

RESEARCH ARTICLE

Childhood adversity and major depression in later life: A competing-risks regression analysis

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Objectives: This study examined the relationship between childhood adversities and major depression in older adults over 8 years.**Methods:** The study sample consisted of 16 946 participants aged 51 years and older from the US Health and Retirement Study. Major depression was assessed using the Composite International Diagnostic Interview. Competing-risks regression analysis was conducted to examine the impact of each childhood adversity on late-life major depression and the potential moderation effects of sex, race/ethnicity, and adulthood trauma.**Results:** After controlling for covariates, childhood adversities including physical abuse by a parent (subdistribution hazard ratio [SHR] = 1.67, 95% confidence interval [CI] = 1.49-1.89, $P < .001$), trouble with the police (SHR = 1.31, 95% CI = 1.13-1.54, $P = .001$), receiving help because of financial difficulties (SHR = 1.17, 95% CI = 1.05-1.31, $P = .006$), and parental substance abuse (SHR = 1.11, 95% CI = 1.01-1.23, $P = .037$) were associated with a higher rate of major depression in later life. The association of physical abuse and major depression was stronger for men than women (SHR = 1.46, 95% CI = 1.15-1.85, $P = .002$), despite an overall lower risk of major depression among men. Potential adulthood trauma had a weaker association with late-life major depression in the presence of childhood physical abuse (SHR = 0.91, 95% CI = 0.85-0.98, $P = .015$). There was a significant dose-response relationship (SHR = 1.20, 95% CI = 1.16-1.24, $P < .001$).**Conclusions:** Childhood adversities increase the risk of major depression in later life, particularly for those who experienced physical abuse and trouble with the police. Men may be more susceptible to the mental health detriments of childhood adversities.**KEYWORDS**

adverse childhood experience, competing-risks analysis, geriatric depression

1 | INTRODUCTION

A life course approach to mental health suggests that depression and other mental disorders are the results of the interplay between psychosocial and biological factors over the life span.¹ Research in the last two decades has provided increasing evidence that late-life depression has its origin early in life. Childhood adversities, such as

abuse and household dysfunction, have been linked to the onset of depression throughout the life course.² Animal and human studies have also documented the wide-ranging adverse effects of exposure to childhood adversities on neural, endocrine, immune, and metabolic physiology³ as well as emotional processing.⁴

Most studies of childhood adversities focused on Adverse Childhood Experiences (ACEs) and often used a cumulative index that

tallies different types of adverse events known as the ACE score. These studies, particularly the original ACE Study led by Felitti and Anda,^{5,6} accentuated the powerful impact of childhood adversities on future health and functioning and created far-reaching implications for trauma-informed policies and practices. An important rationale for using the ACE score is that adversities tend to co-occur, but this approach obscures the distinctiveness of different types of adversities. An increased body of research has suggested that different types and combinations of childhood adversities are not equally traumatic.⁷⁻¹¹ To illustrate, Lanier et al⁹ found that children exposed to poverty and parental mental illness had a higher risk for poor health outcomes than other groups, including those exposed to three or more ACEs. Some researchers have also voiced concerns about treating childhood adversities as a cumulative risk because it does not offer clear, actionable steps.^{12,13} In addition, the inclusion of a wide range of ACEs in scoring often identifies a large proportion of the population exposed to at least one ACE, estimated to be roughly two-thirds to 80% of American adults.^{8,14} Given the pervasiveness of ACEs, unpacking the individual contribution of each ACE provides critical guidance on identification and intervention with population subgroups at the highest risk of depression later in life. Furthermore, although the original 10-item ACEs scale showed a reliable predictive power for health and behavioral health outcomes, recent studies have started to expand the scope to include other types of adversities that may also have harmful developmental impacts. For instance, the Center for Youth Wellness Adverse Childhood Experiences Questionnaire added items such as youth arrest/incarceration, bullying, and neighborhood violence to assess adversities at multiple levels.¹⁵ Some scholars have advocated for the inclusion of poverty due to its adverse neurobiological and psychosocial consequences.^{10,16}

Despite the proliferation of research on childhood adversity, relatively little research has focused on its impact on the mental health outcomes in late life. The “paradox of aging” describes the phenomenon that older adults experience relatively high levels of emotional wellbeing despite declines in biological, physiological, and cognitive capacity. Older adults tend to appraise current situations more positively and report less distress in response to negative exchanges. They also tend to have a more positive memory of past events than younger adults.¹⁷ These age-related differences in emotional processing may result in different responses to childhood adversities in late life. Another understudied topic is the potential modifiers of the childhood adversity-depression link.¹⁸ Knowing what population subgroups are most susceptible to the mental health detriments of childhood adversities informs the development of targeted and tailored approaches to buffer these adverse effects. Furthermore, most studies involving older adults examined symptoms of depression rather than a depressive disorder, and they have used cross-sectional rather than longitudinal designs.

