0.06	−0.14**	55.45 (10.33)

Note. M2 = MIDUS 2 and M3 = MIDUS 3.

Discussion

Main findings of this study

The goal of the present study was to examine whether childhood abuse was associated with a greater number of physical health problems over a 10-year period among midlife adults. Results of the study suggest that, after controlling for numerous psychosocial risk factors, childhood abuse was uniquely associated with a greater number of chronic health conditions over a 10-year period. The relationship between childhood abuse and physical health had a relatively small correlation and regression coefficient; however, research has noted similar effect sizes for diet/exercise and physical health,[29] which are widely accepted strategies to improve health. Thus, we believe that although the correlations are small, they may have significant implications.

What is already known on this topic

Past research has consistently documented that not only is childhood abuse associated with specific physical health issues such as autoimmune diseases, diabetes and cancer, but is also associated with experiencing a greater number of adult chronic health conditions.[14,23] The current study replicates these past findings noting a significant, positive correlation between childhood abuse and the number of chronic physical health conditions in midlife and older adults, while also building on past research by documenting abuse is linked to a greater number of chronic health conditions controlling for prior levels of physical health conditions and the effects do not vary across gender or age.

What this study adds

One way the current study advanced knowledge was by assessing varying experiences of multiple forms of abuse. Abuse subtypes commonly co-occur, so to fully understand the impact of child abuse on physical health assessing multiple forms of abuse is needed; although measures of sexual abuse were not available with the current data. Additionally, we measured abuse using continuous, rather than dichotomous variables.[23] These advancements allow for greater variability in reports of childhood abuse and thus create a clearer picture in understanding how abuse is associated with physical health over time. By dichotomizing childhood abuse, the ability to test the dose–response relationship[5] between childhood abuse and adult outcomes is not possible.

Another way the present study contributes to the current understanding of the association between childhood abuse and adult physical health is by documenting that childhood abuse is associated with the development of chronic health problems over time beyond what is accounted for by

Table 2 Results of hierarchical regression examining the associations between childhood abuse and the development of chronic physical health conditions at MIDUS 3

	b (SE)	*ß*	*Sig*
Step 1			
Age	0.031 (.01)	0.15	<0.001
Income	−0.01 (.00)	−0.03	0.46
Education	0.08 (.05)	−0.01	0.81
BMI	0.05 (.01)	0.12	<0.001
Previous health conditions	0.54 (.04)	0.47	<0.001
Familial support	−0.01 (.15)	0.01	0.99
Familial strain	−0.08 (.14)	−0.02	0.56
Spouse support	0.04 (.19)	0.01	0.86
Spouse strain	0.03 (.16)	−0.01	0.40
Gender	0.44 (.16)	0.10	<0.01
Smoking	−0.12 (.14)	−0.03	0.40
Drinking	0.36 (.32)	0.04	0.27
Anxiety/depression	0.11 (0.21)	0.02	0.58
Self-esteem	−0.02 (0.01)	−0.07	0.07
Step 2			
Childhood abuse	0.05 (0.02)	0.07	0.03

Note. All covariates were measured at MIDUS 2 *b* = unstandardized regression coefficient, SE = standard error and ß is the standardized coefficient.

psychosocial risk factors, supporting prior research.[16] Thus, findings suggest that abuse may accelerate the rate of biological aging.[2,4,7] From a life course perspective, there are numerous determinants of health outcomes across the lifespan (e.g. relationships and health behavior)[15,22,23] and our findings suggest that childhood is a particularly sensitive period in which abuse may create long-term health problems independent of other risk factors.[30] One explanation for the unique relationship between childhood abuse and adult physical health over time is through physiological alterations of brain structure and functionality that occurs following abuse.[31] These problems in childhood may leave adults vulnerable to continue physiological dysfunction in adulthood including problems with the Hypothalamic-Pituitary-Adrenal (HPA)-axis, greater allostatic load and higher levels of inflammatory biomarkers.[4,32]

Although the current study did not examine mediators linking abuse to chronic health conditions, several covariates were significant in predicting the number of chronic physical health symptoms and may be possible mediators linking childhood abuse to chronic health conditions. BMI was identified as a significant covariate predicting lower levels of adult physical health problems, which may make it an important mediator. Childhood abuse has been associated with a greater BMI in adulthood,[33] which may be a consequence of poor eating habits, a sedentary lifestyle or using food to cope with stress. Thus, complications that accompany having a greater BMI may lead to long-term physical health problems.[27]

Limitations of this study

Despite several strengths of the current study including a large sample of midlife adults within the general population, a longitudinal investigation and control for numerous biopsychosocial covariates, the study is not without limitations. First, the MIDUS data do not include a measure of sexual abuse or neglect; thus, the impact of childhood abuse on the development of chronic physical health conditions overtime may be underestimated as both of these are common subtypes of childhood maltreatment. Second, the current study utilized retrospective reports of childhood abuse, which may bias the relationship between childhood abuse and chronic health conditions as participants may over or under report childhood abuse. This limitation is accentuated as both covariates and outcome measure were self-reported (e.g. common method bias). Third, the sample for this study identified as mostly White, creating discrepancies in the generalizability of the finding. Fourth, the current study used a sample of married adults; marriage has a significant impact on health, thus findings may not extrapolate to other single, divorced or widowed adults. Last, the current study did not account for physiological mechanisms that are likely to underly (mediate) the associations.

Conclusion

The current study has several implications for public health professionals. First, screening for childhood abuse is essential; measuring the frequency of childhood abuse is important to understanding adult physical health. Second, the effects of childhood abuse on physical health were seen after controlling for prior physical health, while continual monitoring of adult health status among those who are abused may not be able to address physiological problems potentiated by abuse, there may be further action steps available to reduce the development of future health problems over time. Third, the effects of childhood abuse did not vary according to participant age or gender, suggesting that childhood abuse influences men and women similarly across the life course.

Funding

The current study received no funding. Publicly available data from the MIDUS study was used for this research. Since 1995 the MIDUS study has been funded by the following: John D. and Catherine T. MacArthur Foundation Research Network National Institute on Aging (P01-AG020166; U19-AG051426).

Supplementary data

Supplementary data are available at the *Journal of Public Health* online.

Data Availability Statement

The data underlying this article are available from Inter-university Consortium for Political and Social Research (ICPSR) at https://doi.org/10.3886/ICPSR02760.v19, https://doi.org/10.3886/ICPSR04652.v7, https://doi.org/10.3886/ICPSR36346.v7.

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