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Sibling death and adolescent mental health: A two-generation longitudinal analysis

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ABSTRACT

Bereavement—the loss of a loved one through death—can be a significant mental health risk. Yet, whether and how specific bereavement exposures affect mental health remains underexplored. For instance, little is known about the relationship between sibling death and adolescent mental health and whether any association manifests because of bereaved parents' poor mental health. We use longitudinal Future of Families and Child Well-being Study data (n = 2970) to analyze linkages between sibling death, parents' depression, and adolescents' depressive symptoms. With information collected from biological mothers and adolescents, including the vital status of siblings who share the same biological mother, we focus specifically on maternal siblings and maternal depression. Regression results show that sibling death corresponds with adolescents'—specifically girls'—higher depressive symptoms, but mothers' post-bereavement depression reduces the association to non-significance.

Extensive research emphasizes the critical role siblings play in shaping youth health and wellbeing. Siblings are powerful sources of socialization; their mere presence—and their behaviors, traits, and experiences—can influence individuals' health outcomes, including their mental health, from childhood through adulthood (Wolfe et al., 2014; Kramer and Kowal, 2005; Downey, 2001; Lamb et al., 2014).

Despite selective research documenting the relevance of siblings for health, research on sibling 'spillovers' is still minimal (De Neve and Kawachi, 2017). For instance, little is known about the health consequences of a sibling's early death. Yet, estimates suggest that sibling death is a somewhat common childhood experience in the contemporary U.S. One national survey estimates that approximately 8% of individuals with a sibling experience sibling death before age 25 (Fletcher et al., 2013), with another study estimating 2 million youth are bereaved by the loss of a sibling annually (Packman et al., 2006). Given that premature death is concentrated among lower income groups in the U.S., these estimates may be even higher among youth in socioeconomically disadvantaged families.

The relatively high prevalence of sibling death among U.S. youth is concerning given case studies show that bereaved siblings often struggle with mental health problems (e.g., Brooten et al., 2018; Fanos and Nickerson, 1991; McCown and Pratt, 1985; Rosen, 1985; see Fujita et al., 2025 for review). However, studies on sibling death in population-based samples of adolescents—youth at an especially vulnerable life stage—are rare, with most studies focusing instead on adults (e.g., Cha et al., 2022; Donnelly et al., 2022; Fletcher et al., 2013) or on adolescents in contexts outside of the U.S. (e.g., Bolton et al., 2016; Yu et al., 2017). This raises questions of whether in the U.S.—a context with likely elevated concentrations of sibling death among otherwise disadvantaged youth—sibling death is a unique risk factor for mental health.

Questions also exist about the mechanisms linking sibling death to adolescent mental health. Sibling relationships are embedded within larger family systems (Cox and Blair, 2003); thus, a key question is whether any mental health consequences of sibling death result directly from the loss or indirectly through its consequences for other relations' mental health. For instance, sibling death may partly affect surviving siblings through their bereaved parents' poor mental health (Stroebe et al., 2007), which powerfully affects adolescents' mental health (Livings, 2021). Any association between sibling death and adolescent mental health could partly stem from the implications the death has for the siblings' shared parents' mental health. Alternatively, a link between sibling death and adolescent mental health could operate independent of adolescents' parents' post-bereavement mental health and instead result from their personally coping with the loss and the multitude of pernicious, downstream impacts it has for them and their family.

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Thus, in this study we explore whether there is an association between sibling death and adolescent mental health among a large, diverse sample of U.S. youth—and, if so, whether it results from their parents' post-bereavement mental health. Specifically, we use Future of Families and Child Wellbeing Study (FFCWS) data to first analyze the association between early life exposure to sibling death and adolescents' mental health. The FFCWS cohort—a racially and ethnically diverse sample of youth disproportionately born to unmarried mothers in large U.S. cities who have endured an onslaught of childhood stressors (James et al. 2021)—allows us to study adolescents most likely to have been affected by both sibling death and poor mental health (Fletcher et al., 2018; Reiss, 2013). The panel study is also well-suited for our analysis given that it features longitudinal data collected directly from adolescents and their biological mothers (and, to a lesser extent, biological fathers). As such, we focus primarily on maternal siblings—defined as full or half siblings related to the focal adolescent through their biological mother—and mothers' and adolescents' post-bereavement mental health. We also consider paternal siblings in supplementary analyses. The rich, two-generation data allow us to identify the direct association between maternal sibling death (hereafter, sibling death for parsimony) and adolescent depressive symptoms, net of factors tied to selection into sibling death. The data also enable us to examine whether any portion of the association between early life exposure to sibling death and adolescent depression is explained by mothers' depression during middle childhood and/or early adolescence.

The study results have implications for both theory and health policy. Research on bereavement typically assumes a dyadic perspective, studying the consequences of a single death for a single person (Smith-Greenaway et al., 2025a). Yet the interconnectedness of familial relationships demands consideration of multiple ties simultaneously (Cox and Blair, 2003) to understand whether one death can reverberate across a family with interconnected consequences. Thus, many documented 'bereavement effects' may partially reflect spillover from family members' adverse reactions following a shared loss. By expanding beyond a dyadic perspective—and examining if the consequences of bereavement are explained by another family member's post-death wellbeing—this study will advance theoretical understanding of bereavement dynamics. Further, if sibling death adversely affects adolescent mental health primarily via their parents' post-bereavement mental health, the results will clarify that interventions targeted sibling-bereaved youth will benefit from simultaneously targeting parents.

1. Background

1.1. Importance of sibling relationships for mental health

Despite extensive research recognizing siblings as key influencers of children's health (Lamb et al., 2014), we know little about the health consequences of sibling death during childhood or adolescence. The growing population health literature on bereavement (Smith-Greenaway et al., 2025a), including its role in producing health disparities (Garcia et al., 2025; Kamis et al., 2022; Umberson, 2017), suggests this is an oversight. Although researchers have examined the health consequences of sibling death in later life (Cha et al., 2022; Donnelly et al., 2022), we know less about its health implications as an early life phenomenon among large, diverse samples of youth, including for adolescents' mental health.