The present study aims to unpack the relationship between childhood adversities and late-life depression. Responding to the gaps identified above, we examined each type of adversity separately. We considered not only family-level adversities such as physical abuse and parental substance abuse, but also stressful events related to

Key points

- Childhood adversities had independent and cumulative effects on the risk of major depression in later life.
- Physical abuse by a parent had the most substantial impact on the risk of major depression, followed by trouble with the police, help received from relatives due to financial difficulties, and parental alcohol or drug abuse.
- Men were more susceptible to the mental health detriments of childhood physical abuse.
- The relative impact of childhood physical abuse on the risk of major depression in late life decreased slightly as exposure to potentially traumatic events in adulthood increased.

poverty, the school environment, and the criminal justice system. We also explored the moderators of this relationship in a population-based sample followed over an extended period. We hypothesize that childhood adversities have independent and cumulative effects on the risk of major depression in later life and that the impact of childhood adversities differ by sex, race/ethnicity, and exposure to additional trauma in adulthood. According to Pearlin's differential vulnerability hypothesis,¹⁹ individuals can develop different outcomes despite being exposed to the same level of stress, indicating differential vulnerability across population subgroups. Gender and race/ethnicity are proxies of social forces that influence access to resources and create expectations on individuals, which in turn results in different lived experiences for people who belong to specific demographic categories. For example, women are overall more likely to seek mental health services.²⁰ Familism is a protective factor that buffers the effects of adversities on racial and ethnic groups.²¹ Additionally, pathways of past trauma can vary, increasing the severity of psychiatric symptoms for some while creating opportunities for posttraumatic growth or resilience for others.²² Taken together, moderation analyses are needed to uncover these group differences. The contributions of this study are enhanced by using a robust depression measure, a population-based sample followed over a long period, and a method well suited to analyzing survival data in the presence of competing risks.

2 | METHODS

2.1 | Data

The Health and Retirement Study (HRS)²³ is a nationally representative study of people aged 51 years and older in the United States, sponsored by the National Institute on Aging (NIA U01AG0097) and housed at the University of Michigan Institute for Social Research. All HRS respondents have provided written consent, and the original

study protocol was approved by the University of Michigan Institutional Review Board (IRB). The HRS conducts bi-annual interviews with eligible individuals selected using a multistage area probability design with geographic stratification and clustering (<http://hrsonline.isr.umich.edu>). HRS participants include several birth cohorts with varying entry times. We included all cohorts except for the Late Baby Boomers (added in 2016) because of limited follow-up data. The present study analyzed publicly available, de-identified data, and was determined as “not regulated as human subjects research” by the University of Michigan IRB.

The HRS included comprehensive assessments of psychosocial stressors and mental health status, but not all measures were administered consistently in every wave or to the entire sample. We extracted measures of childhood adversities from all available waves to generate indicators of ever experiencing these events (see the measures section below for details). We extracted data on major depression from the 9th through 13th waves of the HRS, conducted between 2008 through 2016, due to inconsistent administration of measures during the earlier surveys. The final analytical sample included 16 946 participants who had complete data on the childhood adversity measures and were aged 51 years and older at their respective baseline.

2.2 | Measures

2.2.1 | Outcome: Major depression

The World Health Organization's Composite International Diagnostic Interview-short form (CIDI-SF) is a fully standardized structured diagnostic interview designed for assessing psychiatric disorders through extensive surveys with trained lay interviewers.²⁴ The CIDI-SF had a specificity of 93.9% and a sensitivity of 89.6% for major depression, as assessed using the full CIDI.²⁴ The cut-point for the CIDI-SF depends on the aim of the study.²⁴ Following Mojtabai et al,²⁵ we used a cutoff of ≥ 5 on the CIDI-SF to indicate five or more depressive symptoms in the same 2-week period over the last 12 months, which closely resembles the DSM diagnostic criteria for major depressive disorder.

2.2.2 | Exposure: Childhood adversity

Since 2006, the HRS administered the Psychosocial and Lifestyle Questionnaires (PLQ) to a rotating random subsample of the longitudinal panel (see Smith et al²⁶ for details). The PLQ included four items from Krause et al²⁷ that asked about lifetime traumas before age 18: (1) “Did you have to do a year of school over again?”; (2) “Did either of your parents drink or use drugs so often that it caused problems in the family?”; (3) “Were you ever physically abused by either of your parents?”; and (4) “Were you ever in trouble with the police?”. The first three questions were asked in the 2006, 2008, 2010, and 2012 PLQ whereas the question about trouble with the police was asked in

the 2008, 2010, and 2012 PLQ. For each of the four adverse events, we created an indicator of experiencing that event if a “yes” response was ever recorded for the relevant item during any administration of the PLQ. In addition, we included two items on childhood economic hardship from 1998 through 2016 core surveys. Participants were asked to think about their families when they were growing up, from birth to age 16: (1) “Did financial difficulties ever cause you or your family to move to a different place?” and (2) “Was there a time when you or your family received help from relatives because of financial difficulties?”. For each of the two events, we created a dichotomous indicator of experiencing that event if a “yes” response was ever recorded for the relevant item during any of the core surveys. The six variables described above were examined separately as well as an unweighted count of the number of childhood adversities (ranging from 0 to 6).

2.2.3 | Covariates

Time invariant sociodemographic characteristics included sex, race/ethnicity, and education. Time-varying characteristics, including age, marital status, and household net wealth, were extracted from the 2008 through 2016 surveys. Age was considered in the analysis but not as a covariate (see Section 2.3 for more details). We also included an indicator of potentially traumatic events in adulthood, derived from seven items in the PLQ from 2006 through 2012. These items came from Krause et al²⁷ and recorded a “yes” or “no” response to the following questions: (1) “Has a child of yours ever died?”; (2) “Have you ever been in a major fire, flood, earthquake, or other natural disasters?”; (3) “Have you ever fired a weapon in combat or been fired upon in combat?”; (4) “Has your spouse, partner, or child ever been addicted to drugs or alcohol?”; (5) “Were you the victim of a serious physical attack or assault in your life?”; (6) “Did you ever have a life-threatening illness or accident?”; and (7) “Did your spouse or child ever have a life-threatening illness or accident?” We created an unweighted sum of the seven events experienced after age 18.

