Familial Abuse During Childhood and Later-Life Health: Exploring the Role of Victim–Perpetrator Relationships

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Abstract

Objectives: Childhood abuse has been extensively studied in relation to later-life health, yet relatively little attention has been given to understanding the nuanced dynamics across victim–perpetrator relationships. This study addresses this gap by identifying typologies of familial perpetrators of childhood abuse in a national sample and examining their associations with various health outcomes, including physical and mental health as well as substance abuse.

Methods: We used 2 waves of data from the Midlife in the US Study (n = 6,295, mean age = 46.9 at baseline). The analysis was completed in 3 stages. Using Latent Class Analysis (LCA), we identified subpopulations of victims with distinct familial perpetrator histories. With assigned LCA memberships and propensity score weighting, we investigated the extent to which specific victim–perpetrator relationships are associated with health outcomes measured at baseline and a 10-year follow-up adjusting for other early-life risks. We evaluated whether the observed associations differ across the waves.

Results: Parental and sibling abuse commonly co-occur, surpassing the occurrence of single perpetrators. Although minimal health disparities are evident between sibling-only abuse and no/little abuse groups at baseline, parent-only abuse is associated with compromised health outcomes. Severe abuse from both siblings and parents is linked to the most adverse health outcomes. At the follow-up survey, the associations between familiar abuse and health outcomes weakened, particularly for substance abuse.

Discussion: This study, delving into family relationships, family violence, and health disparities, provides new evidence to augment our comprehension of the enduring link between childhood abuse and health within the family context.

Keywords: Childhood abuse, Family violence, Health outcomes, Life-course perspective, Victim–perpetrator relationships

The family is a complex social system in which members are interconnected and tend to maintain their connections from early life throughout the life course (Kerr & Bowen, 1988). For example, parent–child ties and sibling bonds established in childhood can enhance or compromise psychosocial resources and health-related behaviors throughout the life course, possibly through family strain and support (Umberson & Thomeer, 2020). When secure family ties are inhibited through family violence, children might lose early opportunities to develop cognitive and social skills and emotional regulation (Noller, 2005), which play a critical role in later-life health outcomes.

Scholars have posited the importance of certain features of childhood abuse (e.g., type and severity) in shaping its associations with mental and physical health outcomes (Lee et al., 2017), yet little attention has been directed toward understanding the nuanced dynamics across victim–perpetrator relationships. Extant studies have focused on an assessment of parental abuse (Andersson, 2016), even though inter-sibling violence is far more pervasive than parent-to-child abuse, and parental abuse and inter-sibling violence are likely to co-occur in dysfunctional family environments (Hoffman et al., 2005; Kiselica & Morrill-Richards, 2007).

Given the critical role of family ties and the ramifications of family violence on an individual's health and well-being throughout the life course, we investigate the extent to which the associations between childhood abuse and later-life health are specific to the identity of familiar perpetrators. We advance prior studies by (1) identifying typologies of familial perpetrators in a national sample, (2) accounting for a wide array of other early-life adversities as potential confounders, and (3) examining various health outcomes in midlife and beyond more than 10-year period.

Characteristics of Childhood Abuse and Life-Course Health

Adverse experiences and environments in early life are associated with compromised health across the life course by altering physiological systems, influencing various domains of child development, and increasing the likelihood of engaging in unhealthy behaviors (Nelson et al., 2020). A broad array of life adversities may occur in early life, including economic hardship, household dysfunction, maltreatment, and witnessing crime or violence (Suglia et al., 2018). Child abuse is among the most common and widely studied types

of adversity. In both retrospective and prospective studies, child abuse has been associated with elevated risk of substance abuse (Lansford et al., 2010), suicidal thoughts, and psychotic disorders (Powers et al., 2016), as well as compromised physical health conditions, including elevated levels of physiological dysregulation across body systems (Lee et al., 2017), chronic diseases (Morton et al., 2012), and premature death (Lee & Ryff, 2019).

Exposure to childhood abuse is a traumatic event, yet not all abuse is equally associated with short- or long-term health outcomes. Multidimensional and contextual features—the developmental timing (i.e., age of the onset or recency) of the exposure; its type (emotional, physical, and/or sexual), frequency, duration, and severity; and the victim–perpetrator relationship—play an important role (Cicchetti & Toth, 1993). Compared to the other domains of childhood abuse, relatively few studies have investigated the role of the victim–perpetrator relationship in a national sample and its association with later-life health. That's perhaps because many population-based studies have rarely included questions that identify the victim's relationship with perpetrators (e.g., mother, father, brother, sister, or others). Extant studies that investigate later-life health have focused on abuse by parents or caretakers (Andersson, 2016), overlooking how abuse by other potential perpetrators may be associated with victims' health. As an exception, one study reported that parental abuse is associated with physical health in midlife, after controlling for other types of perpetrators (Morton et al., 2012). However, parental abuse is but one form of family violence. When growing up under maladaptive parental behaviors and dysfunctional family structures (Kiselica & Morrill-Richards, 2007; Wiehe, 1997), victims are likely to experience abuse from multiple perpetrators. Thus far, our understanding of the prevalence of abuse perpetrated by multiple family members and its association with victims' lifelong health, compared to abuse by a single family member, is limited.

Familial Perpetrator Relationships

Accumulating evidence indicates that parents are among the most common perpetrators of child abuse (Child Welfare Information Gateway, 2020). According to betrayal trauma theory, abuse inflicted by a primary caretaker may result in more severe consequences compared to abuse by someone in a more distant relationship (Freyd, 1994). This distinctive effect could be attributed to the critical role of attachment to parents and surrogate figures in ensuring the survival and safety of children (Bowlby, 1982). Exposure to abuse by primary caregivers may lead to insecure and disorganized attachment among children; these attachment styles, in turn, may be associated with externalizing (e.g., aggressive or oppositional) and internalizing behavior (e.g., depressive symptoms) in later childhood and beyond (Fearon et al., 2010; Groh et al., 2012). Additionally, they may hinder the formation of affectional bonds beyond childhood (Velotti et al., 2018), suggesting enduring implications of parental abuse on victims' social relationships and health.

In addition to parents, siblings play a significant role in developmental reference points in early life (Noller, 2005), including cognitive and social development (Dunn & Munn, 1986), emotional understanding, self-regulation, and a sense of belonging (Brody, 2004). Sibling ties generally outlast parent–child ties and frequently represent the lengthiest close

relationship. Thus, building up a positive and supportive sibling relationship during early life benefits individuals' health and well-being throughout the life course. Yet, a growing body of studies has highlighted the repercussions of sibling abuse. Although a certain degree of occasional sibling rivalry, conflict, and squabbles is anticipated and considered normal, forming the basis for the development of social behaviors, repeated aggression or bullying between siblings—often perpetrated by older siblings—is maladaptive and may constitute the most prevalent form of family violence (Button & Gealt, 2010).

Some studies have suggested that sibling abuse can be as detrimental as parental abuse (Wiehe, 1997). Specifically, victims of sibling abuse suffer from various externalizing and internalizing problems (Barnett et al., 2010). Psychological issues are most prevalent; for example, low self-esteem, depression, anxiety, anger control problems, and difficulty establishing interpersonal relationships (Button & Gealt, 2010; Meyers, 2014; Wiehe, 1997). However, scholars reported the significant role of parents in the context of sibling abuse; a lack of parental responsiveness to sibling abuse has been found to be closely linked to victims' mental health issues, contributing to feelings of worthlessness, helplessness, and low self-esteem (Meyers, 2014).

In certain families, sibling abuse might be indicative of broader patterns of family violence and dysfunction within the family unit. Prior studies suggest that inter-sibling abuse is likely to occur when the family structure supports power imbalances, rigid gender roles, differential treatment of siblings, and lack of parental supervision or support (Bank & Kahn, 1997; Kiselica & Morrill-Richards, 2007; Whipple & Finton,1995). Children may have learned verbal and physical assaults from witnessing or being subject to violence in households where other forms of family violence (e.g., parental abuse and domestic violence) are present (Button & Gealt, 2010; Hoffman et al., 2005). These findings, however, are mostly based on studies of youth or young adults, clinical samples, or in-depth interviews of victims with a focus on emotional and behavioral problems among victims. We have little knowledge of co-occurring sibling and parental abuse and its association with later-life health, compared to parent-only or sibling-only abuse.

Aims and Hypotheses of the Current Study

To the best of our knowledge, no population-based study of older adults has examined typologies of familial perpetrators involved in childhood abuse. The first aim, therefore, is to identify subpopulations of individuals who have different familial victim–perpetrator relationships. We hypothesize that there are different groups of individuals abused by (a) siblings-only, (b) parents-only, and (c) both siblings and parents, with various types of abuse (Hypothesis 1).