Adolescents are a population particularly vulnerable to poor mental health in the U.S. (Kieling et al., 2011) and thus may be especially at risk following a sibling's death during early life. Yet, research on the health consequences of childhood bereavement has focused centrally on caregiver deaths, including those of parents and grandparents (Kamis et al., 2022; Livings et al., 2022, 2023; Patterson et al., 2020; Smith-Greenaway et al., 2025b). Relatedly, the widely used Adverse Childhood Experiences (ACE) questionnaire considers parent deaths as adverse events but overlooks sibling death as another major childhood stressor. Yet, one study suggests nearly one-in-twelve contemporary U.S. youth experience sibling death before age 25 (Fletcher et al., 2013). Combined with socioeconomic inequalities in U.S. mortality, this notable prevalence of sibling loss suggests that an even higher share of youth in disadvantaged families are likely to experience early life sibling death—a monumental life course event whose consequences we do not fully understand.

1.2. Sibling death and adolescent mental health

Although some research implies there could be select socio-emotional benefits associated with sibling death, such as greater maturity or better coping skills (Martinson and Rosemary, 1991), sibling death is otherwise theorized to be a source of poor mental health. For instance, research relying mostly on clinical or convenient samples of bereaved youth emphasizes the health burdens they experience, including anxiety, depression, loneliness, disbelief, fear, trouble sleeping, substance use, and behavioral problems (e.g., Brooten et al., 2018; Fanos and Nickerson, 1991; McCown and Pratt, 1995; Rosen, 1985; see Fujita et al., 2025 for review).

Yet, given these studies have focused on small or select groups of bereaved youth in a particular geographic area or who endured sibling death under specific circumstances (e.g., a specific cause of death), we lack an understanding of whether these associations persist among samples of diverse U.S. adolescents who have experienced sibling death under an equally diverse set of circumstances. Although studies of adolescents in other countries suggest that sibling death is a mental health risk factor (Bolten et al., 2016; Yu et al., 2017), as noted, inequality in U.S. mortality means sibling death is likely a select experience. As such, any observed correlations between sibling death and adolescent mental health could be, at least in part, driven by other inequalities; sibling death may not necessarily act as an independent risk factor. That is, given U.S. socioeconomically disadvantaged youth have significantly higher all-cause mortality risk relative to their advantaged peers (Braudt et al., 2019), sibling death may be merely concentrated among families experiencing other hardships, leaving open the possibility that these other characteristics explain any observed association with poor mental health.

Studies from large, representative panel studies have, however, shown that sibling death has adverse educational consequences, both for adolescents (Fletcher et al., 2018) and young adults (Fletcher et al., 2013; Thyden et al., 2023), even after accounting for selection. Yet, some evidence suggests that the consequences are concentrated among sisters (Fletcher et al., 2013), perhaps reflecting gendered dynamics in sibling relationships, including girls reporting greater intimacy with siblings (Kim et al., 2006). Given that adolescent girls are especially at risk of poor mental health (Livings, 2021), and past evidence that sibling death is a gendered experience (Fletcher et al., 2013), it is critical to not only explore whether any associations persist net of other childhood disadvantages, but also whether they are gendered in nature.

1.3. Parental mental health as a pathway linking sibling death and adolescent mental health

Questions of how sibling death affects adolescents' wellbeing also remain unanswered. If sibling death corresponds with adolescents' poor mental health, it could at least partly result from their bereaved parents' poor mental health. A child's death has powerful consequences for parents' mental health (Komischke-Konnerup et al., 2021; Li et al., 2005; Wonch Hill et al., 2017). Further, although adversity associated with bereavement often lessens with time, extensive research suggests that a child's death can lead to prolonged grief (Klass, 2013; Rogers et al., 2008), adversely affecting parents' mental health for years (Rogers et al., 2008; Song et al., 2019).

Additionally, parental mental health, especially maternal mental

health, affects adolescents' mental health. Children whose parents experience mental health problems, including depression, are themselves at higher risk of poor mental health (Pietikäinen et al., 2020; Smith, 2004). Adolescent girls are especially sensitive to their mothers' poor mental health (Livings, 2021). Thus, girls who have endured sibling death may be at greater risk of developing mental health problems primarily because of their greater sensitivity to their parents' mental health.

Alternatively, linkages between sibling death and adolescent mental health may operate independently of parents' post-bereavement mental health, working through other direct and indirect pathways. In terms of direct pathways, childhood sibling death can create an intense grief response that features negative emotions such as loneliness, sadness, and feelings of guilt (Kim et al., 2006; McHale et al., 2012). Further, siblings have been described as 'forgotten grievers' (Rostila et al. 2012)—often overlooked by other family members and society more broadly, which may leave bereaved youth at risk of developing mental health problems.

Other research emphasizes the survivor guilt that siblings experience (Crehan 2004)—a reaction that may further leave adolescents at risk of measurably worse mental health, regardless of their parents' mental health response. Sibling death may also heighten adolescents' awareness of their own mortality. Siblings are a key comparator in individuals' lives—people with whom they see themselves reflected given their genetic and social similarities. Low expectations about one's survival is associated with poor health outcomes in adulthood, implying the same could be true in adolescence (Warner and Swisher, 2015). Thus, if sibling death makes adolescents hyperaware of their own mortality, this could lead to worse mental health (Crehan, 2004), regardless of the consequences that the death has on their parents.

Further, even if adolescents' parents do not face mental health problems following a sibling death, a sibling's death can have a range of consequences for adolescents' parents and their broader family. For example, experiencing child death can correspond with parents' worse relationship outcomes (Oliver, 1999), which could be another way that sibling death shapes poor adolescent outcomes. Still more, a sibling's death may also adversely affect other family members besides their parents, including their other surviving siblings, grandparents, and more distal relatives. Thus, given the seismic impact of a death on a family, these consequences may lead to adolescents' mental health problems, even absent their parents' poor mental health.

1.4. Current study

The first goal of the current study is to use panel data of a diverse sample of U.S. adolescents and their biological parents to examine if early life sibling death (before age 9, specifically) is associated with adolescent mental health, specifically their depressive symptoms at age 15. A second goal is to examine whether the relationship operates in gendered ways. A third and final goal is to use the two-generation nature of the panel data to identify whether any associations between early life exposure to sibling death and adolescent mental health operates principally via parents' mental health, specifically mothers' depression during middle childhood and adolescence, or whether a significant association persists even after accounting for parents' mental health.