2.3 | Statistical analysis

To describe the study sample, we conducted descriptive statistics using data from the 2010 wave, accounting for the HRS complex survey design using a Taylor Series Linearization of the estimator. We used the 2010 wave data because all HRS cohorts included in the present study had entered by the 2010 survey. The impact of childhood adversity on late-life major depression was estimated using competing-risks regression analysis. The exploration of the moderation effects of sex, race/ethnicity, and potentially traumatic events in adulthood involved entering the relevant interaction terms in the regression analysis. Competing-risks regression is a particular type of survival analysis that aims to correctly estimate the marginal probability of an event in the presence of competing events. Conventional statistical methods for the analysis of survival data, such as the

Kaplan-Meier method and the Cox proportional hazards model, make the critical assumption of independent censoring. Under this assumption, participants who remain under follow-up have the same future risk for the occurrence of the event as those no longer being followed. This approach can result in biased estimates in the presence of competing risks.²⁸ A competing risk is an event whose occurrence precludes or alters the occurrence of the main event of interest. In the present study, death serves as a competing event. A participant who dies without ever experiencing a major depressive episode is no longer at risk of major depression, regardless of how long the duration of follow-up is.

Correct estimation of the failure probabilities in the presence of competing risks involves using the cumulative incidence functions (CIF) when estimating the crude incidence of outcomes and the competing-

risks regression analysis when examining the effects of covariates.²⁸ The CIF describes the incidence of the occurrence of an event accounting for competing risks. These analyses were conducted in Stata 15 S.E. Version (StataCorp L.P., College Station, Texas), using the *stcurve* function for estimating the CIF and the *stcrreg* function for a competing-risks regression model known as the Fine-Gray proportional hazards model for subdistribution.²⁹ The exponentiated regression coefficient from the Fine-Gray model is called the subdistribution hazard ratio (SHR). The SHR denotes the relative change in the subdistribution hazard function—the instantaneous rate of the occurrence of the failure event of interest—associated with a 1-unit change in a given covariate among participants who have not yet experienced an event of that type.³⁰ The SHR can be interpreted similarly to the hazard ratio from Cox regression, with some caveats. Simply put, the hazard ratio

TABLE 1 Descriptive statistics of the study sample in 2010 stratified by childhood adversity status

Sample characteristics	All	Any childhood adversity		P-value
		No	Yes	
Age in years	65.4 (64.9, 65.9)	66.0 (65.4, 66.6)	64.8 (64.3, 65.3)	<.001
Birth cohort (%)				.001
Mid Baby Boomers (born 1954-1959)	18.5 (16.0, 21.3)	17.9 (15.1, 21.1)	19.1 (16.7, 21.8)	
Early Baby Boomers (born 1948-1953)	22.3 (20.8, 23.9)	22.0 (20.1, 24.2)	22.6 (21.0, 24.3)	
War Babies (born 1942-1947)	19.7 (18.5, 21.0)	18.3 (16.8, 19.9)	21.1 (19.6, 22.7)	
Original HRS cohort (born 1931-1941)	28.6 (27.0, 30.1)	29.5 (27.6, 31.5)	27.6 (26.1, 29.2)	
Children of the Depression (born 1924-1930)	5.6 (4.8, 6.4)	6.9 (5.1, 6.8)	5.3 (4.5, 6.2)	
AHEAD cohort (born 1980-1923)	5.3 (4.8, 6.0)	6.4 (5.6, 7.3)	4.3 (3.7, 5.0)	
Sex (%)				<.001
Female	55.6 (54.9, 56.3)	60.1 (58.8, 61.4)	51.0 (49.9, 52.2)	
Male	44.4 (43.7, 45.1)	40.0 (38.6, 41.2)	49.0 (47.8, 50.2)	
Race/ethnicity (%)				<.001
White, non-Hispanic	82.1 (79.9, 84.1)	83.7 (81.8, 85.5)	80.4 (77.8, 82.8)	
Black, non-Hispanic	8.1 (7.2, 9.2)	7.6 (6.6, 8.7)	8.7 (7.8, 9.8)	
Other, non-Hispanic	3.0 (2.4, 3.6)	2.9 (2.2, 3.8)	3.0 (2.4, 3.8)	
Hispanic	6.8 (5.3, 8.7)	5.9 (4.6, 7.5)	7.8 (6.0, 1.0)	
Education (%)				<.001
Less than high school	12.7 (11.5, 14.0)	10.1 (8.7, 11.6)	15.3 (14.2, 16.7)	
High school or equivalent	33.5 (32.2, 34.9)	31.0 (29.5, 32.6)	36.0 (34.3, 37.7)	
Some college but no degree	25.5 (24.4, 26.7)	25.5 (24.2, 26.9)	25.4 (23.8, 27.1)	
College degree	28.3 (26.5, 30.2)	33.3 (30.9, 35.8)	23.2 (21.5, 25.1)	
Marital status (%)				.468
Married, partnered, or cohabiting	66.8 (65.6, 68.0)	67.0 (65.4, 68.6)	66.6 (65.2, 68.0)	
Divorced, separated, or widowed	27.1 (26.0, 28.2)	26.6 (25.3, 28.0)	27.5 (26.1, 28.9)	
Never married	6.1 (5.5, 6.8)	6.4 (5.4, 7.5)	5.9 (5.2, 6.6)	
Household net wealth (in 2010 \$)	484 510 (453 491, 515 530)	563 653 (523 253, 604 053)	404 174 (366 884, 441 465)	<.001
Potentially traumatic events in adulthood	1.3 (1.2, 1.3)	1.1 (1.0, 1.1)	1.5 (1.4, 1.5)	<.001