The second aim of our study is to examine the extent to which the specific identity of perpetrators matters for victims' health. Based on existing literature, we posit that compared to individuals with no history of childhood abuse, those abused by siblings are likely to exhibit poorer health outcomes (Hypothesis 2–1). Given more compromised outcomes for abuse perpetrated by a caregiver, as opposed to a noncaregiver (Freyd, 1994) and the significant role of parents in the context of sibling abuse (Meyers, 2014), we hypothesize that individuals subjected to parental abuse only will report worse

health than those abused by siblings only (Hypothesis 2–2). Last, we hypothesize that the most vulnerable individuals are likely those who grew up in families with both inter-sibling and parental abuse (Hypothesis 2–3).

Data and Methods

Sample

Data come from the National Survey of Midlife in the United States (MIDUS; Brim et al., 2004). Relative to other national studies of aging, MIDUS possesses comprehensive data on childhood experience, including early-life socioeconomic status, family instability, childhood abuse (the identity of physical and emotional abusers), and parent–child bonds, as well as a wide array of health outcomes. MIDUS began in 1995/1996 (N = 7,108, Wave [W] 1) with noninstitutionalized, English-speaking adults aged 25–74 in the contiguous states. National random digit dialing with oversampling of older people and men was used to select the main sample (N = 3,487) and a sample of twin pairs (N = 1,914). The study also included a random subsample of siblings of individuals in the main sample (N = 950) and oversamples from five metropolitan areas in the United States (N = 757). MIDUS consists of a two-stage survey: a telephone interview and a Self-Administered Questionnaire (SAQ). Approximately 89% of the sample completed both the telephone interview and SAQ at W1 (N = 6,325 out of 7,108). Follow-up interviews were completed every 9–10 years: n = 4,963 in 2004–2006 (W2) and n = 3,294 in 2013–2014 (W3). We limited our sample to those who completed the telephone interview and the SAQ at W1 and have any information on childhood abuse measures (N = 6,295). Our analytic sample comes from W1 and W2 only because around 60% of respondents in W1 were not present in W3, including W3 would raise concerns about the potential for substantial bias, especially since the mechanisms causing the missingness are not completely known (Scheffer, 2002).

Measures

Familial Perpetrator of Childhood Abuse was drawn from the Conflict Tactics Inventory (Straus et al., 1996). Respondents were asked at Wave 1 how often (never, rarely, sometimes, or often) they had endured each of the three domains of abuse: *moderate physical abuse* (prompts for this domain: pushed, grabbed, or shoved; slapped; object thrown at respondent); *severe physical abuse* (kicked, bit, or hit with a fist; hit with an object [or attempted]; beat up; choked; burned or scalded); and *emotional abuse* (made insulting remarks; sulked or refused to talk; stomped away; did something out of spite; made threats; kicked/smashed something in anger). Respondents reported separately their exposure to abuse from each of five potential perpetrators: mother, father, brothers, sisters, and anybody else. We recoded exposure to each domain by each family as 1 when respondents reported sometimes or often, otherwise 0. We merged paternal and maternal abuse into *parental abuse* and brother and sister abuse into *sibling abuse*. This resulted in six indicators of childhood abuse (3 types of abuse × 2 types of familial perpetrators). See Supplementary material for the logic of operationalization.

Prior meta-analyses show that the effect of childhood abuse varies across different health outcomes (Norman et al., 2012), thus a single outcome might not be adequate when considering the overall associations with childhood abuse. Therefore, we included five different health outcomes measured at Waves 1 and 2. *Physical limitations* (range 0–9) count the number of the following physical tasks for which respondents reported at least "some" limitations: "lifting or carrying groceries," "bathing or dressing yourself," "climbing several flights of stairs," "bending, kneeling, or stooping," "walking more than a mile," "walking several blocks," "walking one block," "vigorous activity (e.g., lifting heavy objects)," and "moderate activity (e.g., vacuuming)." *Chronic physical diseases* (range 0–9) count the number of nine chronic conditions that are prevalent in later-life. The first seven conditions include asthma/bronchitis/emphysema, arthritis/rheumatism/joint problems, autoimmune conditions, hypertension, diabetes, neurological disorders, or stroke that respondents experienced or were treated in the past 12 months. The remaining two conditions include heart problems and cancer (not including skin cancer) that have never been diagnosed by a physician.

A diagnosis of *Depression*, which was assessed with information from the phone interview and defined according to criteria specified in Diagnostic and Statistical Manual of Mental Disorders (3rd ed.; DSM-III-R), requires a period of at least 2 weeks of either depressed mood or anhedonia most of the day or nearly every day, and a series of at least four other symptoms typically, including depressed mood or loss of interest in most activities, fatigue or loss of energy, increased or decreased appetite, insomnia, concentration problems, feelings of worthlessness, or constant thoughts of death (Kessler et al., 2004).

Alcohol abuse was measured with a four-item version of the Michigan Alcohol Screening Test (MAST; Selzer, 1971). Due to a coding mistake, the full five-item scale used in W1 was not available in W2. Using a binary yes/no response, respondents were asked if, during the past 12 months, they: (1) had emotional or psychological problems from using alcohol, (2) had a strong desire or urge to use alcohol that they could not resist it or could not think of anything else, (3) spent a great deal of time using alcohol and getting over its effects, or (4) used more alcohol than usual to get the same effect. Because this measure was highly skewed due to the majority of respondents reporting no alcohol abuse, we created a binary variable whereby 0 indicated the respondent answered "no" to all four items, otherwise coded as 1.

To measure *drug abuse*, respondents were first asked, using a yes/no response, whether they had used substances in the past 12 months (e.g., sedatives, tranquilizers, stimulants, painkillers, cocaine/crack, hallucinogens). If respondents answered affirmatively to the use of any of these drugs, they were asked five questions about their substance use, with four items being analogous to the MAST but adapted for substance use. The fifth question was about the item that was accidentally excluded from the MAST and asked if the use of substances increased the respondent's chances of getting hurt (e.g., when driving a car). Because the scale was highly skewed such that most respondents reported no drug abuse, we created a binary variable whereby 0 indicated the respondent answered "no" to all items and otherwise 1.

Covariates at Wave 1

Several risk factors may pre- or co-occur with childhood abuse, for example, family size and structure, economic hardships, household dysfunction, and community risk factors (Sedlak, 1997). Based on data availability in MIDUS, we included 11 early-life indicators. *Number of siblings* was

created using a series of questionnaires that asked the number of natural, step-, and half-brothers/sisters during childhood. As <6% of respondents had more than eight siblings, we top-coded these respondents together. *Having an older sibling* indicates whether respondents had an older sister or brother when they were growing up. *Family instability* indicates not living with both biological parents up to age 16. Based on respondents' report of their mother's and father's highest education level, we created a categorical variable of *parental education* (1 = less than high school, 2 = high school degree, 3 = some college, 4 = college degree or higher). Similarly, using mother's and father's occupational prestige score (observed range 7.1–80.5) measured by Duncan's Socioeconomic Index, we created a categorical variable of *parental occupation,* coded as 1 (= not working) when both parents didn't work or worked only a little, 2 (= low prestige) when parental occupational prestige score fell in the first tertile, 3 (= middle prestige) when located in the second tertile and 4 (= upper prestige) when located in the third tertile. *Financial level growing up* indicates perceived financial status compared to other families (1 = a lot worse off than the average family to 7 = a lot better off, reverse coded). *Childhood poverty* was measured by childhood welfare status (0 = never on welfare, 1 = ever on welfare). *Number of moves* (range: 0–6+) indicates the number of times the respondent moved to a totally new neighborhood or town during childhood. *Childhood abuse by others*: A substantial percentage of respondents (26% for emotional abuse, 17% for moderate physical abuse, and 8% for severe physical abuse) were victimized by those outside their immediate family. Although these perpetrators could include extended family members, the inventory lacks questions to identify those specific perpetrators. Thus, we controlled for these types of abuse perpetrated by others. We also controlled for *age* as a continuous variable, *gender* (1 = woman; 0 = man), and *race* (1 = White; 0 = non-White).

Analytic Approach

Our analyses followed a three-step procedure. The method in previous studies—using dummy variables for different perpetrator types and assessing each victim–perpetrator relationship independently (e.g., Morton et al., 2012)—may not represent the reality of multiple family members causing abuse of different types. To address these challenges, our first step was to apply Latent Class Analysis (LCA; Nylund-Gibson & Choi, 2018) to succinctly capture subgroups of individuals based on the identity of familial abusers and the types of abuse they experienced.