2. Data and methods

The Future of Families and Child Wellbeing Study (FFCWS) is a cohort study of children, and their biological parents and later caregivers, followed since enrollment at their birth between 1998 and 2000. The study began with a sample of 4898 newborns of mostly unmarried parents from 20 U.S. cities with populations greater than 200,000 (Reichman et al., 2001). After initial postpartum interviews with mothers and fathers, FFCWS completed six additional waves of data collection when the focal child was approximately 1, 3, 5, 9, 15, and 22 years old. The first five waves include separate interviews with biological mothers and fathers (if available), and the last two waves include interviews with children's primary caregiver (most commonly their biological mother). Youth were also interviewed at the last three waves. We focus on adolescent mental health at the year-15 survey to understand the consequences of early life sibling death (before age 9) for adolescents' mental health using reports from their biological mothers. In total, 3444 adolescents were interviewed at the year-15 survey. Given our interest in parental mental health, and given most adolescents' primary caregivers are their mothers, we further restrict the sample to 3027 adolescents whose primary caregiver is their biological mother who was also interviewed at the year-15 survey. This restriction allows use of data from mothers on the child's maternal siblings and measures of mothers' post-bereavement depression. After sample restrictions, we have valid outcome data for 2970 adolescents.

Given the potential for stressful life experiences—including child death—to systematically affect the likelihood of a family remaining involved in the FFCWS, we assessed whether sibling death is associated with continued enrollment at the year-15 survey. We found no evidence that sibling death altered adolescents' likelihood of participating in the year-15 survey. Even so, FFCWS adolescents interviewed at age 15 have more advantaged profiles than the full sample at baseline (Smith-Greenaway et al., 2025b). Thus, the prevalence of adolescents exposed to sibling death in our data—and its consequences for the most disadvantaged children—may be conservative.

We impute missing values for covariates among the 340 adolescents in our analytic sample with missing data. Only two covariates (mothers' depression and children's race) had more than 50 cases of missing data; the remaining covariates with missing data had between 2 and 31 cases of missing data. We produced 20 multiply imputed datasets that we combine to generate pooled results with chained equations in Stata (Royston, 2004).

Importantly, 762 of adolescents' mothers did not report biological children apart from the focal child. Our main models maintain these cases for representativeness because detailed sibling history data are not collected, which lowers confidence that we successfully identified all children with maternal siblings. We also estimate supplementary analyses (discussed below) wherein we omit youth with no recorded siblings to ensure the stability of the results.

2.1. Measures

Adolescent mental health. We examine adolescents' depressive symptoms at age 15. Interviewers administered the widely used and validated condensed version of the Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977). Adolescents rated five statements about the prior four weeks (e.g., "I feel depressed") on a scale ranging from strongly disagree (0) to strongly agree (3). There is no standard threshold for identifying "depression" using the CES-D; thus, like past studies (Mittleman, 2019), we averaged responses to create a continuous depressive symptom score (0–3) (α=0.77). Higher values indicate more depressive symptoms. Note that the symptoms pertain to the four-week period prior to the year-15 survey. This ensures that adolescents' symptoms correspond to a period following both sibling death exposure, our key independent variable, and maternal depressive symptoms, our mediator of interest (see Fig. 1), as described in more detail below.

Maternal mental health. The Composite International Diagnostic Interview—Short Form (CIDI-SF), Section A (Kessler et al., 1998) was administered to mothers at the year-9 and year-15 surveys—two time points following the measurement of sibling death, our key independent variable, and prior to the measurement of adolescent depressive symptoms (see Fig. 1), our key dependent variable. Specifically, around the time the focal adolescent was age 9 and 15, mothers were asked if they had feelings of depression for at least two consecutive weeks in the *past year*. Positive responses prompted questions about specific symptoms (e.g., difficulty concentrating). If mothers reported at least three symptoms

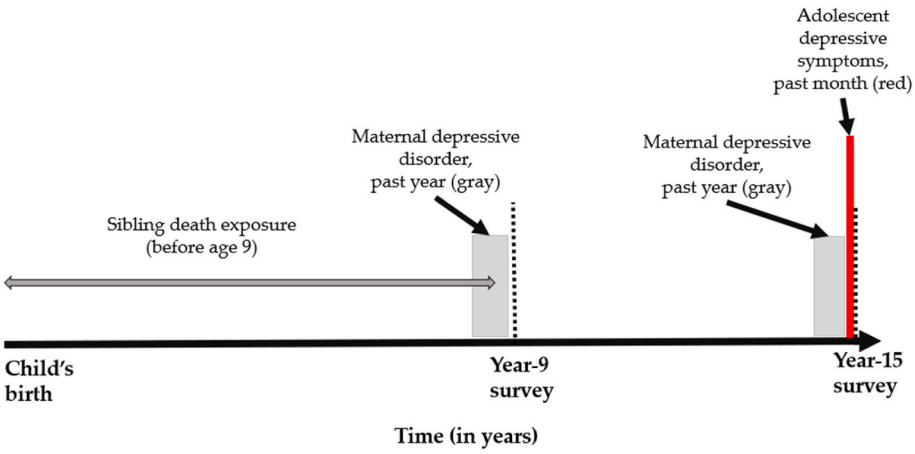

Fig. 1. Depiction of the timing of measurement of sibling death, maternal depression, and adolescent depressive symptoms in the Future of Families and Child Wellbeing Study.

for at least half the day, almost every day, during a two-week period in the past year, they were coded as having major depressive disorder.

Note that although these measures of maternal depressive symptoms pertain mostly to a period of time between the measurement of sibling death and adolescent depressive symptoms, making them ideal mediators, there is a short, one-month overlap in the reporting windows of symptoms of maternal depression and adolescent depressive symptoms at the year-15 survey—introducing a possibility that some cases of maternal depression began after the onset of adolescent depressive symptoms. Although we note this as a data limitation, given the small potential for overlap, it is unlikely that any such cases drive the overall results.

Sibling death. Children's biological mothers were asked at the year-5 and year-9 surveys whether they "have any children that have died". We code sibling death (=1) using mothers' responses to these questions. Therefore, as noted, our primary measure of sibling death focuses only on adolescents' maternal siblings. Like noted above, there is minimal temporal overlap in the symptoms of maternal depression (pertaining to the year prior to year-9 survey) and sibling death exposure at the year-9 survey, leaving the possibility a sibling death occurred in the year before the year-9 survey but after the onset of maternal depression. However, given the generally minimal overlap, with most sibling deaths reported at the year-5 survey, it is unlikely that any such cases drive the overall results.