Note: The 2010 HRS survey weights and design factors were applied in estimates. "Any childhood adversity" refers to reports of any of the following childhood adversity items: (a) did a year of school over; (b) parental alcohol or drug abuse; (c) physical abuse by either parent; (d) ever in trouble with the police; (e) financial difficulties caused move; and (f) received help from relatives because of financial difficulties.

considers the rate of the given type of event in participants who are currently event-free (ie, event-free but remained in the follow-up). In contrast, the SHR considers the rate of the event in participants who are either currently event-free or who have previously experienced a competing event (eg, died).³⁰ We used age as the time-scale in survival analysis where participants enter the analysis at the age when they filled out the baseline questionnaire, as recommended by Kom et al.³¹

2.3.1 | Sensitivity analysis

We checked the robustness of the results against different cut-points for the CIDI-SF and potential calendar effects. We repeated the competing-risks regression analysis using a cut-point of ≥ 3 . This analysis produced regression coefficients similar to those from the analysis using a cut-point of ≥ 5 . Potential calendar effects were explored by comparing parameter estimates from a standard Cox proportional hazards model and a Cox model stratified by birth cohorts. No significant calendar effects emerged, and therefore, we retained the unstratified competing-risks regression model.

3 | RESULTS

Half of the analytical sample reported at least one childhood adversity, with a mean count of 0.8 (SD = 1.1). As shown in Table 1, persons with at least one childhood adversity were slightly younger and more likely to be men and racial and ethnic minorities. They had a lower lifetime educational achievement and less household net wealth later in life and reported more potentially traumatic events in adulthood.

As shown in Table 2, the most prevalent childhood adversity was parental alcohol or drug abuse (19.8%), followed by financial difficulties that caused a move (16.4%), and repeated a year of school (16.2%). Past-year major depression was more prevalent in the presence of all childhood adverse events. Major depression was the most prevalent among people who were physically abused by a parent (19.5%), followed by those who were ever in trouble with the police (12.1%).

Figure 1 presents the CIF comparing the cumulative incidence of major depression by selected childhood adversity indicators. The cumulative incidence had a steeper increase over the lifetime for those with experiences of childhood adversity.

Table 3 contains the results of the competing-risks regression analysis. After controlling for covariates, reports of four childhood adversity items were associated with a significant increase in the sub-distribution hazard of major depression. Specifically, the sub-distribution hazard of major depression was 67% higher for those who were physically abused by a parent (SHR = 1.67, 95% confidence interval [CI] = 1.49-1.89, $P < .001$), 31% higher for those who were ever in trouble with the police (SHR = 1.31, 95% CI = 1.13-1.54, $P = .001$), 17% higher for those who received help from relatives because of financial difficulties (SHR = 1.17, 95% CI = 1.05-1.31, $P = .006$), and 11% higher for those with experiences of parental

TABLE 2 Prevalence of major depression in 2010 by the experience of childhood adversity

Childhood adversity items	All	% with major depression
Did a year of school over before the age of 18		
Yes	16.2 (15.3, 17.1)	9.4 (8.1, 10.8)
No	83.9 (82.9, 84.8)	6.4 (5.8, 7.1)
Either parent drank or used drugs so often that it caused problems in the family before the age of 18		
Yes	19.8 (18.8, 20.8)	10.7 (9.1, 13.5)
No	80.2 (79.2, 81.2)	5.9 (5.4, 6.5)
Physically abused by either parent before the age of 18		
Yes	9.3 (8.6, 10.0)	19.5 (16.7, 22.6)
No	90.7 (9.0, 9.1)	5.6 (5.1, 6.1)
Ever in trouble with the police before the age of 18		
Yes	7.8 (7.3, 8.3)	12.1 (9.5, 15.2)
No	92.3 (91.7, 92.7)	6.5 (5.8, 7.1)
Financial difficulties caused a move to a different place through the age of 16		
Yes	16.4 (15.5, 17.3)	8.9 (7.5, 10.5)
No	83.6 (82.7, 84.5)	6.5 (5.9, 7.1)
Received help from relatives because of financial difficulties through the age of 16		
Yes	14.7 (14.1, 15.4)	10.8 (9.1, 12.9)
No	85.3 (84.6, 86.0)	6.2 (5.6, 6.8)

Note: The 2010 HRS survey weights and design factors were applied in estimates.

alcohol or drug abuse (SHR = 1.11, 95% CI = 1.01-1.23, $P = .037$) as compared to people without experiences of the given childhood adversity. Repeating a year of school and moving due to financial hardships were not significantly associated with the rate of major depression.

The interaction terms between each of the potential moderators and childhood adversities were entered one at a time. The interaction terms between sex*childhood physical abuse (SHR = 1.46, 95% CI = 1.15-1.85, $P = .002$) and between adulthood trauma*childhood physical abuse (SHR = 0.91, 95% CI = 0.85-0.98, $P = .015$) were statistically significant. As Figure 2A shows, the relative increase in the rate of major depression due to childhood physical abuse was more substantial for men than women, despite an overall lower risk of major depression among men. As Figure 2B shows, the relative rate of major

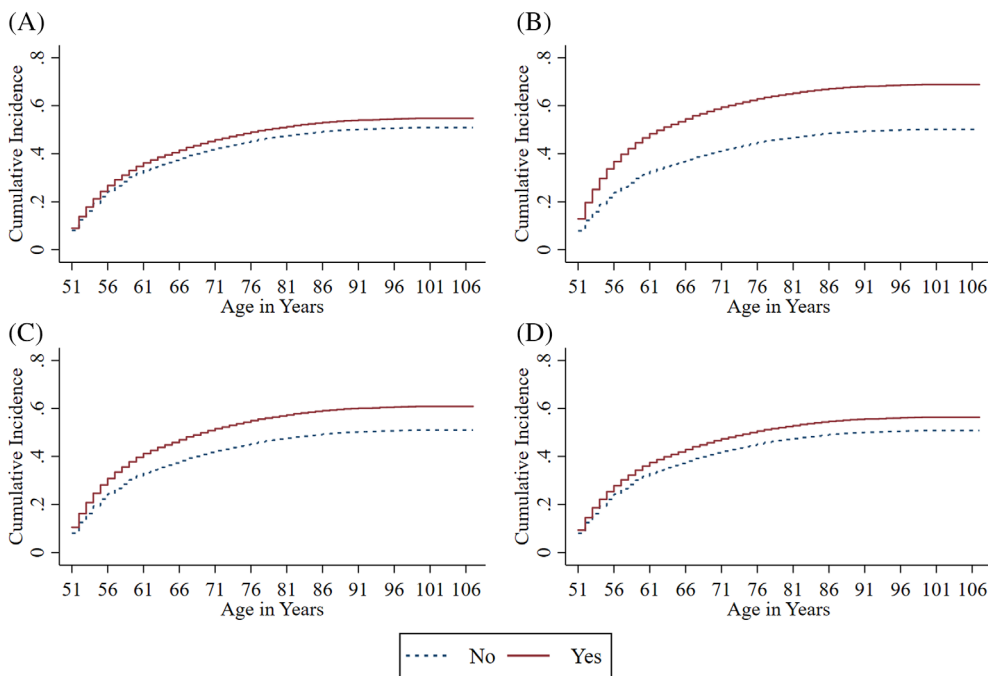


FIGURE 1 Cumulative incidence functions for major depression by selected childhood adversities. A “yes” label indicates the presence of given childhood adversity. Each panel corresponds to a childhood adversity item: (A) parental alcohol or drug abuse, (B) physical abuse by a parent, (C) ever in trouble with the police, and (D) ever received help from a relative due to financial difficulties [Colour figure can be viewed at wileyonlinelibrary.com]

depression rose faster with each additional increase in the count of potentially traumatic events in adulthood for those who were not physically abused, despite an overall lower risk of major depression among them.

Additional analysis showed that each additional childhood adversity was associated with a 20% increase in the subdistribution hazard of major depression (SHR = 1.20, 95% CI = 1.16-1.24, $P < .001$) (results not shown in tables).

4 | DISCUSSION

Our study extends the current findings on the relationship between childhood adversities and depression to late-life major depression using population-based panel data. Consistent with previous studies,^{6,32} an overall dose-response relationship was found, with a higher count of childhood adversities corresponding to a higher risk of major depression in late life. Beyond confirming previous findings, we identified the specific childhood adversities that had a more substantial effect over late-life depression than others. Being physically abused by a parent had the most substantial impact on the risk of major depression, followed by getting in trouble with the police, received help due to financial difficulties, and parental alcohol or drug abuse. Our study also contributed to understanding group differences to childhood adversities by uncovering gendered responses to physical abuse. For both men and women, childhood physical abuse increased their risk of major depression in later life. However, the relative increase in the risk was larger for men than women, suggesting that men were more susceptible to the adverse impact of childhood physical abuse on mental health. The impact of physical abuse on late-life major depression also differed by exposure to traumatic events in

adulthood. As the exposure to potentially traumatic events in adulthood increased, the relative impact of childhood physical abuse slightly decreased.

The finding that physical abuse exerted a more substantial effect on late-life major depression than other childhood adversities is consistent with other studies.¹⁰ This may be due to insecure caregiver-child attachment, resulted from living in a paradox where the caregiver who is expected to provide security becomes the source of violence.³³ According to Bowlby,³⁴ caregiver-child attachment shapes the cognitive schema of a person to understand self, other, and the relationship between self and other. Individuals with an insecure attachment with their caregivers perceive the self as unworthy and unlovable, the other irresponsible, and the self-other relationship unreliable, which are individual and interpersonal risk factors for depression.

Gender differences in the association between childhood maltreatment and later major depression have been reported. A study of the incarcerated population found that women were more likely to be exposed to sexual victimization during childhood, but men who reported this experience were significantly more depressed.³⁵ Possible explanations involve gender differences in traditional gender role expectations, social support, and mental health services seeking behaviors. Childhood adversities have socioeconomic consequences on the survivors, increasing the risk of poverty and unemployment in adulthood.³⁶ These socioeconomic consequences may exert a more substantial toll on the mental health of men due to traditional gender norms related to expectations and career success. Men traditionally have been expected to be the providers for their families, a role central to the definition of masculinity, and they focus more on material and career successes than women.³⁷ As such, failures to accumulate wealth and attain career success erode the self-concept of men to a

TABLE 3 Results from the Fine-Gray model of competing-risks regression analysis

Predictors	Subdistribution hazard ratio (95% CI)	P-value
Sex		
Female	Reference	
Male	0.58 (0.52, 0.64)	<.001
Race/ethnicity		
White, non-Hispanic	Reference	
Black, non-Hispanic	0.58 (0.51, 0.66)	<.001
Other, non-Hispanic	0.85 (0.67, 1.09)	.199
Hispanic	1.04 (0.91, 1.19)	.534
Education		
Less than high school	Reference	
High school or equivalent	0.88 (0.78, 1.00)	.040
Some college but no degree	0.84 (0.74, 0.96)	.012
College degree	0.72 (0.62, 0.84)	<.001
Marital status		
Married, partnered, or cohabiting	Reference	
Divorced, separated, or widowed	1.60 (1.45, 1.77)	<.001
Never married	1.41 (1.17, 1.70)	<.001
Household net wealth in quartiles	0.81 (0.78, 0.85)	<.001
Count of potentially traumatic events in adulthood	1.25 (1.21, 1.28)	<.001
Childhood adversities		
Did a year of school over	1.03 (0.92, 1.15)	.636
Parental alcohol or drug abuse	1.11 (1.01, 1.23)	.037
Physical abuse by either parent	1.67 (1.49, 1.89)	<.001
Ever in trouble with the police	1.31 (1.13, 1.54)	.001
Financial difficulties caused move	1.08 (0.97, 1.21)	.163
Received help from relatives because of financial difficulties	1.17 (1.05, 1.31)	.006

greater extent, making them more susceptible to the mental health consequences of childhood adversities. Men are also less likely to seek social support to cope with distress than women. As a result, men often miss out on the opportunities that can buffer the mental health consequences of childhood adversities.³⁸ In addition, men are less open about psychological problems and less likely to utilize mental health services than women,²⁰ leaving their depressive symptoms unresolved throughout the life course. These gendered findings, however, should be interpreted with caution as depression that may have

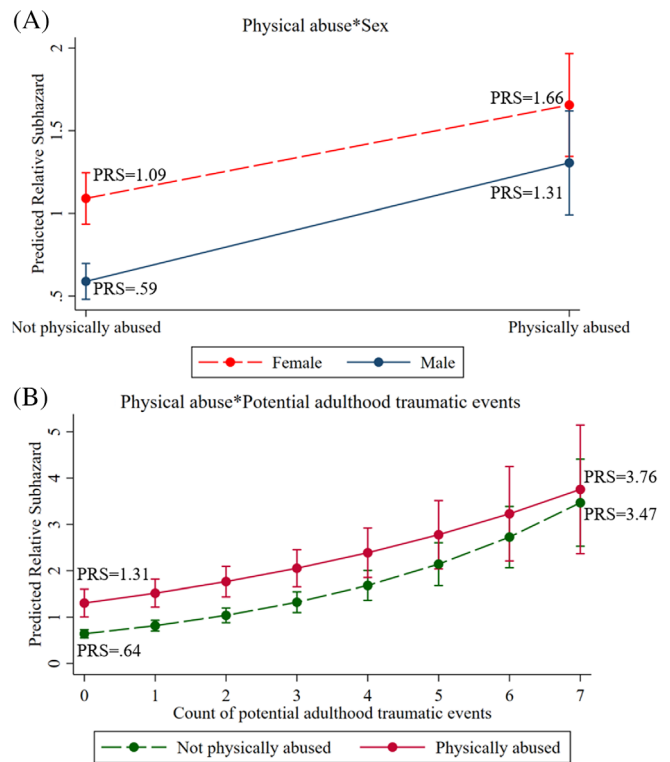


FIGURE 2 Predicted relative subhazard from the competing-risks regression analysis. Other covariates were held at their means. Panel A depicts the predicted relative subhazard associated with the physical abuse*sex interaction term. Panel B depicts the predicted relative subhazard associated with the physical abuse*potential adulthood traumatic events interaction term. PRS, predicted relative subhazard [Colour figure can be viewed at wileyonlinelibrary.com]

occurred earlier in life was not assessed in our study. Perhaps women with experiences of childhood adversities had depression earlier in life (eg, adolescence, young adulthood, and early middle age) but were more likely to experience remission later in life than men. In other words, manifestations of the gendered relationship between childhood adversities and major depression may depend upon the developmental stages.

Those abused during childhood were slightly less affected by the experiences of adulthood trauma, which may be an indicator of post-traumatic growth. Posttraumatic growth refers to the positive and frequently transformational psychological changes following a highly stressful life event.³⁹ Research indicates that despite living with significant levels of psychological distress, survivors of childhood sexual abuse demonstrated considerable posttraumatic growth involving a sense of a stronger self and appreciation of life.⁴⁰ In another study, adults with serious mental illness who experienced childhood physical and sexual abuse showed self-acceptance, adaptive coping, and improved self-worth, which paved the way for them to heal and transform from their past trauma and achieve a higher level of functioning.⁴¹

This study has several limitations. The CIDI-SF used in the HRS assesses 12-month major depression, not lifetime major depression. It was unknown whether the incidence of major depression observed during the study period was the first time a major depressive episode

had ever occurred. Although the most common time of onset for major depression is in a person's 20s and 30s,⁴² late-onset depression is not uncommon. As such, the study findings should be regarded as the first occurrence of major depression during the study period rather than the first occurrence of major depression during a person's lifetime. The HRS conducted biennial interviews, whereas the CIDI-SF probed past 12-month symptoms. A major depressive episode may have occurred during the non-interviewing years, resulting in an overestimate of people in the "event-free" pool. The CIDI-SF was administered to self-respondents only. Missing data due to proxy interviews or attrition were more likely to occur for those with cognitive and physical impairments, which are known risk factors for depression. In addition, the measurement of childhood adversities was based on retrospective recall and subject to recall and reporting bias.

5 | CONCLUSION

Childhood adversities have a lasting impact on mental health by increasing the risk of major depression in later life, particularly for those who experienced physical abuse and trouble with the police. More resources should be invested in preventing the occurrence of these childhood adversities as early-life preventive efforts. Men may be more susceptible to the mental health detriments of childhood adversity in late life, calling for more effort to identify men at a high-risk for late-life depression and provide them with necessary help. Avenues for future research include further exploration of the relationship between childhood adversities, adulthood trauma, and late-life mental health, and modifiable factors that buffer the mental health detriments of childhood adversities across the life span.

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CONFLICT OF INTEREST

None declared.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in the Health and Retirement Study web portal at <http://hrsonline.isr.umich.edu/>. These data came from the following public data products: HRS Biennial Data Products 1998 through 2016 HRS Core files and the RAND Contributed Files RAND HRS Longitudinal File 2016 (v.1).

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REFERENCES

- Koenen KC, Rudenstine S, Susser E, Galea S. *A Life Course Approach to Mental Disorders*. Oxford, UK: Oxford University Press; 2013.
- Lindert J, Von Ehrenstein OS, Grashow R, Gal G, Braehler E, Weisskopf MG. Sexual and physical abuse in childhood is associated with depression and anxiety over the life course: systematic review and meta-analysis. *Int J Public Health*. 2014;59(2):359-372. <https://doi.org/10.1007/s00038-013-0519-5>.
- Berens AE, Jensen SKG, Nelson CA. Biological embedding of childhood adversity: from physiological mechanisms to clinical implications. *BMC Med*. 2017;15(1):135. <https://doi.org/10.1186/s12916-017-0895-4>.
- McLaughlin KA, Kubzansky LD, Dunn EC, Waldinger R, Vaillant G, Koenen KC. Childhood social environment, emotional reactivity to stress, and mood and anxiety disorders across the life course. *Depress Anxiety*. 2010;27(12):1087-1094. <https://doi.org/10.1002/da.20762>.
- 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. [https://doi.org/10.1016/S0749-3797\(98\)00017-8](https://doi.org/10.1016/S0749-3797(98)00017-8).
- Anda RF, Whitfield CL, Felitti VJ, et al. Adverse childhood experiences, alcoholic parents, and later risk of alcoholism and depression. *Psychiatr Serv*. 2002;53(8):1001-1009. <https://doi.org/10.1176/appi.ps.53.8.1001>.
- Choi NG, DiNitto DM, Marti CN, Choi BY. Association of adverse childhood experiences with lifetime mental and substance use disorders among men and women aged 50+ years. *Int Psychogeriatr*. 2017; 29(3):359-372. <https://doi.org/10.1017/S1041610216001800>.
- Merrick MT, Ports KA, Ford DC, Afifi TO, Gershoff ET, Grogan-Kaylor A. Unpacking the impact of adverse childhood experiences on adult mental health. *Child Abuse Negl*. 2017;69:10-19. <https://doi.org/10.1016/j.chiabu.2017.03.016>.
- Lanier P, Maguire-Jack K, Lombardi B, Frey J, Rose RA. Adverse childhood experiences and child health outcomes: comparing cumulative risk and latent class approaches. *Matern Child Health J*. 2018;22(3): 288-297. <https://doi.org/10.1007/s10995-017-2365-1>.
- Finkelhor D, Shattuck A, Turner H, Hamby S. Improving the adverse childhood experiences study scale. *JAMA Pediatr*. 2013;167(1):70-75. <https://doi.org/10.1001/jamapediatrics.2013.420>.
- Nichols E, Szoek CE, Vollset SE, et al. Global, regional, and national burden of Alzheimer's disease and other dementias, 1990-2016: a systematic analysis for the global burden of disease study 2016. *Lancet Neurol*. 2019;18(1):88-106. [https://doi.org/10.1016/S1474-4422\(18\)30403-4](https://doi.org/10.1016/S1474-4422(18)30403-4).
- Layne CM, Olsen JA, Baker A, et al. Unpacking trauma exposure risk factors and differential pathways of influence: predicting postwar mental distress in Bosnian adolescents. *Child Dev*. 2010;81(4):1053-1076. <https://doi.org/10.1111/j.1467-8624.2010.01454.x>.
- McLennan JD, MacMillan HL, Afifi TO. Questioning the use of adverse childhood experiences (ACEs) questionnaires. *Child Abuse Negl*. 2020;101:104331. <https://doi.org/10.1016/j.chiabu.2019.104331>.
- Gilbert LK, Breiding MJ, Merrick MT, et al. Childhood adversity and adult chronic disease: an update from ten states and the District of Columbia, 2010. *Am J Prev Med*. 2015;48(3):345-349. <https://doi.org/10.1016/j.amepre.2014.09.006>.
- Purewal SK, Bucci M, Gutiérrez Wang LG, et al. Screening for adverse childhood experiences (ACEs) in an integrated pediatric care model. *Zero to Three*. 2016;37(1):10-17.
- Mersky JP, Janczewski CE, Topitzes J. Rethinking the measurement of adversity: moving toward second-generation research on adverse childhood experiences. *Child Maltreat*. 2017;22(1):58-68.
- Charles ST, Carstensen LL. Social and emotional aging. *Annu Rev Psychol*. 2010;61:383-409. <https://doi.org/10.1146/annurev.psych.093008.100448>.
- Cheong EV, Sinnott C, Dahly D, Kearney PM. Adverse childhood experiences (ACEs) and later-life depression: perceived social support

- as a potential protective factor. *BMJ Open*. 2017;7(9):e013228. <https://doi.org/10.1136/bmjopen-2016-013228>.
19. Pearlin LI. The sociological study of stress. *J Health Soc Behav*. 1989; 30(3):241-256. <https://doi.org/10.2307/2136956>.
 20. Mackenzie CS, Gekoski WL, Knox VJ. Age, gender, and the underutilization of mental health services: the influence of help-seeking attitudes. *Aging Ment Health*. 2006;10(6):574-582. <https://doi.org/10.1080/13607860600641200>.
 21. Smokowski PR, Chapman MV, Bacallao ML. Acculturation risk and protective factors and mental health symptoms in immigrant Latino adolescents. *J Hum Behav Soc Environ*. 2007;16(3):33-55. <https://doi.org/10.1300/10911350802107710>.
 22. Cicchetti D. Resilience under conditions of extreme stress: a multi-level perspective. *World Psychiatry*. 2010;9(3):145-154. <https://doi.org/10.1002/j.2051-5545.2010.tb00297.x>.
 23. Health and Retirement Study, HRS Biennial Data Products and RAND Contributed Files public use dataset. Produced and Distributed by the University of Michigan with Funding from the National Institute on Aging (Grant Number NIA U01AG009740). Ann Arbor, MI; 2019.
 24. Kessler RC, Andrews G, Mroczek D, Ustun B, Wittchen H-U. The World Health Organization composite international diagnostic interview-short form (CIDI-SF). *Int J Methods Psychiatr Res*. 1998;7(4): 171-185. <https://doi.org/10.1002/mpr.47>.
 25. Mojtabai R, Olfson M. Major depression in community-dwelling middle-aged and older adults: prevalence and 2- and 4-year follow-up symptoms. *Psychol Med*. 2004;34(4):623-634. <https://doi.org/10.1017/S0033291703001764>.
 26. Smith J, Ryan L, Sonnega A, Weir D. *Psychosocial and Lifestyle Questionnaire Documentation Report Core Section L.B*. Ann Arbor: University of Michigan, Institute for Social Research; 2017.
 27. Krause N, Shaw BA, Cairney J. A descriptive epidemiology of lifetime trauma and the physical health status of older adults. *Psychol Aging*. 2004;19(4):637-648. <https://doi.org/10.1037/0882-7974.19.4.637>.
 28. Austin PC, Lee DS, Fine JP. Introduction to the analysis of survival data in the presence of competing risks. *Circulation*. 2016;133(6):601-609. <https://doi.org/10.1161/CIRCULATIONAHA.115.017719>.
 29. Fine JP, Gray RJ. A proportional hazards model for the subdistribution of a competing risk. *J Am Stat Assoc*. 1999;94(446):496-509. <https://doi.org/10.1080/01621459.1999.10474144>.
 30. Austin PC, Fine JP. Practical recommendations for reporting Fine-Gray model analyses for competing risk data. *Stat Med*. 2017;36(27): 4391-4400. <https://doi.org/10.1002/sim.7501>.
 31. Kom EL, Graubard BI, Midthune D. Time-to-event analysis of longitudinal follow-up of a survey: choice of the time-scale. *Am J Epidemiol*. 1997;145(1):72-80. <https://doi.org/10.1093/oxfordjournals.aje.a009034>.
 32. Ege MA, Messias E, Thapa PB, Krain LP. Adverse childhood experiences and geriatric depression: results from the 2010 BRFSS. *Am J Geriatr Psychiatry*. 2015;23(1):110-114. <https://doi.org/10.1016/j.jagp.2014.08.014>.
 33. Stronach EP, Toth SL, Rogosch F, Oshri A, Manly JT, Cicchetti D. Child maltreatment, attachment security, and internal representations of mother and mother-child relationships. *Child Maltreat*. 2011;16(2): 137-145. <https://doi.org/10.1177/1077559511398294>.
 34. Bowlby J. *Attachment and Loss: Vol. 2. Separation: Anxiety and Anger*. Harmondsworth, England: Penguin Books; 1978.
 35. Roxburgh S, MacArthur KR. Childhood adversity and adult depression among the incarcerated: differential exposure and vulnerability by race/ethnicity and gender. *Child Abuse Negl*. 2014;38(8):1409-1420. <https://doi.org/10.1016/j.chiabu.2014.02.007>.
 36. Zielinski DS. Child maltreatment and adult socioeconomic wellbeing. *Child Abuse Negl*. 2009;33(10):666-678. <https://doi.org/10.1016/j.chiabu.2009.09.001>.
 37. Dyke LS, Murphy SA. How we define success: a qualitative study of what matters most to women and men. *Sex Roles*. 2006;55(5-6):357-371. <https://doi.org/10.1007/s11199-006-9091-2>.
 38. Gayer-Anderson C, Fisher HL, Fearon P, et al. Gender differences in the association between childhood physical and sexual abuse, social support and psychosis. *Soc Psychiatry Psychiatr Epidemiol*. 2015;50(10):1489-1500. <https://doi.org/10.1007/s00127-015-1058-6>.
 39. Tedeschi RG, Calhoun LG. Posttraumatic growth: conceptual foundations and empirical evidence. *Psychol Inq*. 2004;15(1):1-8. https://doi.org/10.1207/s15327965pli1501_01.
 40. Shakespeare-Finch J, de Dassel T. Exploring posttraumatic outcomes as a function of childhood sexual abuse. *J Child Sex Abuse*. 2009;18(6): 623-640. <https://doi.org/10.1080/10538710903317224>.
 41. Wang X, Lee MY, Yates N. From past trauma to posttraumatic growth: the role of self in participants with serious mental illnesses. *Soc Work Ment Health*. 2019;17(2):149-172. <https://doi.org/10.1080/15332985.2018.1517401>.
 42. Eaton WW, Shao H, Nestadt G, Lee BH, Bienvenu OJ, Zandi P. Population-based study of first onset and chronicity in major depressive disorder. *Arch Gen Psychiatry*. 2008;65(5):513-520. <https://doi.org/10.1001/archpsyc.65.5.513>.
 43. Health and Retirement Study; HRS public use data from 1998-2016. Produced and distributed by the University of Michigan with funding from the National Institute on Aging (grant number NIA U01AG009740). Ann Arbor, MI; 1992-current.

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