After extracting latent class memberships, we implemented Propensity Score Weighting (PSW; Austin, 2011) to assess the association between familial abuse and later-life health. PSW offers distinct advantages compared to the regression approach. PSW relies on a subset of the sample where there are overlapping distributions of covariates among groups. In contrast, the regression approach relies on model extrapolation when there is no substantial overlap, which is less credible (Imbens & Rubin, 2015). Moreover, PSW enables us to evaluate the covariate balance between the groups. By checking the covariate balance, we can create data that mimics randomized data given observed covariates. In the current study, we expect that the latent groups of childhood abuse are likely to vary substantially by childhood background. Considering this variability, PSW would be a great option because of the two advantages it offers. To implement PSW, we first employed

a multinomial logistic model, regressing the group membership on the covariates. Once the multinomial logistic model was fitted, we computed the inverse probability of each individual being in their latent group given the covariates. These inverse probabilities served as weights in outcome analyses. Then, we performed the outcome analysis with logistic regressions for the binary outcomes and Ordinary Least Squares (OLS) regressions for continuous outcomes given the weights. Adjusted standard errors were used to account for this two-stage estimation procedure. We conducted the outcome analyses separately for each wave.

Third, we tested the difference in the coefficients of the outcome analyses between the two waves using Seemingly Unrelated Regression (SUR; Zellner, 1962). The SUR model was originally developed to fit multiple regression equations with correlated error terms. However, in our study, it was not employed to address within-individual correlations across waves. Instead, we utilized it to simply compare coefficients across two waves.

The rate of item-specific missing data was around 1% for childhood abuse measures, <4% for the outcome and confounders at W1, but 26%– 40% for the W2 outcomes due to item-specific nonresponse, death, or being lost to follow up between W1 and W2. Under the missing at random assumption, the missingness on the predictor was managed in the context of estimating LCA of childhood abuse in Mplus using full information maximum likelihood estimation. As for the outcomes and covariates, a single data set was imputed by predictive mean matching (Rubin, 1986). Despite being a single data set, the imputed values are reflective of the actual data patterns by matching predictive values with the observed values. To improve the quality of the prediction, the imputation procedure includes variables in and outside of our analysis (Supplementary material). We conducted the PSW with the PS weight package in *R* (Zhou et al., 2020), accounting for within-family correlations and we applied Stata's *suest* command to SUR models given the PSW generated in *R*.

Results

Latent Classes of Familial Perpetrators and Their Characteristics

Fit indices and substantive interpretability suggest that a six-class solution is statistically and conceptually superior to other class solutions (see Supplementary Table 1). In the six-class solution, each group exhibits distinct combinations of the abuser identities and types of abuse (Table 1). Specifically, individuals in the largest group (51% of the sample) were abused by neither siblings nor parents (Class 1). For example, the mean prevalence of moderate physical abuse in this group (3%–4%) is far less than the entire sample (27%–37%). Next, there are two groups of individuals who were abused by a single type of perpetrator. The first (Class 2) consists of the second largest group (18%) in the sample, representing those who had abusive siblings but not abusive parents. The second (Class 3) includes those with abusive parents but not abusive siblings (11%). Finally, the remaining three groups (Classes 4–6) included individuals who were abused by both parents and siblings. Class 4 consists of only 4% of the sample with individuals abused emotionally by parents and siblings. The following group (11%) represents individuals who experienced emotional and moderate physical abuse by both parents and siblings. The last group (6%) includes

Table 1. Latent Class Memberships of Childhood Abuse Defined by Familial Perpetrator and Type (*N* = 6,295)

Perpetrator	Type	Full sample	None	Single perpetrator		Multiple perpetrators		
			Class 1 (51%)	Class 2 (18%)	Class 3 (11%)	Class 4 (4%)	Class 5 (11%)	Class 6 (6%)
			No/Little abuse	Abusive sibling only	Abusive parent only	Emotionally abusive sibling & parent	Moderately abusive parent & sibling	Severely abusive parent & sibling
Parent(s)	Moderate PA	27%	4%	15%	93%	20%	57%	95%
	Severe PA	12%	0%	1%	44%	4%	0%	100%
	EA	38%	12%	8%	95%	100%	100%	92%
Sibling(s)	Moderate PA	37%	3%	95%	10%	0%	100%	93%
	Severe PA	16%	1%	33%	1%	4%	35%	79%
	EA	46%	16%	82%	24%	100%	100%	94%

Notes: PA = physical abuse; EA = emotional abuse.

individuals who were exposed to the most severe forms of abuse—extreme physical and emotional abuse by both siblings and parents. Taken together, based on childhood abuse profiles, we labeled the six groups as (1) No/Little abuse, (2) Abusive sibling only, (3) Abusive parent only, (4) Emotionally abusive parent & sibling, (5) Moderately abusive parent & sibling, and (6) Severely abusive parent & sibling.

Descriptive statistics in Table 2 show those who reported abuse as children were younger (younger cohorts). Those who were exposed to more severe forms of abuse (e.g., multiple perpetrators and types) tended to undergo more crowded, dysfunctional, impoverished family environments as children. They also encountered physical and emotional abuse during childhood by those other than their parents or siblings.

Propensity Score Weighting

During the PSW process, we removed 298 observations according to the optimal symmetric trimming rule (Crump et al., 2009). The removed cases exhibited insufficient overlap in the covariate distribution. Then, we checked whether the covariates were well balanced before and after weighting in terms of standardized differences in demographic and childhood characteristics across the six LCA groups. Before weighting, the mean differences in covariate distributions across the six groups ranged from 0.1 standard deviations (*SD*) to 0.9 *SD*. After weighting, the differences were ≤0.1 *SD*, indicating that the weighted groups are well balanced concerning the given covariates.

Latent Classes of Familial Perpetrators and Adult Health

Figure 1(A–E) illustrates the results of the outcome analyses. We observed four patterns across five outcomes. There is minimal difference in most health outcomes between no/little abuse and sibling-only abuse. As for a single perpetrator, parent-only abuse shows worse health outcomes than sibling-only abuse. Having multiple perpetrators with more severe childhood abuse shows the worst health outcomes. Finally, the observed associations at W1 weakened at W2, particularly for substance abuse.

To test our hypotheses, we focus on 10 comparisons by setting three reference groups: sibling-only abuse, parent-only abuse, and severely abusive parents & siblings. As for reporting statistical significance, we first show significance levels

from weighted regression models. For more stringent significance criteria, we used the Benjamini–Hochberg (BH) method to adjust for multiple comparisons, which is less conservative than the widely used Bonferroni correction (Benjamini & Hochberg, 1995).

Table 3 shows predicted mean differences and probability differences in health outcomes at W1 across the reference and comparison groups. In a comparison between sibling-only abuse and no/little abuse, we found no significant difference in any health outcome after the BH adjustment. When comparing the two types of single perpetrators, parent-only abuse (vs sibling-only abuse) is linked with worse health outcomes, including more chronic physical conditions (*b* = 0.125, not significant [ns] after the BH adjustment) and functional limitations (*b* = 0.432), as well as an elevated risk of depression (6.7%) and drug abuse (2.9%, ns after the BH adjustment).

In comparisons between sibling-only abuse and three multiple-perpetrators groups, having abusive siblings *and* parents is linked to worse mental health regardless of the types of abuse. Specifically, having emotionally abusive siblings & parents shows a 9.1% higher risk of depression than sibling-only abuse. Similarly, having a moderately abusive parent and sibling yields a higher risk of depression (7.2%) and drug abuse (3.0%) than sibling-only abuse. Notably, compared to sibling-only abuse, having a severely abusive parent and sibling has a salient association with all health outcomes, including elevated risk of depression (7.2%), alcohol abuse (5.4%), and drug abuse (9.2%) as well as more chronic conditions (*b* = 0.182) and functional limitations (*b* = 0.473), although chronic conditions and alcohol abuse are no longer significant after the BH adjustment.

In comparisons between parent-only abuse and the co-occurrence of parental and sibling abuse groups, "severely abusive parent & sibling" is associated with a greater risk of alcohol abuse (7.3%, ns after the BH adjustment) and drug abuse (6.3%). Yet, other health outcomes do not significantly differ between parent-only abuse and the other two groups, except that having emotionally abusive parents & siblings is associated with fewer chronic conditions (*b* = 0.164, ns after the BH adjustment).