Note that in additional analyses, we use two supplemental measures of sibling death. First, mothers who report a deceased child were subsequently asked how many children had died. In total, 35 children in our analytic sample had experienced multiple sibling deaths; in supplementary analyses, we differentiate these youth to assess whether there is unique mental health consequences associated with having been bereaved by multiple sibling deaths. Second, our primary measure excludes the deaths of paternal siblings, as biological fathers were often not interviewed (and we are therefore missing considerable data on paternal siblings). Thus, we include appendices of results from a subsample of adolescents with valid data on paternal sibling death to assess if their exclusion affects findings and/or if paternal sibling death is uniquely related to adolescent mental health.

Control variables. We control for key socio-demographic characteristics including adolescents' gender based on their mothers' report of the child's sex at birth, resulting in a coding of adolescents as boys or girls. We also include controls for adolescents' self-reported race and ethnicity and age—both measured at the time of the year-15 survey (which occurred over a multi-year window, resulting in minimally variable ages at the time of the survey, with some adolescents slightly older or younger, ranging from age 14 to 17). We adjust for the mothers' number of children at the year-15 survey.

We also control for other stressors that may affect adolescent depressive symptoms, including household poverty at the time of the child's birth, whether the focal child's parents were unmarried at their birth, whether they ever had an incarcerated parent, and their maternal grandparents' vital status at the year-15 survey. We also control for adolescents' parents' relationship status at the year-15 survey, including whether their biological father is estranged or deceased. We control for whether their biological mother and/or father completed college and whether their mother was born in the U.S. Finally, given the mother-child relationship may alter how mothers' mental health affects adolescent mental health, we control for adolescent-reported closeness to their mother at the year-15 survey.

Note that although many covariates are measured in early life, select covariates were measured at later waves and could themselves be influenced by sibling death and therefore on the causal pathway linking sibling death to the adolescents'—and mothers'—mental health. Nonetheless, to ensure any associations between sibling death and adolescents' depressive symptoms are not spurious, we take a stringent approach to model associations net of these other risk factors.

3. Results

3.1. Descriptive characteristics of youth, by experience of sibling death

Table 1 shows descriptive statistics for the analytic sample. Nearly seven percent (6.92%) of adolescents have experienced sibling death by age 9, demonstrating a high prevalence of loss among this cohort. The descriptive results also show the pervasiveness of other hardships. Nearly one-in-five youth have mothers with major depressive disorder in the year before the year-9 and/or year-15 interviews. About one-in-three adolescents were living in an impoverished household at birth, and more than one-half had ever-incarcerated parents. Only a fraction has still married parents by age 15. Nearly one-in-six youth (15.06%) has an estranged or deceased father, demonstrating the high prevalence of familial instability and loss among this cohort. Only roughly one-in-ten adolescents have a college-educated mother or father.

Table 1 also describes the adolescents by sibling death exposure, demonstrating corresponding sociodemographic differences in the profiles of youth who have versus have not experienced sibling loss. Adolescents who experienced sibling death have higher depressive symptoms relative to those who did not ($p < .05$) and are more likely to have depressed mothers ($p < .05$) in the year leading up to the year-9 and year-15 interviews.

Sibling death is also concentrated among specific demographic groups. A higher proportion of sibling bereaved adolescents identify as non-Hispanic Black (63.74% versus 48.87%, $p < .05$), aligning with

Table 1
Descriptive statistics of adolescents, full sample and disaggregated by sibling death.

Variable	Total sample N = 2630	No sibling death N = 2448	Sibling death N = 182
	%/Mean (SD)	%/Mean (SD)	%/Mean (SD)
Adolescent depressive symptoms at year-15 survey	0.60 (0.60)	0.58 (0.59)*	0.72 (0.68)
Sibling death before age 9	6.92		100.00
Mother depressed within one year before year-9 survey	16.31	15.72*	24.18
Mother depressed within one year before year-15 survey	18.25	17.76*	24.72
Covariates			
Child gender at birth			
Boy	50.30	50.46	52.20
Girl	49.70	49.51	47.80
Child's self-identified race and ethnicity at year-15 survey			
Non-Hispanic white	17.07	17.89*	6.04
Non-Hispanic Black	48.97	48.87*	63.74
Hispanic	24.11	24.55*	18.13
Other	2.70	2.70	2.75
Multiracial	4.98	4.90	6.04
Don't know	2.17	2.08	3.30
Child's age at time of year-15 survey	15.43 (0.67)	15.43 (0.66)	15.41 (0.71)
Total children living in household at year-15 survey	2.46 (1.36)	2.45 (1.36)*	2.66 (1.40)
Household below federal poverty level at birth	33.88	33.00*	45.60
Biological parents unmarried at birth	74.68	73.82*	86.26
Parent ever incarcerated before year-15 survey	51.98	51.14*	63.18
Maternal grandparents vital status at year-15 survey			
Both alive	52.40	52.61	49.45
Maternal grandfather deceased	24.94	24.80	26.92
Maternal grandmother deceased	9.43	9.39	9.89
Both deceased	13.23	13.19	13.73
Biological parents' relationship at year-15 survey			
Married	24.68	25.04	19.78
Romantic relationship	6.16	6.37	3.29
Separated	54.03	53.51	60.99
Estranged/Father deceased	15.06	15.07	15.94
Father college degree at year-15 survey	10.42	10.87*	4.40
Mother college degree at year-15 survey	11.71	12.30*	3.85
Mother born in U.S.	86.50	86.19	90.66
Adolescent-mother relationship quality at year-15 survey			
Extremely close	59.81	59.96	57.69
Quite close	26.77	26.84	25.82
Fairly close	10.46	10.33	12.09
Not very close	2.97	2.87	4.40

Note: Estimates based on non-imputed FFCWS data among adolescents in analytic sample with missing data; Number of observations prior to imputation. * = significant difference at p < .05.

Table 2
Descriptive statistics of adolescents, disaggregated by child gender and sibling death.

Variable	Boy		Girl	
	%/Mean (SD)	%/Mean (SD)	%/Mean (SD)	%/Mean (SD)
	N = 1236	N = 87	N = 1212	N = 95
	No sibling death	Sibling death	No sibling death	Sibling death
Adolescent depressive symptoms at year-15 survey	0.52 (0.55)*	0.64 (0.63)	0.65 (0.62)*	0.80 (0.72)
Sibling death before age 9	0.00	100.00	0.00	100.00
Mother depressed within one year before year-9 survey	16.83*	25.29	14.60*	23.16
Mother depressed within one year before year-15 survey	18.85*	26.44	16.67	23.16
Covariates				
Child gender at birth				
Boy	100.00	100.00	0.00	0.00
Girl	0.00	0.00	100.00	100.00
Child's self-identified race and ethnicity at year-15 survey				
Non-Hispanic white	17.88*	4.60	17.90*	7.37
Non-Hispanic Black	46.60*	65.52	49.17*	62.11
Hispanic	24.68	20.69	24.42*	15.79
Other	3.72	3.45	1.65	2.11
Multiracial	4.94	2.30	4.87*	9.47
Don't know	2.18	3.45	1.98	3.16
Child's age at time of year-15 survey	15.44 (0.67)	15.54 (0.79)	15.42 (0.66)*	15.28 (0.61)
Total children living in household at year-15 survey	2.44 (1.34)*	2.69 (1.42)	2.46 (1.38)	2.63 (1.38)
Household below federal poverty level at birth	33.25*	43.68	32.76*	47.37
Biological parents unmarried at birth	73.14	79.31	74.50*	92.63
Parent ever incarcerated before year-15 survey	50.89*	63.22	51.40*	63.16
Maternal grandparents vital status at year-15 survey	51.29	48.28	53.96	50.53
Both alive	25.24	33.33	24.34	21.05
Maternal grandfather deceased	9.63*	6.90	9.16	12.63
Maternal grandmother deceased	13.83	11.49	12.54	15.79
Biological parents' relationship at year-15 survey				
Married	26.38	21.84	23.68	17.89
Romantic relationship	6.15	4.60	6.60*	2.11
Separated	52.91	59.77	54.13	62.11
Estranged/Deceased	14.56	13.79	15.59	17.89
Father college degree at year-15 survey	11.17	3.45	10.56*	5.26
Mother college degree at year-15 survey	12.86*	3.45	11.72*	4.21
Mother born in U.S.	86.17	86.21	86.22*	94.74
Adolescent-mother relationship quality at year-15 survey				
Extremely close	65.13	59.77	54.70	55.79
Quite close	24.92	27.59	28.80	24.21
Fairly close	8.01	6.90	12.71	16.84
Not very close	1.94*	5.75	3.80	3.16

Note: Estimates based on non-imputed FFCWS data among subsample of adolescents in analytic sample without missing data.
Number of observations prior to imputation. * = significant difference between those who experience sibling death and those who did not at p < .05.

earlier findings (Doherty et al., 2024). Adolescents who have endured sibling death are also more likely to have been born into impoverished households (45.60% versus 33.00%, $p < .05$), born to unmarried parents (86.26% versus 73.82%, $p < .05$), and to have experienced parental incarceration (63.18% versus 51.14%, $p < .05$). Further, youth who have experienced sibling death have less educated parents, on average, with less than one-half as many having a college-educated father (4.40% versus 10.87%, $p < .05$) or mother (3.85% versus 12.30%, $p < .05$).

Whereas Table 1 describes the full sample to convey broad patterns in the data, Table 2 further disaggregates the descriptive statistics by child gender, as we do in some multivariable models. As shown in Table 2, there are similar sociodemographic differences in the profiles of boys and girls who have versus have not experienced sibling death. Adolescent boys and girls who experienced sibling death have higher depressive symptoms relative to those who did not ($p < .05$). Adolescent boys and girls who experienced sibling death before age 9 are also more

likely to have depressed mothers ($p < .05$). Like among the full sample, the gender disaggregated findings further demonstrate that sibling death is concentrated among specific demographic groups.

Table 3
Regression model results of the association between sibling death and adolescent depressive symptoms.

	Model 1		Model 2	
	Coeff	(95% CI)	Coeff	(95% CI)
Sibling death before age 9	0.11**	(0.03, 0.20)	0.09*	(0.01, 0.17)
Covariates				
Child gender at birth				
Boy	–		–	
Girl	0.13***	(0.09, 0.17)	0.09***	(0.05, 0.13)
Child's self-identified race and ethnicity at year-15 survey				
Non-Hispanic white			–	
Non-Hispanic Black			−0.06	(-0.12, 0.01)
Hispanic			0.01	(-0.06, 0.09)
Other			0.01	(-0.13, 0.15)
Multiracial			0.02	(-0.08, 0.13)
Don't know			0.03	(-0.12, 0.19)
Child's age at time of year-15 survey			−0.00	(-0.03, 0.03)
Total children living in household at year-15 survey			0.01	(-0.00, 0.03)
Household below federal poverty level at birth			0.04	(-0.00, 0.09)
Biological parents unmarried at birth			−0.02	(-0.08, 0.04)
Parent ever incarcerated before year-15 survey			0.04	(-0.01, 0.08)
Maternal grandparents vital status at year-15 survey				
Both alive			–	
Maternal grandfather deceased			0.01	(-0.04, 0.06)
Maternal grandmother deceased			0.07*	(0.00, 0.15)
Both deceased			0.04	(-0.02, 0.11)
Biological parents' relationship at year-15 survey				
Married			–	
Romantic relationship			0.15**	(0.05, 0.25)
Separated			0.11***	(0.05, 0.17)
Estranged/Father deceased			0.13***	(0.06, 0.21)
Father college degree at year-15 survey			−0.07	(-0.16, 0.01)
Mother college degree at year-15 survey			−0.02	(-0.10, 0.06)
Mother born in U.S.			−0.05	(-0.12, 0.02)
Adolescent-mother relationship quality at year-15 survey				
Extremely close			–	
Quite close			0.21***	(0.16, 0.25)
Fairly close			0.40***	(0.33, 0.47)
Not very close			0.66***	(0.54, 0.78)
Model fit statistics				
F-test	21.31***		15.28***	

Note: Estimates based imputed data.
***$p < .001$; **$p < .01$; *$p < .05$; N = 2963.

3.2. Association between sibling death and adolescent depressive symptoms

Table 3 presents ordinary least squares (OLS) regression models estimating the association between sibling death and adolescent depressive symptoms. Model 1, which estimates the association among the full sample and controls only for child gender, shows having experienced sibling death before age 9 corresponds with adolescents' higher depressive symptoms at age 15 ($b = 0.11$; $p < .01$). Specifically, early life course exposure to sibling death corresponds with a 0.15 standard deviation unit increase in adolescent depressive symptoms—a relatively small effect size by conventional standards. Model 1 further demonstrates that, overall, girls have significantly higher depressive symptoms relative to boys ($p < .001$).

Model 2 includes all covariates. The association between sibling death and depressive symptoms is reduced in magnitude but remains statistically significant ($p < .05$). Being a girl, having a deceased maternal grandmother, having separated parents or an estranged/deceased father (compared to having married parents), and having a more distant relationship with one's biological mother are each positively associated with adolescents' depressive symptoms. Notably, early childhood sibling death has a larger association with adolescents' depressive symptoms than having a deceased maternal grandmother, but a smaller association than parents' relationship status and closeness with their mother, suggesting that the magnitude of the association is notable and of comparable influence as some, but not all, childhood stressors.

3.3. Association between sibling death and adolescent depressive symptoms, considering gender and mothers' depression

We next estimate the models separately for adolescent boys and girls. Before presenting model results, Fig. 2 depicts the relationship between sibling death and adolescents' depressive symptoms for boys and girls separately. There is an observably higher burden of depressive symptoms among boys who experienced sibling death compared to boys who did not. However, among girls, those bereaved by sibling death during early life have significantly higher depressive symptoms relative to their peers ($p < .01$).

Table 4and Table 5 presents multivariable models by adolescent gender. Beginning with boys, Model 1 of Table 4 offers no evidence that sibling death is related to their depressive symptoms. Instead, other childhood stressors—including grandmother death, father death/

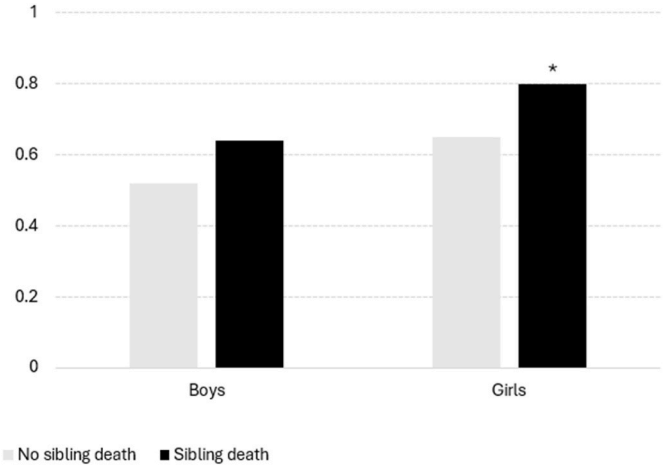

Fig. 2. Average depressive symptom scores for adolescents, by gender and sibling death
Note: Data based on 2970 adolescents enrolled in the FFCWS data.
*$p < .01$.

Table 4
Regression model results of the association between sibling death and adolescent depressive symptoms among boys.

	Model 1		Model 2	
	Coeff	(95% CI)	Coeff	(95% CI)
Sibling death before age 9	0.05	(-0.06, 0.17)	0.05	(-0.07, 0.16)
Mother depressed within one year before year-9 survey			0.06	(-0.02, 0.14)
Mother depressed within one year before year-15 survey			0.03	(-0.04, 0.11)
Covariates				
Child's self-identified race and ethnicity at year-15 survey				
Non-Hispanic white	–		–	
Non-Hispanic Black	0.02	(-0.07, 0.11)	0.03	(-0.06, 0.11)
Hispanic	0.06	(-0.04, 0.16)	0.06	(-0.04, 0.16)
Other	0.11	(-0.05, 0.28)	0.11	(-0.05, 0.28)
Multiracial	0.05	(-0.10, 0.19)	0.05	(-0.09, 0.20)
Don't know	0.21*	(0.01, 0.42)	0.22*	(0.02, 0.43)
Child's age at time of year-15 survey	0.00	(-0.04, 0.04)	0.00	(-0.04, 0.04)
Total children living in household at year-15 survey	0.02*	(0.00, 0.04)	0.02*	(0.00, 0.04)
Household below federal poverty level at birth	0.05	(-0.01, 0.11)	0.05	(-0.01, 0.11)
Biological parents unmarried at birth	−0.02	(-0.11, 0.06)	−0.02	(-0.10, 0.06)
Parent ever incarcerated before year-15 survey	0.03	(-0.03, 0.09)	0.02	(-0.04, 0.09)
Maternal grandparents vital status at year-15 survey				
Both alive	–		–	
Maternal grandfather deceased	0.05	(-0.02, 0.11)	0.04	(-0.02, 0.11)
Maternal grandmother deceased	0.12*	(0.02, 0.22)	0.12*	(0.02, 0.22)
Both deceased	0.06	(-0.03, 0.14)	0.05	(-0.03, 0.14)
Biological parents' relationship at year-15 survey				
Married	–		–	
Romantic relationship	0.24***	(0.10, 0.37)	0.23**	(0.10, 0.36)
Separated	0.07	(-0.01, 0 0.15)	0.07	(-0.01, 0.15)
Estranged/Father deceased	0.15**	(0.05, 0.25)	0.14**	(0.05, 0.24)
Father college degree at year-15 survey	−0.07	(-0.18, 0.05)	−0.07	(-0.18, 0.05)
Mother college degree at year-15 survey	−0.01	(-0.12, 0.10)	0.00	(-0.11, 0.11)
Mother born in U.S.	−0.06	(-0.15, 0.03)	−0.07	(-0.16, 0.02)
Adolescent-mother relationship quality at year-15 survey				
Extremely close	–		–	
Quite close	0.20***	(0.14, 0.27)	0.20***	(0.13, 0.26)
Fairly close	0.39***	(0.29, 0.49)	0.38***	(0.28, 0.48)
Not very close	0.53***	(0.34, 0.71)	0.53***	(0.34, 0.72)
Model fit statistics				
F-test	6.88***		6.50***	

Note: Estimates based imputed FFCWS data; N = 1502 adolescent boys.
***$p < .001$; **$p < .01$; *$p < .05$.

Table 5
Regression model results of the association between sibling death and adolescent depressive symptoms among girls.

	Model 1		Model 2	
	Coeff	(95% CI)	Coeff	(95% CI)
Sibling death before age 9	0.13*	(0.00, 0.25)	0.12	(-0.01, 0.24)
Mother depressed within one year before year-9 survey			0.04	(-0.05, 0.13)
Mother depressed within one year before year-15 survey			0.12**	(0.03, 0.20)
Covariates				
Child's self-identified race and ethnicity at year-15 survey				
Non-Hispanic white	–		–	
Non-Hispanic Black	−0.13**	(-0.22, −0.03)	−0.13**	(-0.22, −0.03)
Hispanic	−0.04	(-0.15, 0.08)	−0.03	(-0.15, 0.08)
Other	−0.15	(-0.40, 0.11)	−0.13	(-0.39, 0.12)
Multiracial	−0.01	(-0.17, 0.14)	−0.01	(-0.17, 0.14)
Don't know	−0.13	(-0.38, 0.10)	−0.13	(-0.37, 0.11)
Child's age at time of year-15 survey	0.00	(-0.04, 0.04)	0.00	(-0.04, 0.04)
Total children living in household at year-15 survey	0.00	(-0.02, 0.03)	0.00	(-0.02, 0.02)
Household below federal poverty level at birth	0.04	(-0.03, 0.11)	0.03	(-0.04, 0.10)
Biological parents unmarried at birth	−0.02	(-0.11, 0.07)	−0.02	(-0.11, 0.06)
Parent ever incarcerated before year-15 survey	0.04	(-0.03, 0.11)	0.03	(-0.04, 0.10)
Maternal grandparents vital status at year-15 survey				
Both alive	–		–	
Maternal grandfather deceased	−0.04	(-0.11, 0.04)	−0.04	(-0.11, 0.04)
Maternal grandmother deceased	0.03	(-0.08, 0.14)	0.03	(-0.08, 0.13)
Both deceased	0.04	(-0.06, 0.13)	0.03	(-0.06, 0.13)
Biological parents' relationship at year-15 survey				
Married	–		–	
Romantic relationship	0.06	(-0.08, 0.21)	0.06	(-0.08, 0.21)
Separated	0.15**	(0.06, 0.24)	0.14**	(0.05, 0.23)
Estranged/Father deceased	0.11*	(0.00, 0.22)	0.11	(-0.00, 0.22)
Father college degree at year-15 survey	−0.09	(-0.22, 0.03)	−0.10	(-0.22, 0.03)
Mother college degree at year-15 survey	−0.01	(-0.14, 0.11)	−0.01	(-0.14, 0.11)
Mother born in U.S.	−0.04	(-0.14, 0.06)	−0.05	(-0.15, 0.06)
Adolescent-mother relationship quality at year-15 survey				
Extremely close	–		–	
Quite close	0.21***	(0.14, 0.28)	0.21***	(0.14, 0.28)
Fairly close	0.41***	(0.31, 0.51)	0.40***	(0.31, 0.50)
Not very close	0.75***	(0.59, 0.91)	0.73***	(0.57, 0.90)
Model fit statistics				
F-test	8.57***		8.29***	

Note: Estimates based imputed FFCWS data; N = 1468 adolescent girls.
***$p < .001$; **$p < .01$; *$p < .05$.

estrangement, having unmarried parents, and having a more distant relationship with their mothers—corresponds with higher depressive symptoms among adolescent boys. Although there is no statistically significant relationship to explain, Model 2 includes two measures of mothers' depression to assess their relevance to boys' depressive symptoms. As shown, neither measure of mothers' depression is associated with adolescent boys' depressive symptoms.

Table 5 presents the results for girls. Model 1 show that, net of covariates, sibling death is associated with significantly higher depressive symptoms ($b = 0.13$; $p < .05$). Experiencing a sibling death corresponds with a 0.22 standard deviation unit increase in depressive symptoms—again, a relatively small effect size, but one that is comparable in magnitude to other childhood stressors in the model. The results further demonstrate that, like boys, girls' sociodemographic characteristics relate to their depressive symptoms. Fathers' estrangement/death and/or their parents' separation, as well as not having as close of a relationship with their mother, are associated with adolescent girls' depressive symptoms.

Given the significant association between sibling death and adolescent girls' depressive symptoms, which operates net of a host of covariates, Model 2 introduces two measures of mothers' depression to assess the relationship between having a deceased sibling and adolescent girls' depressive symptoms. The results demonstrate that the inclusion of mothers' depressive symptoms explains the association between exposure to sibling death before age 9 and adolescent girls' depressive symptoms. The association between sibling death and adolescent girls' depressive symptoms is reduced in magnitude. Further, the inclusion of mothers' depressive symptoms reduces the association between sibling death and adolescent depressive symptoms to non-significance. Model 2 also demonstrates that mothers' depression in the year prior to age 15 is significantly associated with adolescent girls' depressive symptoms at age 15 ($p < .01$).

3.4. Supplementary analyses

Although our main independent variable is whether adolescents have ever experienced sibling death before age 9, 1.2% of adolescents experienced two or more sibling deaths. Thus, we re-estimated the models with a three-category indicator for whether the adolescent had experienced early life exposure to no sibling death, one sibling death, or multiple sibling deaths. As shown in Appendix A, we find no evidence that the number of sibling deaths is associated with boys' mental health. Among girls, we again find that—after including maternal depression—experiencing sibling death—regardless of whether it was one or multiple deaths—is no longer independently related to their depressive symptoms. Further, the confidence intervals overlap for having experienced one or multiple sibling deaths, suggesting that these exposures are comparable.

In addition to examining whether the number of sibling deaths differentially affects youth, we also explored whether the findings were robust to only including adolescents for whom we are certain have at least one maternal sibling. That is, the analytic sample includes all adolescents, including those who may not have any maternal siblings. Thus, to ensure the findings are not capturing the experience of having—not just losing—a sibling, we re-estimated all models among adolescents with at least one confirmed maternal sibling. Appendix B shows the results mirror those for the full sample: sibling death does not correspond with worse depressive symptoms for boys (Model 1)—a null finding that unsurprisingly persists net of consideration of mothers' depression (Model 2). Shifting to girls, however, the results in Model 3 shows that sibling death corresponds with significantly more depressive symptoms among girls when focusing on the subsample for whom we are certain have at least one maternal sibling ($p < .05$). The results in Model 4 show that the association between sibling death and adolescent depressive symptoms becomes non-significant once accounting for mothers' depression, like the results among the full sample.

Finally, we considered the possible relevance of adolescents' paternal siblings. We created a binary variable of paternal sibling death among the subsample of adolescents with valid data. In total, 26 adolescent boys' and 27 adolescent girls' fathers confirmed a paternal sibling death among those who had not experienced a maternal sibling death. Appendix C shows that including a measure of paternal sibling death does not correspond with adolescent boys' nor girls' depressive symptoms. Appendix D further shows that excluding adolescents with confirmed paternal sibling deaths (but not maternal sibling deaths) from the analyses does not alter the key findings for maternal sibling death.

4. Discussion

Although early life sibling death is a relatively common experience among contemporary cohorts of youth (Fletcher et al., 2013), we lack evidence of its consequences for adolescent mental health, and whether any such consequences are a function of bereaved parents' mental health. Focusing on a panel study of biological mothers and their adolescent children who have disproportionately disadvantaged profiles, this study examines if there is an association between early life exposure to sibling death before age 9 and adolescent depressive symptoms at age 15, and if so, whether it operates independently from—or is largely a byproduct of—mothers' post-bereavement depression during middle childhood and early adolescence.

The study makes several contributions. The study adds to growing evidence that sibling death is a more prevalent childhood stressor than often acknowledged. Focusing on a sample of socioeconomically disadvantaged 15-year-olds, and considering only maternal sibling deaths, we find nearly 7% of adolescents have already experienced sibling death by age 9—representing approximately one in every 15 adolescents. Our study further establishes that the experience disproportionately concentrates among youth who have endured other stressors, including poverty, family instability, father absence due to estrangement or death, and father incarceration.

The study further demonstrates that—net of these other stressors—sibling death is associated with adolescents', specifically girls', depressive symptoms: having experienced a sibling death before age 9 corresponds with greater depressive symptoms at age 15 among girls. We find no significant association for boys. The lack of an association for boys is, on the one hand, a bit puzzling. This result diverges from evidence that boys in the FFCWS cohort are highly sensitive to familial deaths. Specifically, past research demonstrates that parental and grandparental deaths affect boys' mental health, behavioral, and educational outcomes (Livings et al., 2023, 2023; Smith-Greenaway et al. 2025). However, on the other hand, the null results for boys aligns closely with other studies of sibling death, specifically, which tend to emphasize sisters' worse outcomes (Fletcher et al., 2013). Girls' greater sensitivity to sibling death is likely, at least in part, attributable to their greater sensitivity to their mothers' poor mental health (Livings 2021)—given the association becomes non-significant once we account for mothers' depression. Of course, although our results produce a null association between sibling death and adolescent boys' depressive symptoms, there may be subsamples of boys for whom sibling death corresponds with depressive symptoms. While our analysis of the data along these lines produced no such findings, this is a possibility that we encourage future research to explore further—especially with data that features richer information on the sibling deaths, including sibling gender, sibling age, and the circumstances of their death.

That sibling death is a mental health risk factor, particularly for girls, is notable given the high proportion of FFCWS adolescents that have experienced life-altering hardships like parental incarceration (Wildeman and Western, 2010), housing instability (DeLuca and Eva, 2022), and chronic poverty (McLanahan, 2009). Further, although the magnitude of the associations is rather small by conventional standards, the results are notable compared to other studies of childhood stressors. For example, Koss et al. (2025) study adverse childhood experiences

(ACEs) and depressive symptoms using the same CES-D score among the FFCWS cohort. Comparing across studies, our results show that sibling death is associated with an increase in depressive symptoms that is comparable in magnitude to four ACEs, suggesting sibling death is equivalent to having experienced multiple other forms of adverse childhood experiences.

As noted above, the study additionally demonstrates that the association between sibling death and girls' depressive symptoms becomes non-significant once we include measures of mothers' depression. This highlights the need for multi-generational interventions that simultaneously address the wellbeing of both the bereaved parents and siblings following a death. Indeed, efforts to address bereaved parents' mental health have the potential to improve their outcomes and aid their surviving children's, especially daughters', mental health.

Although the study offers several key findings, advancing our understanding of the presence and nature of linkages between sibling death and adolescent depressive symptoms, it has limitations. First, the FFCWS cohort is not representative of the U.S. population of adolescents, and thus the results may be specific to this disproportionately disadvantaged cohort of youth. Second, the data are also limited in their information on siblings. We lack information on the context surrounding the sibling deaths, including timing and cause, which may influence its consequences for adolescents (Fletcher et al., 2013). We also lack data on the deceased siblings themselves, including their gender and age in relation to the focal child—characteristics that may further shape the consequences of their deaths. Third, given biological mothers were only asked of deaths when the focal child was roughly 5 and 9 years old, we capture only sibling deaths that occurred before the focal child reached middle childhood. Fourth, although the prospective nature of the FFCWS data is a notable strength, given the outcome data were collected just once during adolescence, it limits our understanding of the potentially dynamic nature of depressive symptoms and their potential to worsen, improve, or persist over time. Taken together, richer sibling death data, combined with mental health data over time, would allow us to identify further heterogeneity in our results—a line of inquiry that we encourage future research to explore.

Notwithstanding these limitations, this study extends ample evidence that child death is a consequential life event for parents to highlight that it spills over laterally to shape surviving siblings', especially sisters', mental health. Future mental health research should acknowledge sibling death as a relatively prevalent phenomenon among marginalized U.S. youth and an under analyzed risk factor for adolescents that is, at least partly, a result of their parents' poor post-bereavement mental health. Given that poor mental health in adolescence is tied to adversity in later life (Copeland et al., 2015), this work attests to the need for services and interventions designed to help both grieving parents and also the often-forgotten surviving siblings in navigating bereavement.

CRediT authorship contribution statement

Emily Smith-Greenaway: Conceptualization, Formal analysis, Funding acquisition, