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Research Article

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Are adverse childhood experiences associated with trajectories of social isolation in adulthood? Evidence from two United States National surveys

Stephanie A. Robert, PhD*, Weidi Qin, PhD, Jooyoung Kong, PhD

Sandra Rosenbaum School of Social Work, University of Wisconsin-Madison, Madison, Wisconsin, United States
*Address correspondence to: Stephanie A. Robert, PhD. E-mail: sarobert@wisc.edu

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Abstract

Background and Objectives: **Social isolation is a contemporary public health crisis. However, we know little about trajectories of social isolation over time, and even less about early life precursors of these trajectories. Adverse childhood experiences (ACEs) are known predictors of a variety of poor economic, social, and health outcomes throughout adulthood. Informed by the life course perspective and stress process theory, we examine whether number of ACEs is an early life precursor of trajectories of social isolation throughout adulthood.**

Research Design and Methods: **We used longitudinal national data from both the Midlife in the United States (MIDUS) waves 1–3 (1995–2014) (ages 25–74 at baseline) and the Health and Retirement Study (HRS) waves 8–15 (2006–2020) (ages 51 and older). Growth curve modeling was used to examine the association between the number of ACEs and social isolation trajectories throughout adulthood.**

Results: **In both the MIDUS and HRS, social isolation increases over time among U.S. adults, with a steeper trajectory at older ages. A higher number of ACEs is associated with higher levels of social isolation throughout adulthood. However, in both datasets, there was no statistically significant interaction between ACEs and time—the association between ACEs and adult social isolation persists but does not accelerate throughout adulthood.**

Discussion and Implications: **Because the gap in social isolation between those with more and fewer ACEs is already pronounced at baseline among MIDUS and HRS adults, approaches to reducing adult social isolation need to address circumstances, such as ACEs, that launch trajectories earlier in the life course.**

Keywords: Health and Retirement Study (HRS), Midlife in the U.S. (MIDUS), Life course perspective

Background and Objectives

The Surgeon General's 2023 declaration of social isolation and loneliness as a public health epidemic was informed by years of accumulating evidence of the strong association between social relationships and health (Berkman & Syme, 1979; Holt-Lunstad, 2022; Holt-Lunstad et al., 2015; House et al., 1988; National Academies of Sciences, Engineering, and Medicine, 2020; Steptoe et al., 2013; Yang et al., 2013), along with concerns about notable trends of increased social isolation over time in the United States (Kannan & Veazie, 2023). Although much research demonstrates that social isolation and loneliness are strong predictors of poor health and mortality (Lyu et al., 2024; National Academies of Sciences, Engineering, and Medicine, 2020), far less attention has been paid to the determinants of social isolation and loneliness themselves. In particular, there is little research on trajectories of social isolation and loneliness over time (National Academies of Sciences, Engineering, and Medicine, 2020; Umberson & Donnelly, 2023). Moreover, examining whether there are early life predictors of social isolation and loneliness trajectories rather than just contemporaneous predictors might inform interventions to prevent or address loneliness and social isolation over the lifecourse.

This article focuses on trajectories of social isolation, which is the objective lack of social contact and connection whereas loneliness is the subjective sense of loneliness and isolation (National Academies of Sciences, Engineering, and Medicine, 2020; Steptoe et al., 2013). Social isolation is typically more strongly associated with physical health outcomes than is loneliness (Hong et al., 2023; Steptoe et al., 2013; Stokes et al., 2021). Research consistently finds that socially isolated adults are more likely to experience higher mortality, morbidity, and lower life satisfaction (Golaszewski et al., 2022; Kim & Park, 2024; Lyu et al., 2024; National Academies of

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Sciences, Engineering, and Medicine, 2020), highlighting the importance of understanding the complex mechanisms linking earlier life experiences to later-life social isolation and identifying potential intervention points. Although much research examines predictors of social isolation in older adults (Cudjoe et al., 2020; National Academies of Sciences, Engineering, and Medicine, 2020), we examine trajectories of social isolation throughout adulthood. Understanding the life course determinants of social isolation trajectories is critical both for improving social isolation as a well-being outcome in its own right and for reducing its impacts on physical and mental health.

When thinking about potential life course predictors of social isolation trajectories, we turn to adverse childhood experiences (ACEs). Although there may be a variety of life course predictors of social isolation trajectories, ACEs have been consistently linked to a wide variety of later life physical and mental health outcomes (Felitti et al., 1998; Hughes et al., 2017). Although both social isolation and ACEs have been strongly linked to poor health, we know little about connections between ACEs and adult social isolation. It is possible that ACEs may contribute to both the onset of social isolation and its perpetuation or accumulation over time. The main contribution of our study is to combine the strong literature on ACE's long-term effects on adult outcomes with our interest in understanding early life-course predictors of social isolation trajectories throughout adulthood. If ACEs are associated with adult social isolation trajectories, this would inform interventions over the life course and for older populations at risk of social isolation.

We draw on the life course perspective to examine the number of ACEs as a potential early life precursor of trajectories of social isolation in adults. To explore a full range of adult age ranges and to ensure robust results, we use two national, longitudinal surveys with slightly different and overlapping adult age ranges to examine the association between retrospective reports of ACEs and trajectories of social isolation over time among U.S. adults.

Determinants of social isolation

In terms of predictors of social isolation, research consistently demonstrates that social isolation among adults is associated with lower income, lower education, and being unmarried or living alone (Cudjoe et al., 2020; National Academies of Sciences, Engineering, and Medicine, 2020). Being unmarried or living alone are sometimes included in indices of social isolation, but are sometimes used as predictors (Umberson et al., 2022). Being Black or Hispanic are sometimes found to be associated with greater social isolation (National Academies of Sciences, Engineering, and Medicine, 2020; Umberson & Donnelly, 2023), though some research finds the opposite trends (Cudjoe et al., 2020; Umberson & Donnelly, 2023). Most evidence suggests that greater social isolation is associated with having worse physical and mental health (National Academies of Sciences, Engineering, and Medicine, 2020; Umberson & Donnelly, 2023), There are complicated results for gender differences as trends vary in combination with age and marital status (Shartle, 2023; Umberson et al., 2022; Umberson & Donnelly, 2023). Research suggests that age is linearly associated with social isolation (National Academies of Sciences, Engineering, and Medicine, 2020), though some research finds that the association between age and isolation is not linear, but increases at a faster rate at older ages (Luo and Li, 2023; Shartle, 2023).

Although we know a fair amount about demographic characteristics associated with social isolation, we know little about how inequities in social isolation arise over the life course or what early life course experiences may set people on social isolation trajectories throughout the life course and into old age. Indeed, the current societal emphasis on social isolation among older adults has an unintended consequence of posing a vision of social isolation as emerging in older adulthood. Yet it could be that many socially isolated older adults have been isolated throughout their lives, even if isolation is greatest in older ages (Shartle, 2023). We respond to Umberson and Donnelly's (2023) call for considering social isolation a lifelong process that may have early life course precursors that affect social isolation over the entire life span. Our study will control for known demographic predictors of social isolation, while exploring whether ACEs are associated with social isolation in adulthood and its trajectories over time.

ACEs and social isolation in adulthood

Childhood adversity has been consistently shown to predict a variety of economic, social, and health outcomes throughout the life course (Alley et al., 2025; Danese et al., 2009; Hughes et al., 2017; Kong, 2018; Ratcliff et al., 2025; Tzouvara et al., 2023). Although some previous research on the long arm of childhood adversity has focused on single measures of childhood adversity, such as child abuse or childhood poverty, cumulative number of ACEs provides a more global understanding of whether intensity and broad scope of childhood adversity are associated with later outcomes. ACEs refer to a range of potential traumatic events experienced by children and adolescents, such as exposure to domestic violence and substance abuse (Felitti et al., 1998). Number of ACEs has generally been found to have a graded relationship with later adverse health and social outcomes, with more experiences associated with worse outcomes (Felitti et al., 1998; Tzouvara et al., 2023). Because of the long-term impact of ACEs on a variety of outcomes, Bellis et al. (2019) estimated that a 10% reduction in ACE prevalence could save $105 billion in North America and Europe alone.

Why might ACEs affect social isolation over the life course? A life course perspective posits that childhood is a sensitive period where significant adversity can pattern subsequent negative outcomes that can accumulate over the life course (Ben-Shlomo & Kuh, 2002; Miller et al., 2011; O'Rand, 2006). ACEs may launch "trajectories of risk" that are carried through the life course and can have cumulative effects (Umberson & Donnelly, 2023). This article aims to be the first study to test whether number of ACEs is associated with social isolation in adulthood and its trajectories throughout adulthood.

Motivating hypotheses of a direct association between ACEs and social isolation trajectories is the stress process model, which is often combined with a life course approach to understand how childhood adversity can affect social, economic, and health outcomes years later (Miller et al., 2011). A stress process model helps us conceptualize significant adversity in childhood as a primary stressor that initiates stress responses while also

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leading to secondary stressors that can proliferate and amplify over time (Pearlin et al., 1981, 2005). Stress process models and life course theory converge with developmental theory and research demonstrating how childhood adversity and trauma affect a child's socioemotional development by creating insecure attachment, maladaptive stress responses, and disrupting emotion regulation (Miller et al., 2011). These developmental challenges can affect the creation and maintenance of positive social relationships, which can impact social isolation (Doyle & Cicchetti, 2017). For example, child maltreatment is associated with maladaptive stress responses in adulthood (Kong et al., 2021). ACEs affect adult emotion dysregulation which affects interpersonal challenges (Poole et al., 2018). Those abused in childhood are more likely to have less family support and more family strain in adulthood (Kong et al., 2019; Kong and Moorman, 2016; Umberson et al., 2014). These cumulative social impacts may result in reduced interpersonal resources, increasing risk of social isolation throughout the life course.

Although we know of no studies that have examined the association between ACEs and social isolation throughout adulthood, there have been a few studies that have found associations between early life adversity and loneliness rather than social isolation. Among U.S. veterans, those reporting the greatest increases in loneliness more than 3 years were most likely to report ACEs (Ong et al., 2024). In a cross-sectional study in Ireland, older adults who reported childhood parental substance abuse had greater loneliness (Kamaya et al., 2013). In Finland, older adults with the highest loneliness trajectory more than 10 years were more likely than those with the lowest loneliness trajectory to report a variety of childhood adverse experiences (Tiilikainen et al., 2024). These handful of studies on ACEs and loneliness are limited to a focus on veterans and older adults and examining only short (or no) trajectories. However, their findings of associations between ACEs and loneliness provide some support for examining ACEs and social isolation in adulthood and examining trajectories throughout adulthood.

Current study

Our first hypothesis is that adults reporting more ACEs experience greater social isolation in adulthood. Our second hypothesis is that adults reporting more ACEs will have steeper trajectories of social isolation throughout adulthood into older ages. To robustly test our hypotheses and provide a strong base on which to build subsequent research, we use two national, longitudinal surveys that cover different and overlapping age ranges of adults in the United States over time. Additionally, using two datasets allows us to generate more nuanced understanding by comparing findings from two different samples, strengthening the generalizability of the findings to the U.S. adult population.

Research design and methods

Data

Midlife in the United States

Midlife in the United States (MIDUS) is a nationally representative study of health and well-being across adulthood (Brim et al., 1999). The initial sample (MIDUS 1) was conducted between 1995 and 1996 with 7,108 adults aged 25 to 74. Participants were selected through random-digit dialing (RDD) for a nationally representative sample of U.S. adults. Two major follow-up surveys were administered: MIDUS 2 (2004–2006) and MIDUS 3 (2013–2014). The final analytic sample consisted of $n = 3,487$ participants from the RDD sample who completed the MIDUS 1 telephone interview and self-administered questionnaires. This baseline sample was then followed through MIDUS 2 (T2 $n = 2,257$) and MIDUS 3 (T3 $n = 1,414$). Approximately 28.4% of respondents had complete data across all three waves. Most missing data occurred in the second and third waves due to attrition. Missingness in the MIDUS is addressed through multiple imputation, as described below.

Health and Retirement Survey

The Health and Retirement Study (HRS) is a nationally representative sample of adults aged 51 or older in the United States, with oversampling of African Americans, Hispanics, and Florida residents. Launched in 1992, participants were re-interviewed every 2 years. We utilized eight waves of HRS data (Wave 8 in 2006 to Wave 15 in 2020) from: (1) the RAND longitudinal file (Bugliari et al., 2024), (2) Leave-Behind Psychosocial and Lifestyle Questionnaire (LBQ) (Smith et al., 2023), and (3) Childhood Family and Childhood Health Aggregated Data (Smith et al., 2023). We chose eight waves because HRS started collecting psychosocial data, including social isolation measures, from the LBQ in 2006. LBQ data were collected among a rotating random 50% of the study sample in each biennial survey. For example, a random half sample was selected for LBQ participation in 2006, and the other half sample participated in 2008. Those who participated in LBQ in 2006 were surveyed again in 2010, and those who participated in 2008 were followed up in 2012. As such, we concatenate data from the 2006 and 2008, 2010 and 2012, 2014 and 2016, 2018 and 2020 samples to represent four-wave longitudinal data (T1–T4) among the complete sample. Among the 14,768 participants surveyed at baseline, we excluded participants below age 51 ($n = 431$) because the age range fell outside the HRS target sampling frame. We also excluded 2 participants with missing data on race, resulting in a final analytic sample size of $n = 14,335$ at baseline wave (T1). The follow-up sample size was $n = 10,180$ for T2, $n = 7,775$ for T3, and $n = 5,025$ for T4. Consistent with the analyses conducted with MIDUS, multiple imputation was used to handle missing data, as described below.

Measures

Social isolation

In both the MIDUS and HRS, social isolation was assessed using a shortened version of the Berkman-Syme Social Network Index (Ford et al., 2006). This composite measure included four binary indicators: (a) not being married or living with a partner, (b) no weekly contact with non-resident family or friends/neighbors, (c) less than monthly religious service attendance, and (d) less than monthly participation in other social groups. These measures were summed to create an index ranging from 0 to 4, with a high score indicating greater social isolation. Following Umberson et al. (2022), we conducted sensitivity analyses using

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a three-item composite social isolation measure that excluded the marital/partnership item, instead including marital/partnership status as a control variable.

ACEs

In the HRS, ACEs included the presence of: parental physical abuse, mother's neglect, parental substance use, childhood financial hardship, and parental separation or divorce. Although the MIDUS had a larger list of ACEs than the HRS, to enhance comparability, we included only comparable ACEs measures in MIDUS. Specifically, in MIDUS, ACEs included the presence of parental physical abuse, mother's neglect, parental substance use, childhood financial hardship, and not living with both parents (coding adapted from Danielson and Sanders, 2018). The five yes/no indicators were summed, creating an ACE score ranging from 0 to 5 in both datasets.

Covariates

Our literature review described known demographic predictors of social isolation. As such, we included baseline measurements of sex (female vs. male) and race/ethnicity. For MIDUS, we included Black, White, and other race/ethnicity—Hispanic ethnicity was not collected at baseline. For HRS, we included non-Hispanic Black, Hispanic, White, and other race/ethnicity. We included baseline birth year, respondent's educational attainment, and father's educational attainment. For educational attainment, HRS used years of education while MIDUS coded level of education ordinally from 1 (*no formal schooling*) to 12 (*PhD or other advanced professional degree*) (1 = *no school/some grade school*, 2 = *junior high school*, 3 = *some high school*, 4 = *GED*, 5 = *graduated from high school*, 6 = 1–2 *years of college*, 7 = *3 or more years of college*, 8 = *college graduation* (2-year, vocational), 9 = *college graduation* (4–5 year), 10 = *some graduate school*, 11 = *master's degree*, 12 = *PhD or other advanced professional degree*). Self-rated health (1 = *poor* to 5 = *excellent*) and depressive symptoms were measured at each wave. The number of depressive symptoms was used both in MIDUS and HRS. In MIDUS, participants rated how often they experienced six negative emotions (e.g., "so sad that nothing could cheer them up," "nervous," "worthless") during the past 30 days on a 5-point scale (Mroczek & Kolarz, 1998). A composite was calculated by averaging these items, with higher scores reflecting more frequent symptoms ($\propto$= 0.87). In HRS, respondents were asked whether they experienced the following eight symptoms all or most of the time during the last week: "felt depressed," "everything is an effort," "sleep is restless," "felt alone," "felt sad," "could not get going," "felt happy," and "enjoyed life." Two positive valence items were reverse coded, and items were summed (range = 0–8), with higher scores indicating more symptoms ($\propto$ = 0.79).

Analytic strategy

Descriptive analyses present the distribution of variables in both MIDUS and HRS, weighted to be representative of the adult populations within age groups represented in the surveys. Weighted growth curve modeling is then employed to examine predictors of changes in social isolation over time and account for repeated observations within individuals (level 1: time, level 2: individual). In both datasets, we used age as the time variable to allow for more accurate modeling of developmental trajectories across midlife and older adulthood. Both MIDUS and HRS include respondents with wide age ranges (e.g., ages 25–74 at MIDUS 1); therefore, using "wave" or measurement occasion would confound individuals at different life stages. By using age (and including a control for birth year), we can estimate how ACEs interact with time to affect social isolation across adulthood, capturing whether the impact of ACEs on social isolation remains stable or changes along a continuous developmental trajectory.

Age was grand-mean centered and rounded to the nearest whole number, yielding 54 for MIDUS and 72 for HRS. We included both linear and quadratic time variables to explore potential nonlinear trajectories of social isolation within the observed age range. In both datasets, the inclusion of time and time^2 was supported by model fit comparisons (e.g., Bayesian information criteria), indicating that the curvilinear model better captured the observed changes in social isolation over time than a linear model alone.

To check for the appropriateness of growth curve modeling, we calculated the interclass correlation (ICC) using an empty model with no covariates. In the MIDUS data, the ICC was 0.482, indicating that 48.2% of the total variance in social isolation was attributable to between-individual differences; the ICC was 0.538 in the HRS data, indicating that 53.8% of the total variance in isolation resulted from individual differences. This high level of nesting within individuals confirms the appropriate use of growth curve modeling in both data sets.

In our growth curve models, self-rated health and depression were treated as time-varying covariates. This allowed us to adjust for wave-specific physical and mental health status when estimating the unique associations between ACEs and social isolation while accounting for concurrent health changes. All other covariates were included as time-invariant variables measured at baseline.

We present the results in two models. Model 1 examines the main effects of ACEs and time to estimate baseline differences in social isolation by ACEs and the overall change in social isolation over time, controlling for covariates. Model 2 introduces interaction terms between ACEs and time variables to test whether social isolation trajectories vary by respondents' ACEs.

For both MIDUS and HRS, we used sample weights in both univariate and multivariate analyses. For both data sets, we used multiple imputation via the ICE command in Stata (Royston, 2005), generating five imputed datasets (the use of 10 imputed data sets showed similar results). The imputation model included all covariates and the outcome variables from the main analytical model to ensure the accuracy of the imputed values. Missingness was assumed to be Missing At Random (MAR) as it was significantly predicted by baseline covariates in logistic regression models. To evaluate the quality of the imputation, we compared the distributions and the central tendencies of the observed and imputed values and found no substantial differences. The imputation quality was also confirmed by a high level of relative efficiency (0.95), indicating that the imputation process achieved high estimation precision. After imputation, analyses were pooled using the MI estimate procedure (StataCorp, 2021). Both datasets used the MIXED

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command in Stata to compute growth curve models (StataCorp, 2025) (StataCorp LLC, College Station, TX).

We performed sensitivity analyses by running these same models using a 3-item social isolation outcome measure rather than the 4-item measure—omitting the partnership status variable, but including partnership status as a control.

Results

Table 1 presents the weighted sample characteristics and key variables for MIDUS and HRS. For MIDUS, social isolation increases slightly over time: 1.34 (T1), 1.37 (T2), and 1.45 (T3). On average, MIDUS respondents reported 0.84 ACEs. For HRS, social isolation also increased over time: 2.46 (T1), 2.68 (T2), 2.70 (T3), and 2.75 (T4). On average, HRS respondents reported 0.66 ACEs.

Table 2 presents the results of the growth curve modeling for MIDUS and HRS, adjusting for covariates. First, in Model 1 for the MIDUS, we see no linear association between age and social isolation ($b = 0.00$, p = ns), but a positive and statistically significant quadratic association ($b = 0.0002$, $p < .001$). This indicates that social isolation is at its lowest point around age 54 (grand mean age) and begins to accelerate after that point.

Testing our first hypothesis, Model 1 for MIDUS shows that number of ACEs is associated with greater social isolation ($b = 0.13$, $p < .001$), such that each additional ACE is associated with a .13 higher social isolation score. Testing hypothesis two, Model 2 shows that when interaction terms between number of ACEs and the time variables (linear and quadratic age) are added in Model 2, they are not statistically significant, suggesting that although number of ACEs is associated with social isolation, this association is stable across adulthood rather than varying over time.

In Model 1 for the HRS, results also indicate a statistically significant quadratic relationship between age and social isolation, controlling for covariates. At age 72 (grand mean age), each additional year of age is associated with a 0.04-point increase in social isolation (linear time effect = 0.04, $p < .001$), and the positive age effect accelerates at older ages (quadratic time effect = 0.001, $p < .001$).

Testing our first hypothesis using the HRS, Model 1 shows that number of ACEs is associated with greater social isolation

Table 1 Descriptive statistics of the MIDUS (3 waves) and HRS (4 waves) study samples.