We also found that the type of abuse matters even among those who had multiple perpetrators. Compared to having severely abusive parents & siblings, those with emotionally abusive parents & siblings exhibit fewer chronic physical

Table 2. Descriptive Statistics (Probability or Mean) by Latent Classes of Childhood Abuse (*N* = 6,295)

Variables	Full sample	By latent classes of childhood abuse					
		No/Little abuse	Single perpetrator		Multiple perpetrators		
			Abusive sibling only	Abusive parent only	Emotionally abusive parent & sibling	Moderately abusive parent & sibling	Severely abusive parent & sibling
	(*n* = 6,295)	(*n* = 3,225)	(*n* = 1,110)	(*n* = 663)	(*n* = 227)	(*n* = 669)	(*n* = 401)
Demographic characteristics							
Female	0.52	0.54	0.47	0.51	0.58	0.55	0.50
Age	46.90	49.02	44.59	46.83	43.52	42.87	45.03
White	0.91	0.91	0.93	0.86	0.91	0.92	0.90
Childhood conditions							
Number of siblings	3.52	3.26	3.75	3.48	3.55	4.00	4.22
Having an older sibling	0.73	0.70	0.80	0.64	0.75	0.80	0.83
Parental education							
Less than high school	0.27	0.28	0.22	0.31	0.21	0.24	0.36
High school graduation	0.36	0.34	0.38	0.41	0.41	0.40	0.35
Some college	0.15	0.15	0.16	0.12	0.15	0.14	0.16
College or higher	0.22	0.22	0.24	0.16	0.23	0.23	0.13
Parental occupation prestige							
Not working	0.06	0.06	0.06	0.07	0.06	0.05	0.09
Low prestige	0.32	0.32	0.28	0.38	0.27	0.31	0.34
Middle prestige	0.30	0.29	0.32	0.29	0.35	0.31	0.36
Upper prestige	0.32	0.33	0.34	0.27	0.32	0.33	0.21
Better financial status	4.04	4.20	4.11	3.81	4.06	3.75	3.47
Welfare Aid	0.07	0.04	0.06	0.11	0.08	0.10	0.15
Family instability	0.21	0.19	0.18	0.31	0.23	0.23	0.30
Num. of moving	1.67	1.52	1.58	2.03	1.46	1.87	2.27
Childhood abuse by others							
Moderate physical abuse	0.17	0.06	0.32	0.20	0.09	0.32	0.40
Severe physical abuse	0.08	0.03	0.12	0.09	0.05	0.12	0.30
Emotional abuse	0.26	0.12	0.36	0.29	0.34	0.49	0.52

conditions (*b*= –0.220, ns after the BH adjustment). Similarly, those who had moderately abusive parents and siblings show a lower risk of alcohol abuse (–6.5%) and drug abuse (–6.2%), although the difference in drug abuse only remains significant after the BH adjustment.

Table 4 shows the predicted health outcomes at W2 across the reference and comparison groups (see Supplementary Tables 2 and 3 for SUR models). Although certain abused groups exhibit poorer health than others, the overall disparities observed at W1 either weakened or ceased to be statistically significant by W2. Notably, physical health outcomes worsened across all groups at W2, potentially contributing to reduced disparities. For instance, in comparison to sibling-only abuse, the parental-only abuse group demonstrated a 0.432 higher level in functional limitations at W1 but only a 0.150 higher level at W2 (*p*-value of coefficient difference = .034). Conversely, the probability of engaging in alcohol or drug abuse diminished across all groups, especially for those who underwent more severe abuse involving multiple perpetrators. As an example, in contrast to sibling-only abuse, individuals subjected to both severe parental and sibling abuse displayed a 9.2% higher risk of drug abuse at W1, but this difference narrowed to 3.7% by W2 (*p*-value of coefficient difference = .086).

For sensitivity analyses, we implemented multiple regression models after controlling for confounders (see Supplementary Tables 4 and 5). In terms of statistical significance, the results from PSW are more conservative in terms of Type I error (false positive) than those from the regression method. Nevertheless, we reached similar conclusions using both analytic approaches regarding the association between childhood abuse and adult health outcomes.

Discussion

The results from our analysis indicate considerable heterogeneity among victims in terms of the identity of perpetrators and types of abuse. Regarding perpetrators, little attention has been given to inter-sibling abuse, but experts on family violence have argued that it is far more common than parent-to-child abuse (Kiselica & Morrill-Richards, 2007). The results of our study support that argument to some degree; sibling-only abuse is more common than parent-only abuse. However, our findings illuminate that the co-occurrence of sibling and parental abuse is more prevalent than abuse by either parent(s) only or siblings only. We also found that victims of both sibling and parental abuse suffer from varying types and severities of abuse, for example, emotional abuse

versus severe physical abuse. Taken together, our findings are consistent with established patterns of family violence—when individuals report one form of family violence, other forms of violence (e.g., parental abuse, inter-sibling violence, intimate partner violence) might be present in the household (Button & Gealt, 2010; Hoffman et al., 2005).

Second, we found that the familial identity of the perpetrator is associated with later health, but there is little evidence that individuals who had only abusive sibling(s) have worse later-life health than those with no/little child abuse. Our results are incongruent with prior work that found a negative association between sibling abuse and mental health (Mackey et al., 2010). Yet, it is important to note that most prior studies have relied on community-based samples or clinical studies of individuals seeking therapy. More importantly, prior work failed to differentiate individuals who experienced sibling-only abuse from those who experienced both sibling and parental abuse and did not adjust for other types of adverse childhood experiences. Thus, previous findings might partially reflect the effect of parental abuse as well as other early-life adversities.

In contrast to sibling-only abuse, we found parent-only abuse is linked to poorer later-life health, in terms of functional limitations, chronic physical conditions, and depression. Empirical studies have shown the long arm of child–parent relationships (affectional and/or abusive) on mental and physical health as well as health-related behaviors in later-life (Lee et al., 2014; Morton et al., 2012). By creating different forms of familial victim–perpetrator relationships, this study expands prior work by showing that the adverse association of parent-only abuse on health is stronger than sibling-only abuse and comparable with the co-occurrence of parental and sibling abuse with more moderate forms (i.e., emotionally abusive parent & sibling), supporting the robust and enduring associations between parental abuse and later-life health.

Moreover, our findings highlight while a severely abusive relationship with parents compromises the mental and physical health of individuals, the burden is larger when they were also abused severely by siblings—an indicator of the absence of a supportive family member.
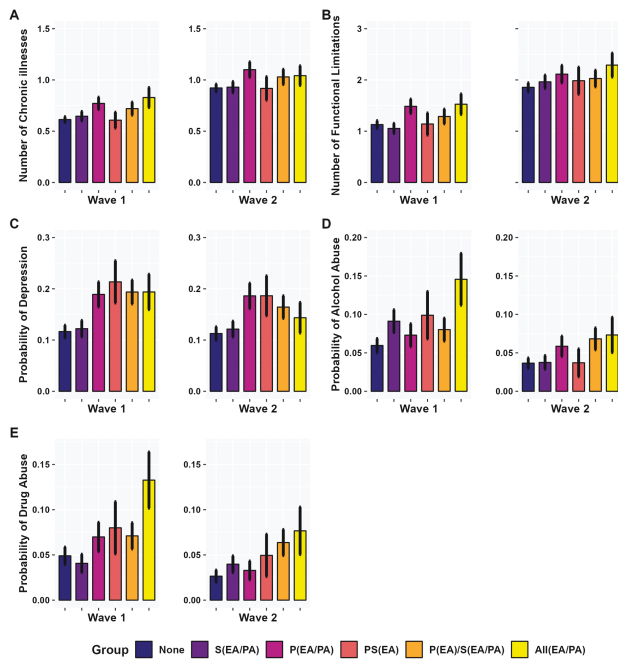

Figure 1. Latent class memberships of childhood abuse and predicted health outcomes (Waves 1 and 2). None = no/little abuse; S(EA/PA) = abusive sibling only; P(EA/PA) = abusive parent only; PS (EA) = emotionally abusive parent and sibling; PS (EA)S(PA/EA) = moderately abusive parent and sibling; and PS(EA/SA) = severely abusive parent and sibling. Alt text: Predicted health outcomes at Wave 1 and Wave 2 across six groups of individuals who have unique experiences of child abuse.

Table 3. Predicted Differences in Health Outcomes in Wave 1 Between Reference and Comparison Groups, Based on Propensity Score Weighting (*N* = 5,997)

Latent classes of childhood abuse	Chronic physical disease[a]	Functional limitations[a]	Depression[b]	Alcohol abuse[b]	Drug abuse[b]
Sibling-only abuse vs					
No/little abuse	−.033 (.040)	.076 (.092)	−.006 (.015)	−.032 (.013)*	.008 (.010)
Parent-only abuse	.125 (.056)*	**.432(.126)****	**.067 (.021)****	−.018 (.015)	.029 (.014)*
Emotionally abusive sibling and parent	−.038 (.066)	.087 (.173)	**.091(.032)****	.008 (.025)	.039 (.022)
Moderately abusive parent and sibling	.074 (.057)	.234 (.128)	**.072 (.021)****	−.011 (.015)	**.030 (.013)***
Severely abusive parent and sibling	.182 (.079)*	**0.473 (.164)****	**.072 (.028)***	.054 (.027)*	**.092 (.024)*****
Parent-only abuse vs					
Emotionally abusive parent and sibling	−.164 (.072)*	−.345 (.187)	.024 (.035)	.026 (.025)	.010 (.024)
Moderately abusive parent and sibling	−.051 (.064)	−0.198 (.147)	.005 (.024)	.007 (.015)	.001 (.016)
Severely abusive parent and sibling	.057 (.084)	.041 (.179)	.005 (.031)	.073 (.027)**	**.63 (.025)***
Severely abusive parent and sibling vs					
Emotionally abusive sibling and parent	−.220 (.091)*	−.386 (.214)	.020 (.039)	−.047 (.033)	−.053 (.0031)
Moderately abusive parent and sibling	−.108 (.085)	−.239 (.180)	.000 (.030)	**−.065 (.027)***	−0.62 (.025)*

Note: We removed 298 nonoverlapping cases (out of 6,295) in propensity score weighting.
[a]Coefficients show mean differences between the reference and comparison groups.
[b]Coefficients show probability differences between the reference and comparison groups. Bold values indicate that health disparities between the reference and comparison groups are statistically significant after the Benjamini–Hochberg adjustment for multiple comparisons.
*p < .05.
**p < .01.
***p < .001.