	MIDUS		HRS	
	% or Mean (*SD*)	Range	% or Mean (*SD*)	Range
Social isolation (T1)	1.34 (1.04)	0–4	2.46 (0.90)	0–4
Social isolation (T2)	1.37 (1.09)	0–4	2.68 (0.82)	0–4
Social isolation (T3)	1.45 (1.10)	0–4	2.70 (0.81)	0–4
Social isolation (T4)	–		2.75 (0.79)	0–4
ACEs	0.84 (1.03)	0–5	0.66 (0.90)	0–5
Not living with both parents	26.22		11.9	
Household members with substance abuse	21.93		16.1	
Financial distress	13.37		24.6	
Parental physical abuse	24.21		7.0	
Maternal neglect	8.47		15.3	
Female	51.58		54.8	
Race				
White	85.5		80.8	
Black	7.98		9.3	
Hispanic	–		7.6	
Other race/ethnicity	6.52		2.4	
Birth year	1949.85[a] (11.40)	1920–1974	1940[b] (10.27)	1901–1957
Respondent's education[c]	7.30 (2.51)	1–12	12.79 (3.09)	0–17
Father's education[c]	4.88 (2.99)	1–12	9.61 (3.81)	0–17
Self-rated health (T1)	3.62 (0.90)	1–5	3.18 (1.12)	1–5
Self-rated health (T2)	3.66 (0.92)	1–5	3.22 (1.07)	1–5
Self-rated health (T3)	3.38 (1.05)	1–5	3.19 (1.03)	1–5
Self-rated health (T4)	–		3.19 (1.01)	1–5
Depressive symptoms (T1)	1.54 (0.61)	1–5	1.46 (1.98)	0–8
Depressive symptoms (T2)	1.51 (0.54)	1–5	1.29 (1.88)	0–8
Depressive symptoms (T3)	1.48 (0.57)	1–5	1.22 (1.82)	0–8
Depressive symptoms (T4)	–		1.18 (1.79)	0–8

Note. ACEs = adverse childhood experiences; HRS = Health and Retirement Study; MIDUS = Midlife in the United States.
The reported statistics are weighted.
[a]MIDUS wave 1 began in 1995, so this average birth year corresponds to a baseline age of approximately 45.
[b]HRS baseline data were from the 2006 wave, and this average birth year translates to a baseline age of approximately 66.
[c]Education coded in levels for MIDUS but years for HRS.

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Table 2 Growth curve modeling: ACEs predicting social isolation trajectories in the MIDUS and HRS.

	MIDUS		HRS	
	Model 1	Model 2	Model 1	Model 2
Fixed effects	*B* (*SE*)		*B* (*SE*)	
Intercept	1.11 (0.08)***	1.11 (0.08)***	2.78 (0.06)***	2.78 (0.06)***
Age	0.00 (0.00)	0.00 (0.00)	0.04 (0.001)***	0.04 (0.001)***
Age^2	0.0002 (0.00)***	0.0002 (0.00)***	0.001 (0.00)***	0.001 (0.00)***
ACEs	0.13 (0.02)***	0.12 (0.02)***	0.05 (0.01)***	0.05 (0.01)***
Female	0.01 (0.03)	0.01 (0.03)	0.07 (0.01)***	0.07 (0.01)***
Black	−0.13 (0.08)	−0.13 (0.07)	−0.12 (0.03)***	−0.12 (0.03)***
Hispanic	–	–	−0.22 (0.04)***	−0.22 (0.04)***
Other race/ethnicity	0.09 (0.08)	0.09 (0.08)	0.06 (0.05)	0.06 (0.05)
Birth year	0.00 (0.00)	0.00 (0.00)	0.03 (0.002)***	0.03 (0.002)***
Education	−0.04 (0.01)***	−0.04 (0.01)***	−0.02 (0.004)***	−0.02 (0.004)***
Father's education	0.00 (0.01)	0.00 (0.01)	0.01 (0.002)*	0.01 (0.002)*
Self-rated health	−0.02 (0.01)	−0.02 (0.01)	−0.05 (0.01)***	−0.05 (0.01)***
Depressive symptoms	0.15 (0.03)***	0.15 (0.03)***	0.03 (0.003)***	0.03 (0.003)***
ACEs × age	–	0.00 (0.00)	–	0.00 (0.00)
ACEs × age^2	–	0.00 (0.00)	–	0.00 (0.00)
Random effects	[CI]	[CI]	[CI]	[CI]
Variance of intercept	0.71 [0.68, 0.75]	0.71 [0.68, 0.75]	0.63 [0.62, 0.64]	0.63 [0.62, 0.64]
Variance of age	0.01 [0.01, 0.02]	0.01 [0.01, 0.02]	0.02 [0.02, 0.03]	0.02 [0.02, 0.03]
Covariance of intercept and age	0.15 [0.02. 0.28]	0.15 [0.02. 0.28]	0.05 [−0.01, 0.10]	0.05 [−0.01, 0.10]
Residual variance	0.79 [0.77, 0.82]	0.79 [0.77, 0.82]	0.48 [0.47, 0.49]	0.48 [0.47, 0.49]

Note. ACEs = adverse childhood experiences; HRS = Health and Retirement Study; MIDUS = Midlife in the United States.
Age was grand-mean centered at age 54 for MIDUS and 72 for HRS.
*$p < .05$; **$p < .01$; ***$p < .001$.

($b = 0.05$, $p < .001$), such that each additional ACE is associated with a .05 higher social isolation score. For our second hypothesis, consistent with the results found in the MIDUS model, Model 2 shows that there is no statistically significant interaction between ACEs and the time variables. In sum, both the MIDUS and HRS models consistently show that higher number of ACEs is associated with greater social isolation among U.S. adults, but this association does not further increase in magnitude over time.

In sensitivity analyses we reproduced Table 2 with a 3-item social isolation measure that excludes partnership status while including partnership status as a control variable in the models. The results (not shown) were consistent with the primary analysis. A higher number of ACEs is associated with greater social isolation in adulthood, and there is no increase in the association over time.

Discussion and implications

Despite concern about the growth of social isolation in the United States, we know little about lifecourse determinants of social isolation trajectories over time (Umberson & Donnelly, 2023). ACEs have consistently been shown to be an early life precursor of a range of adult social and health outcomes (Alley et al., 2025; Danese et al., 2009; Hughes et al., 2017; Kong, 2018; Ratcliff et al., 2025; Tzouvara et al., 2023), but social isolation has not been examined as one of those outcomes. Our study is the first to examine the association between number of ACEs and social isolation trajectories in adulthood. A strength of our study is that we used two national data sets, each covering a different age range of adults, and both with multiple waves of follow up to assess social isolation trajectories.

Before testing our hypotheses about the associations between ACEs and social isolation trajectories, we first modeled the trajectories of social isolation. Both data sets showed different but complementary patterns. In the MIDUS (centered at age 54), social isolation remains relatively stable until the mid-50s before beginning a slight increasing upward trend. In the HRS (centered at age 72), social isolation showed a linear increase with age that further accelerates in later years. Taken together, these findings suggest that levels of social isolation increasingly accelerate throughout older ages. This is consistent with prior studies (Luo & Li, 2023; Shartle, 2023), but our long follow-up using two multiwave longitudinal data sets with different and overlapping age ranges further support this trend.

Our first hypothesis was that adults who report more ACEs have greater social isolation in adulthood. This hypothesis was supported across both U.S. national, longitudinal surveys. This finding is consistent with life course, stress process, and developmental theories that suggest that ACEs might have a

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long-term effect on social isolation throughout adulthood. This finding also aligns with prior studies showing that exposure to ACEs may undermine the quality of social relationships, especially with kin, as well as the overall quality of social ties and networks (Kong, 2018; Tzouvara et al., 2023). It is also consistent with research finding that early life adversity is associated with later life loneliness, rather than social isolation in U.S. veterans (Ong et al., 2024) and Finnish (Tiilikainen et al., 2024) and Irish older adults (Kamaya et al., 2013). But ours is the first study we know of to examine the association between ACEs and social isolation trajectories in U.S. adults.

Our second hypothesis was that the association between number of ACEs and social isolation would show increasing trajectories over adulthood—representing accelerating cumulative disadvantage. This hypothesis was not confirmed. In both the MIDUS and HRS, the association between number of ACEs and social isolation is already clear earlier in adulthood and remains stable over time rather than increasing further at older ages. As such, a critical implication is that if we want to understand why a higher number of ACEs is associated with greater social isolation in adulthood, we need to look earlier in the life course. Future research needs to examine the differential trajectories of social isolation from childhood to adolescence to young adulthood that result in disparities in social isolation at MIDUS and HRS baseline for people already aged 25 and older and 51 and older,, respectively. Indeed, Umberson et al. (2022) found that social isolation starts as far back as emerging adulthood. Moreover, do other disparities in social isolation occur early in the life course other than those presented here by ACEs? Although there is some research looking at trajectories of social isolation from childhood to adulthood (LayYee et al. 2023), and effects of childhood isolation on later life outcomes (Danese et al., 2009), measures of social isolation used with children in these studies are different from those used with adults, making it difficult to examine social isolation trajectories. There is much further research to be done on the timing of earlier life social isolation and its precursors.

We also conclude that we need to further understand what drives accelerated social isolation at older ages. Although our results show that number of ACEs is associated with greater social isolation across adulthood, they are not driving the increases in social isolation at older ages that we note in these data. We join other calls to understand the factors that drive acceleration in social isolation at older ages. As one avenue, we encourage future research to look at potential early life precursors to the acceleration as well as contemporaneous multilevel precursors. For example, using a life course approach, Qin et al. (2024) showed that neighborhood factors are related to trajectories of social isolation over time among a nationally representative sample of Medicare beneficiaries. Umberson and Donnelly (2023) present a useful conceptual model to help future research look at upstream and early life precursors of social isolation trajectories. We agree with their suggestion that it may be particularly fruitful to examine how socioeconomic disadvantage over the life course may affect social isolation trajectories.

A strength of our study is our use of two large, national surveys to investigate the potential association between ACEs and social isolation trajectories in adulthood–essentially providing replication within our study with similar measures of both ACEs and social isolation, and with different adult age ranges. Examining two studies presents potential limitations as well. We have slightly different measures of some of our control variables, such as education and depressive symptoms. Yet, our similar findings suggest that these differences may not have mattered much in supporting the main conclusions of this study. Another potential limitation is that ACEs are measured in adulthood retrospectively and may suffer from recall and reporting bias. Relatedly, we included the sum of five ACE items consistently available in both datasets, which may limit the comparability of our results with studies that use different or additional ACE items, such as Felitti et al. (1998). Future studies could look at a range of other early life adverse experiences, particularly in work that can further look at mechanisms linking those experiences to social isolation. In addition, given prior studies showing the association between ACEs and early mortality (Hughes et al., 2017), we cannot rule out the possibility that individuals with higher ACEs may have died earlier, on average, and thus are disproportionately excluded from participating in these national surveys (selection). Indeed, in our analyses examining the MAR assumption in both the MIDUS and HRS, we found that higher ACEs scores were associated with a lower likelihood of attrition in later waves. This could mean that people who are resilient despite early adversity were more likely to remain in the studies and to participate in the study at the initial wave.

Although we used two similar measures of social isolation for consistency, other measures are used by other studies and there is no agreement on the best way of measuring social isolation. Future studies could attend to a variety of different ways of measuring social isolation, as ACEs and early life precursors may be more predictive of some forms of social isolation than others, and mid- and later-life lifecourse factors may be more important to different social isolation outcomes. Moreover, as discussed earlier, the issue is not settled about whether to include partnership status as a measure of social isolation or whether to specifically examine variations in social isolation by partnership status. Our sensitivity analysis trying the analyses both ways suggested that our main findings about ACEs were similar. However, we agree with Umberson et al. (Umberson et al., 2022; Umberson & Donnelly, 2023) that this issue regarding partnership status be examined further in future studies that look at life course trajectories of social isolation.

In conclusion, our study using two U.S. national longitudinal data sets finds that number of ACEs is associated with higher levels of social isolation throughout adulthood. However, having more ACEs is not associated with further accelerations in social isolation into old age. One implication is that greater support for children and families to prevent ACEs and to address their harmful impacts during childhood may reduce the prevalence of social isolation in adulthood. Further, relational interventions for individuals with ACEs, even for adults, should be considered to mitigate the lasting effects of ACEs on social isolation throughout adulthood. However, further research is also needed to understand the factors and mechanisms behind shaping social isolation in adulthood, including examining both other early life course influences and multilevel processes that emerge in adulthood.

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Conflicts of interest

None declared.

Data availability

Data for the HRS and MIDUS are publicly available through ICPSR. Code for analyses are available upon request. Preregistration for this study was not required.

Author contributions

Stephanie A. Robert planned the study and wrote the paper. Weidi Qin and Jooyoung Kong conducted data analysis and contributed to writing and revision.

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