Table 4. Predicted Differences in Health Outcomes in Wave 2 between Reference and Comparison Groups, Based on Propensity Score Weighting (*N* = 5,997)

Latent classes of childhood abuse	Chronic physical disease[a]	Functional limitations[a]	Depression[b]	Alcohol abuse[b]	Drug abuse[b]
Sibling-only abuse vs					
No/little abuse	−.008 (.049)	−.107 (.115)	−.009 (.015)	−.001 (.008)	−.013 (.008)
Parent-only abuse	.171 (.068)*	<u>.150 (.157)</u>	**.065 (.021)****	.021 (.012)	<u>−.007 (.010)</u>
Emotionally abusive sibling and parent	−.012 (.092)	.022 (.214)	.065 (.030)*	.000 (.015)	.010 (.018)
Moderately abusive parent and sibling	.100 (.067)	.064 (.151)	.043 (.020)*	<u>.031 (.012)</u>*	.024 (.012)
Severely abusive parent and sibling	.112 (.080)	.326 (.195)	.022 (.024)	.036 (.018)*	.037 (.020)
Parent-only abuse vs					
Emotionally abusive parent and sibling	−.183 (.100)	−.128 (.228)	.000 (.033)	−.021 (.016)	.017 (.019)
Moderately abusive parent and sibling	−.071 (.077)	−.086 (.171)	−.022 (.024)	.010 (.014)	<u>.031 (.013)</u>*
Severely abusive parent and sibling	−.059 (.089)	.176 (.211)	-.043 (.028)	.015 (.019)	.044 (.020)*
Severely abusive parent and sibling vs					
Emotionally abusive sibling and parent	−.124 (.108)	−.304 (.256)	.043 (.036)	−.036 (.021)	−.027 (.025)
Moderately abusive parent and sibling	−.012 (.088)	−.262 (.207)	.021(.027)	<u>−.005 (.020)</u>	.013 (.022)

Note: We removed 298 nonoverlapping cases (out of 6,295) in propensity score weighting.
[a]Coefficients show mean differences between the reference and comparison groups.
[b]Coefficients show probability differences between the reference and comparison groups. Bold values indicate that health disparities between the reference and comparison groups are statistically significant after the Benjamini–Hochberg adjustment for multiple comparisons. Underlined values show that the coefficients from W2 are significantly different from those from W1 based on the results from seemingly unrelated regression models at alpha level <0.05.
*$p < .05$.
**$p < .01$.
***$p < .001$.

For many victims, abusive relationships with a parent established in childhood continue to negatively impact the relationship with their parents in later life (Kong & Martire, 2019). The sibling can be an essential source of family support for middle-aged or older adults when parents become less available. Yet, the nature of sibling relationships in adulthood likely has its origins in childhood (Volkom, 2006). Thus, those who had a hostile relationship with both parents and siblings when growing up might have experienced the lowest levels of family support, which may have contributed to their poorer later-life health and well-being.

In comparing the baseline and follow-up survey outcomes, we observed a weakening or lack of statistical significance in health disparities across different groups at the follow-up survey. Several factors may contribute to these trends. Firstly, concerning physical health outcomes, we identified increased numbers of chronic diseases and functional limitations across all groups, with a more pronounced change in the sibling-only abuse group. Additionally, the larger error variance of health outcomes at W2 compared to W1 after accounting for the group membership and the same covariates suggest the potential emergence of new factors in midlife that may be associated with physical health at W2. Secondly, regarding alcohol-related problems and substance abuse, these issues are more prevalent at younger ages and tend to decrease with aging. As individuals age, they may adopt healthier behaviors or receive treatment, contributing to a decline in these issues. Thirdly, the observed patterns may be influenced by the selection process. In a sensitivity analysis, we identified higher probabilities of death or loss to follow up for those who experienced more severe forms of abuse (see Supplementary Table 6). Despite our efforts to address selection bias through imputation techniques, it is possible that missingness might not be random and selection bias may still attenuate the observed gaps across the groups.

Limitations

There are several limitations to our study that could drive future research. First, we collapsed paternal and maternal abuse into parental abuse, and brother and sister abuse into sibling abuse. This approach prevented us from investigating the gender dynamics of family violence. Researchers have argued that female siblings might be more likely to be abused by male siblings (Button & Gealt, 2010; Hoffman et al., 2005). Moreover, mothers and fathers tend to play different roles in family life and may interact with female versus male offspring differently. Thus, paternal versus maternal abuse might yield different health ramifications for boys versus girls (Mallers et al., 2010). Future studies could explore the complex role of gender in the dynamics of victimhood and perpetration, and their associations with life-long health outcomes.

Second, while PSW makes the latent classes of childhood abuse comparable concerning observed covariates, it does not resolve the issue of unobserved confounders. Although we carefully selected a wide array of covariates based on previous literature and availability in MIDUS, we cannot possibly account for all confounders (e.g., parental psychopathology, early childbearing history of mother, childhood neighborhood characteristics) that might influence both the childhood abuse membership and later-health outcomes. Therefore, our findings should be interpreted as associations and not causal estimates.

Third, we used the three-step procedure. Although methods such as the BCH approach (Asparouhov & Muthén, 2014) or adjusting standard errors in PSweight (Zhou et al., 2020) exist to address the uncertainty of multiple estimation procedures in predicting distal outcomes, we faced challenges in holistically addressing this issue across three stages. This limitation could potentially impact the standard errors of the results. For example, in the SUR model, we observed somewhat larger standard errors compared to the results based on PSW after

adjusting standard errors (Table 4 vs Supplementary Table 3), suggesting that our approach may yield more conservative findings.

Finally, the underlying mechanisms that explain the observed association were not investigated in this study. Prior work has found that sibling warmth and support buffers the negative impact of adverse family events on high depressive symptoms during adolescence (Waite et al., 2011). Individuals who have a history of childhood abuse are likely to report poor quality family relationships in later life (Liu et al., 2018). For individuals abused by both parents and siblings in childhood, the negative relationships might continue into adulthood and inhibit the development of other supportive relationships. All of this may yield lost opportunities for constructing a care network that would promote health and psychological wellbeing in later life. Understanding the underlying pathways through which different victim–perpetrator relationships contribute to health over time is a critical next step to address the role of familial violence on later-life health.

Despite such limitations, this study is among the first to apply life-course perspectives on family relationships, family violence, and lifelong health outcomes to the study of childhood abuse and adult health using a national sample of middle-aged and older adults. We advance prior work by exploring victim–perpetrator relationships in the family context and its associations with multiple domains of health outcomes several decades after the abuse occurred.

Supplementary Material

Supplementary data are available at *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* online.

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Conflict of Interest

None.

References

Andersson, M. A. (2016). Chronic disease at midlife: Do parent–child bonds modify the effect of childhood SES? *Journal of Health and Social Behavior*, 57(3), 373–389. https://doi.org/10.1177/0022146516661596

Asparouhov, T., & Muthén, B. (2014). Auxiliary variables in mixture modeling: Three-step approaches using Mplus. *Structural Equation Modeling: A Multidisciplinary Journal*, 21(3), 329–341. https://doi.org/10.1080/10705511.2014.915181

Austin, P. C. (2011). An introduction to propensity score methods for reducing the effects of confounding in observational studies. *Multivariate Behavioral Research*, 46(3), 399–424. https://doi.org/10.1080/00273171.2011.568786

Bank, S. P., & Kahn, M. D. (1997). *The sibling bond*. Basic Books.

Barnett, O. W., Miller-Perrin, C. L., & Perrin, R. D. (2010). *Family violence across the lifespan: An introduction* (3rd ed.). Sage.

Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: A practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society Series B: Statistical Methodology*, 57(1), 289–300. https://doi.org/10.1111/j.2517-6161.1995.tb02031.x

Bowlby, J. (1982). Attachment and loss: Retrospect and prospect. *The American Journal of Orthopsychiatry*, 52, 664–678. https://doi.org/10.1111/j.1939-0025.1982.tb01456.x

Brim, O. G., Ryff, C. D., & Kessler, R. C. (2004). *How healthy are we? A national study of well-being at midlife*. University of Chicago Press.

Brody, G. H. (2004). Siblings' direct and indirect contributions to child development. *Current Directions in Psychological Science*, 13, 124–126. https://doi.org/10.1111/j.0963-7214.2004.00289.x

Button, D. M., & Gealt, R. (2010). High risk behaviors among victims of sibling violence. *Journal of Family Violence*, 25(2), 131–140. https://doi.org/10.1007/s10896-009-9276-x

Child Welfare Information Gateway. (2020). *Protective factors approaches in child welfare*. U.S. Department of Health and Human Services, Administration for Children and Families, Children's Bureau. https://www.childwelfare.gov/resources/protective-factors-approaches-child-welfare/

Cicchetti, D., & Toth, S. L. (1993). *Child abuse, child development, and social policy* (Vol. 8). Norwood.

Crump, R. K., Hotz, V. J., Imbens, G. W., & Mitnik, O. A. (2009). Dealing with limited overlap in estimation of average treatment effects. *Biometrika*, 96(1), 187–199. https://doi.org/10.1093/biomet/asn055

Dunn, J., & Munn, P. (1986). Siblings and the development of prosocial behavior. *International Journal of Behavioral Development*, 9(3), 265–284. https://doi.org/10.1177/016502548600900301

Fearon, R. P., Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., Lapsley, A. M., & Roisman, G. I. (2010). The significance of insecure attachment and disorganization in the development of children's externalizing behavior: A meta-analytic study. *Child Development*, 81(2), 435–456. https://doi.org/10.1111/j.1467-8624.2009.01405.x

Freyd, J. J. (1994). Betrayal trauma: Traumatic amnesia as an adaptive response to childhood abuse. *Ethics & Behavior*, 4(4), 307–329. https://doi.org/10.1207/s15327019eb0404_1

Groh, A. M., Roiman, G. I., van Ijzendoorn, M. H., Bakermans-Kranenburg, M. J., & Fearon, R. P. (2012). The significance of insecure and disorganized attachment for children's internalizing symptoms: A meta-analytic study. *Child Development*, 83(2), 591–610. https://doi.org/10.1111/j.1467-8624.2011.01711.x

Hoffman, K. L., Kiecolt, K. J., & Edwards, J. N. (2005). Physical violence between siblings a theoretical and empirical analysis. *Journal of Family Issues*, 26(8), 1103–1130. https://doi.org/10.1177/0192513x05277809

Imbens, G. W., & Rubin, D. B. (2015). *Causal inference for statistics, social, and biomedical sciences*. Cambridge University Press.

Kerr, M. E., & Bowen, M. (1988). *Family evaluation*. WW Norton & Company.

Kessler, R. C., Mickelson, K. D., Walters, E. E., Zhao, S., & Hamilton, L. (2004). Age and depression in the MIDUS survey. In O. G. Brim, C. D. Ryff, & R. C. Kessler (Eds.), *How healthy are we? A national study of well-being at midlife* (pp. 227–251). University of Chicago Press.

Kiselica, M. S., & Morrill-Richards, M. (2007). Sibling maltreatment: The forgotten abuse. *Journal of Counseling & Development*, 85(2), 148–160. https://doi.org/10.1002/j.1556-6678.2007.tb00457.x

Kong, J., & Martire, L. M. (2019). Parental childhood maltreatment and the later-life relationship with parents. *Psychology and Aging*, 34(7), 900–911. https://doi.org/10.1037/pag0000388

Lansford, J. E., Dodge, K. A., Pettit, G. S., & Bates, J. E. (2010). Does physical abuse in early childhood predict substance use in adolescence and early adulthood? *Child Maltreatment*, 15(2), 190–194. https://doi.org/10.1177/1077559509352359

Lee, C., Coe, C. L., & Ryff, C. D. (2017). Social disadvantage, severe child abuse, and biological profiles in adulthood. *Journal of Health and Social Behavior*, 58(3), 371–386. https://doi.org/10.1177/0022146516685370

Lee, C., & Ryff, C. D. (2019). Pathways linking combinations of early-life adversities to adult mortality: Tales that vary by gender. *Social Science & Medicine (1982)*, 240, 112566. https://doi.org/10.1016/j.socscimed.2019.112566

Lee, C., Tsenkova, V., & Carr, D. (2014). Childhood trauma and metabolic syndrome in men and women. *Social Science & Medicine (1982)*, 105, 122–130. https://doi.org/10.1016/j.socscimed.2014.01.017

Liu, Y., Kong, J., Bangerter, L. R., Zarit, S. H., & Almeida, D. M. (2018). Early parental abuse and daily assistance to aging parents with disability: Associations with the middle-aged adults' daily well-being. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 73(5), e59–e68. https://doi.org/10.1093/geronb/gbx173

Mackey, A. L., Fromuth, M. E., & Kelly, D. B. (2010). The association of sibling relationship and abuse with later psychological adjustment. *Journal of Interpersonal Violence*, 25(6), 955–968. https://doi.org/10.1177/0886260509340545

Mallers, M. H., Charles, S. T., Neupert, S. D., & Almeida, D. M. (2010). Perceptions of childhood relationships with mother and father: Daily emotional and stressor experiences in adulthood. *Developmental Psychology*, 46(6), 1651–1661. https://doi.org/10.1037/a0021020

Meyers, A. (2014). A call to child welfare: Protect children from sibling abuse. *Qualitative Social Work*, 13(5), 654–670. https://doi.org/10.1177/1473325014527332

Morton, P. M., Schafer, M. H., & Ferraro, K. F. (2012). Does childhood misfortune increase cancer risk in adulthood? *Journal of Aging and Health*, 24(6), 948–984. https://doi.org/10.1177/0898264312449184

Nelson, C. A., Scott, R. D., Bhutta, Z. A., Harris, N. B., Danese, A., & Samara, M. (2020). Adversity in childhood is linked to mental and physical health throughout life. *British Medical Journal*, 371, m3048. https://doi.org/10.1136/bmj.m3048

Noller, P. (2005). Sibling relationships in adolescence: Learning and growing together. *Personal Relationships*, 12(1), 1–22. https://doi.org/10.1111/j.1350-4126.2005.00099.x

Norman, R. E., Byambaa, M., De, R., Butchart, A., Scott, J., & Vos, T. (2012). The long-term health consequences of child physical abuse, emotional abuse, and neglect: A systematic review and meta-analysis. *PLoS Medicine*, 9(11), e1001349. https://doi.org/10.1371/journal.pmed.1001349

Nylund-Gibson, K., & Choi, A. Y. (2018). Ten frequently asked questions about latent class analysis. *Translational Issues in Psychological Science*, 4(4), 440–461. https://doi.org/10.1037/tps0000176

Powers, A., Fani, N., Cross, D., Ressler, K. J., & Bradley, B. (2016). Childhood trauma, PTSD, and psychosis: Findings from a highly traumatized, minority sample. *Child Abuse & Neglect*, 58, 111–118. https://doi.org/10.1016/j.chiabu.2016.06.015

Rubin, D. B. (1986). Statistical matching using file concatenation with adjusted weights and multiple imputations. *Journal of Business & Economic Statistics*, 4(1), 87–94. https://doi.org/10.2307/1391390

Scheffer, J. (2002). Dealing with missing data. *Research Letters in the Information and Mathematical Sciences*, 3, 153–160. http://hdl.handle.net/10179/4355

Sedlak, A. J. (1997). Risk factors for the occurrence of child abuse and neglect. *Journal of Aggression, Maltreatment & Trauma*, 1(1), 149–186. https://doi.org/10.1300/j146v01n01_09

Selzer, M. L. (1971). The Michigan alcoholism screening test: The quest for a new diagnostic instrument. *The American Journal of Psychiatry*, 127(12), 1653–1658. https://doi.org/10.1176/ajp.127.12.1653

Straus, M. A., Hamby, S. L., Boney-McCoy, S., & Sugarman, D. B. (1996). The revised Conflict Tactics Scales (CTS2) development and preliminary psychometric data. *Journal of Family Issues*, 17(3), 283–316. https://doi.org/10.1177/019251396017003001

Suglia, S. F., Koenen, K. C., Boynton-Jarrett, R., Chan, P. S., Clark, C. J., Danese, A., Faith, M. S., Goldstein, B. I., Hayman, L. L., Isasi, C. R., Pratt, C. A., Slopen, N., Sumner, J. A., Turer, A., Turer, C. B., & Zachariah, J. P.; American Heart Association Council on Epidemiology and Prevention; Council on Cardiovascular Disease in the Young; Council on Functional Genomics and Translational Biology; Council on Cardiovascular and Stroke Nursing; and Council on Quality of Care and Outcomes Research (2018). Childhood and adolescent adversity and cardiometabolic outcomes: A scientific statement from the American Heart Association. *Circulation*, 137(5), e15–e28. https://doi.org/10.1161/CIR.0000000000000536

Umberson, D., & Thomeer, M. B. (2020). Family matters: Research on family ties and health, 2010 to 2020. *Journal of Marriage and the Family*, 82(1), 404–419. https://doi.org/10.1111/jomf.12640

Velotti, P., Zobel, S. B., Rogier, G., & Tambelli, R. (2018). Exploring relationships: A systematic review on intimate partner violence and attachment. *Frontiers in Psychology*, 9, 1166. https://doi.org/10.3389/fpsyg.2018.01166

Volkom, M. V. (2006). Sibling relationships in middle and older adulthood: A review of the literature. *Marriage & Family Review*, 40(2-3), 151–170. https://doi.org/10.1300/j002v40n02_08

Waite, E. B., Shanahan, L., Calkins, S. D., Keane, S. D., & O'Brien, M. (2011). Life events, sibling warmth, and youths' adjustment. *Journal of Marriage and the Family*, 73(5), 902–912. https://doi.org/10.1111/j.1741-3737.2011.00857.x

Whipple, E. E., & Finton, S. E. (1995). Psychological maltreatment by siblings: An unrecognized form of abuse. *Child & Adolescent Social Work Journal*, 12(2), 135–146. https://doi.org/10.1007/bf01876209

Wiehe, V. R. (1997). *Sibling abuse: Hidden physical, emotional, and sexual trauma* (2nd ed.). SAGE Publications.

Zellner, A. (1962). An efficient method of estimating seemingly unrelated regressions and tests for aggregation bias. *Journal of the American Statistical Association*, 57, 348–368. https://doi.org/10.2307/2281644

Zhou, T., Tong, G., Li, F., & Thomas, L. E. (2020). PSweight: An R package for propensity score weighting analysis. *arXiv*, 2010.08893.

e1: Operationalization of familiar abuse during childhood

e2: Missing data analysis

Table S1. Fit Statistics and Classification Coefficients for Latent Class of Childhood Abuse (N= 6,295)

Table S2. Predicted Differences in Health Outcomes in Wave 1 between Reference and Comparison Groups, Based on Regression Methods with Propensity Score Weighting (N=5,997)

Table S3. Predicted Differences in Health Outcomes in Wave 2 between Reference and Comparison Groups, Based on Regression Methods with Propensity Score Weighting (N=5,997)

Table S4. Predicted Differences in Health Outcomes in Wave 1 between Reference and Comparison Groups, based on Regression Method (N=6,295)

Table S5. Predicted Differences in Health Outcomes in Wave 2 between Reference and Comparison Groups, based on Regression Method (N=6,295)

Table S6. Adjusted Probability of death and lost to follow-up between Wave 1 and Wave 2 by Latent Classes of Childhood Abuse (N=6,295)

e1: Operationalization of familiar abuse during childhood

We recoded exposure to each domain by each family member as 1 when respondents reported sometimes or often, otherwise 0. We merged paternal and maternal abuse into *parental abuse* and brother and sister abuse into *sibling abuse*. This resulted in six indicators of childhood abuse (3 types of abuse * 2 types of familial perpetrators). We decided on this operationalization based on multiple factors, including substantive complexities of childhood abuse profiles, data availability, and statistical payoff. Given that experiencing multiple types of child abuse is common and often portends worse health outcomes than a single type or unidimensional measure of abuse, investigating different types of abuse along with perpetrator–victim relationships is vital. Thus, we consider moderate physical abuse separately from severe physical abuse. The types of perpetrators were collapsed 64 % of respondents have both a sister(s) and a brother(s) when growing up and around 22% of respondents reported that they didn't live with both of their biological parents up until age 16. Moreover, using four different types of familial perpetrators with three types of childhood abuse would have created extensive combinations of childhood abuse profiles, reducing statistical power.

e2: Missing data analysis

The measures of childhood abuse were exclusively administered to respondents who completed a self-administered questionnaire (SAQ) at Wave [W] 1 (n=6,325). Approximately 0.5% of respondents declined to respond to any of the childhood measures considered in our analysis. Consequently, we excluded them from the sample, resulting in our analytic sample (n=6,295). Within this sample, around 1% of respondents had item-specific missing data on childhood abuse measures. This item-specific missingness was managed in the context of estimating latent class analysis (LCA) in Mplus using full information maximum likelihood estimation (default option).

As for the outcome and covariates at W1, the rate of item-specific missing data is less than 4%, but 26% to 40% for the W2 outcomes due to item-specific non-response, death, or being lost to follow-up between W1 and W2. We imputed both dependent variables and covariates assuming Missing at Random (MAR). We acknowledge that MAR is probably violated for the dependent variable, given the higher probabilities of death or loss to follow-up among those who have more health issues. However, Listwise deletion (i.e., not imputing the outcome in W2) would result in removing up to 40% of the W2 health observations, leading to a substantial reduction in sample size. Therefore, we chose to impute the outcome under MAR.

Under MAR, a single dataset was imputed by predictive mean matching (Rubin, 1986). Despite being a single dataset, the imputed values are reflective of the actual data patterns by matching predictive values with the observed values. It is also noteworthy that the simulation study suggests that the imputation quality is influenced by a poor imputation model rather than by use of single-value imputation methods (Landerman et al., 1997).

To improve the quality of the prediction, the imputation procedure includes variables in and outside of our analysis. This encompasses missing patterns attributed to respondents lost to follow-up or deceased between waves. We also have included pertinent sociodemographic and health indicators, such as education, marital status, self-rated health, sleep problems, and smoking status at baseline (W1). The majority of these variables are considered to be relevant factors influencing the likelihood of participation in the follow-up survey of MIDUS (Radler & Ryff, 2010).

Reference:
Landerman, L. R., Land, K. C., & Pieper, C. F. (1997). An empirical evaluation of the predictive mean matching method for imputing missing values. *Sociological Methods & Research, 26*(1), 3-33.

Radler B. T., & Ryff, C. D. (2010). Who participates? Accounting for longitudinal retention in the MIDUS National Study of Health and Well-Being. *Journal of Aging and Health*, *22*(3), 307-331.

Rubin, D. B. (1986). Statistical matching using file concatenation with adjusted weights and multiple imputations. *Journal of Business & Economic Statistics*, *4*(1), 87–94.

Table S1. Fit Statistics and Classification Coefficients for Latent Class of Childhood Abuse (N= 6,295)

K	BIC	Entropy	VLMR p-value	LMR p-value	Final counts (Proportion) of each group
1	41978.456				5803 (1.0)
2	36506.343	.742	.000	.000	2952, 3343 (.47, .53)
3	34592.344	.843	.000	.000	1255, 1435, 3605 (.20, .23, .57)
4	33565.575	.846	.000	.000	1283, 674, 3585, 753 (.20, .11, .57, .12)
5	33497.757	.882	.377	.381	673, 3454, 402, 678, 1088 (.11, .55, .6, .11, .17)
6	33444.403	.899	.000	.000	401, 669, 227,1110, 663, 3225 (.06, .11, .04, .18, .11, .51)
7	33454.713	.893	.040	.042	83, 649, 227, 668, 391, 3395, 882 (.01, .10, .04, .11, .06, .54, .14)
8	33487.925	.889	.020	.000	436, 2902, 306, 26, 1086, 648, 315, 576 (.07, .46, .05, .004, .17, .10, .05, .09)

Note: K= number of classes. BIC = Bayesian Information Criterion; VLMR-LRT = Voung Lo-Mendell-Rubin Likelihood Ratio Adj-LRT = Lo-Mendell-Rubin Likelihood Adjusted LRT test.

Table S2. Predicted Differences in Health Outcomes in Wave 1 between Reference and Comparison Groups, Based on Regression Methods with Propensity Score Weighting (N=5,997)

Latent classes of childhood abuse	Chronic physical disease[a]	Functional limitations[a]	Depression[b]	Alcohol abuse[b]	Drug abuse[b]
Sibling-only abuse vs.					
No/little abuse	-.033 (.040)	.076 (.091)	-.006 (.015)	-.032* (.013)	.008 (.010)
Parent-only abuse	.125 (.056)*	**.432**(.125)**	**.067** (.022)**	-.018 (.015)	.029 (.014)*
Emotionally abusive sibling & parent	-.038 (.066)	.087 (.173)	**.091**(.033)**	.008 (.025)	.039 (.022)
Moderately abusive parent & sibling	.074 (.058)	.234 (.131)	**.072** (.020)**	-.011 (.015)	**.030** (.013)*
Severely abusive parent & sibling	.182 (.082)*	**.473** (.167)**	**.072** (.027)*	.054 (.027)*	**.092** (.023)***
Parent-only abuse vs.					
Emotionally abusive parent & sibling	-.164* (.072)	-.345 (.186)	.024 (.036)	.026 (.024)	.010 (.024)
Moderately abusive parent & sibling	-.051 (.065)	-.198 (.149)	.005 (.025)	.007 (.015)	.001 (.016)
Severely abusive parent & sibling	.057 (.086)	.041 (.181)	.005 (.030)	.073 (.027)**	**0.63** (.025)*
Severely abusive parent & sibling vs.					
Emotionally abusive sibling & parent	-.220 (.094)*	-.386 (.217)	.020 (.040)	-.047 (.033)	-.053 (.029)
Moderately abusive parent & sibling	-.108 (.088)	-.239 (.186)	-.000 (.030)	**-.065** (.027)*	-0.62 (.024)*

Note. We removed 298 non-overlapping cases (out of 6,295) in propensity score weighting. [a] coefficients show mean differences between the reference and comparison groups. [b] coefficients show probability differences between the reference and comparison groups. Bold letters indicate that health disparities between the reference and comparison groups are statistically significant after the Benjamini–Hochberg adjustment for multiple comparisons.

*p <.05, ** p < .01. *** p <.001

Table S3. Predicted Differences in Health Outcomes in Wave 2 between Reference and Comparison Groups, Based on Regression Methods with Propensity Score Weighting (N=5,997)

Latent classes of childhood abuse	Chronic physical disease[a]	Functional limitations[a]	Depression[b]	Alcohol abuse[b]	Drug abuse[b]
Sibling-only abuse vs.					
No/little abuse	-.008 (.049)	-.107 (.116)	-.009 (.015)	-.001 (.008)	-.013 (.008)
Parent-only abuse	.171 (.069)*	<u>.150 (.156)</u>	**.065** (.021)**	.021 (.012)	<u>-.007 (.010)</u>
Emotionally abusive sibling & parent	-.012 (.093)	.022 (.216)	.065 (.032)*	.000 (.015)	.010 (.018)
Moderately abusive parent & sibling	.100 (.068)	.064 (.153)	.043 (.020)*	<u>.031 (.012)*</u>	.024 (.013)
Severely abusive parent & sibling	.112 (.084)	.326 (.199)	.022 (.025)	.036 (.018)*	.037 (.020)
Parent-only abuse vs.					
Emotionally abusive parent & sibling	-.183 (.100)	-.128 (.227)	.000 (.035)	-.021 (.016)	.017 (.019)
Moderately abusive parent & sibling	-.071 (.077)	-.086 (.173)	-.022 (.024)	.010 (.014)	<u>.031 (.013)*</u>
Severely abusive parent & sibling	-.059 (.088)	.176 (.213)	-.043 (.028)	.015 (.019)	.044 (.020)*
Severely abusive parent & sibling vs.					
Emotionally abusive sibling & parent	-.124 (.110)	-.304 (.260)	.043 (.037)	-.036 (.021)	-.027 (.025)
Moderately abusive parent & sibling	-.012 (.090)	-.262 (.212)	.021(.027)	<u>-.005 (.020)</u>	-.013 (.022)

Note. We removed 298 non-overlapping cases (out of 6,295) in propensity score weighting. [a] coefficients show mean differences between the reference and comparison groups. [b] coefficients show probability differences between the reference and comparison groups. Bold letters indicate that health disparities between the reference and comparison groups are statistically significant after the Benjamini–Hochberg adjustment for multiple comparisons. Underlined letters show that the coefficients from Wave 2 are significantly different from those from Wave1 based on the results from seemingly unrelated regression models at alpha level less than 0.05.
*p <.05, ** p < .01. *** p <.001

Table S4. Predicted Differences in Health Outcomes in Wave 1 between Reference and Comparison Groups, based on Regression Method (N=6,295)

Latent classes of childhood abuse	Chronic physical disease[a]	Functional limitations[a]	Depression[b]	Alcohol abuse[b]	Drug abuse[b]
Sibling-only abuse vs.					
No/little abuse	-.031 (.033)	.062 (.073)	-.009 (.011)	-.021 (.009)*	.001 (.006)
Parent-only abuse	.121 (.048)*	**.401** (.111)***	**.062** (.017)***	.002 (.013)	**.027** (.011)*
Emotionally abusive sibling & parent	-.009 (.059)	.068 (.140)	**.079** (.027)**	.004 (.019)	.030 (.016)
Moderately abusive parent & sibling	.054 (.045)	.254 (.105)*	**.069** (.017)***	.011 (.012)	**.031** (.010)**
Severely abusive parent & sibling	.156 (.064)*	**.446** (.143)**	**.061** (.020)**	.020 (.016)	**.067** (.015)***
Parent-only abuse vs.					
Emotionally abusive parent & sibling	-.130 (.066)*	-.333 (.158)*	.017 (.029)	.002 (.019)	.003 (.018)
Moderately abusive parent & sibling	-.067 (.054)	-.146 (.129)	.007 (.020)	.008 (.014)	.004 (.013)
Severely abusive parent & sibling	.035 (.070)	.045 (.161)	-.001 (.023)	.018 (.018)	**.041** (.017)*
Severely abusive parent & sibling vs.					
Emotionally abusive sibling & parent	-.165 (.079)*	-.378 (.182)*	.018 (.031)	-.016 (.022)	-.037 (.021)
Moderately abusive parent & sibling	-.102 (.069)	-.192 (.157)	.008 (.022)	-.009 (.017)	**-.036** (.016)*

Note. [a]coefficients show mean differences between the reference and comparison groups. [b] coefficients show probability differences between the reference and comparison groups. Bold letters indicate health disparities between the reference and comparison groups are statistically significant after Benjamini–Hochberg adjustment for multiple comparisons.
*p <.05, ** p < .01. *** p <.001

Table S5. Predicted Differences in Health Outcomes in Wave 2 between Reference and Comparison Groups, based on Regression Method (N=6,295)

Latent classes of childhood abuse	Chronic physical disease[a]	Functional limitations[a]	Depression[b]	Alcohol abuse[b]	Drug abuse[b]
Sibling-only abuse vs.					
No/little abuse	-.020 (.047)	-.052 (.109)	-.015 (.013)	-.005 (.010)	-.008 (.006)
Parent-only abuse	.131 (.062)*	.145 (.154)	.050 (.018)**	.021 (.012)	.001 (.009)
Emotionally abusive sibling & parent	-.003 (.089)	-.003 (.204)	.040 (.026)	.012 (.019)	-.004 (.012)
Moderately abusive parent & sibling	.068 (.062)	.185 (.139)	.037 (.017)*	.029 (.013)*	<u>.001 (.009)</u>
Severely abusive parent & sibling	.150 (.077)	.234 (.172)	.028 (.020)	.030 (.019)	<u>.007 (.011)</u>
Parent-only abuse vs.					
Emotionally abusive parent & sibling	-.134 (0.88)	-.148 (.217)	-.009 (.030)	-.009 (.020)	-.006 (.014)
Moderately abusive parent & sibling	-.064 (.068)	.040 (.177)	-.012 (.023)	.008 (.015)	-.000 (.011)
Severely abusive parent & sibling	.018 (.081)	.089 (.198)	-.022 (.023)	.008 (.023)	.006 (.012)
Severely abusive parent & sibling vs.					
Emotionally abusive sibling & parent	-.152 (.097)	-.237 (.251)	.012 (.030)	-.017 (.029)	-.012 (.015)
Moderately abusive parent & sibling	-.082 (.080)	-.049 (.186)	.009 (.022)	-.000 (.021)	-.006 (.011)

Note. [a]coefficients show mean differences between the reference and comparison groups. [b] coefficients show probability differences between the reference and comparison groups. Bold letters indicate health disparities between the reference and comparison groups are statistically significant after Benjamini–Hochberg adjustment for multiple comparisons. Underlined letters show that the coefficients from Wave 2 are significantly different from those from Wave 1 based on the results from seemingly unrelated regression models at alpha level less than 0.05.
*p <.05, ** p < .01. *** p <.001

Table S6. Adjusted Probability of Death and Lost to follow-up between Wave 1 and Wave 2 by Latent Classes of Childhood Abuse (N=6,295)

| | | | By latent classes of childhood abuse | | | | |
| | | | Single perpetrator | | Multiple perpetrators | | |
Attrition between Waves 1 and 2	Full sample	No/Little abuse	Abusive sibling only	Abusive parent only	Emotionally abusive parent & sibling	Moderately abusive parent & sibling	Severely abusive parent & sibling
Died	0.91	.086	.092	.101	.096	.082	.117
Lost to follow-up	.170	.164	.164	.194	.147	.183	.172

Note. We use logistic regression to compute marginal probabilities after adjusting for age and sex at mean.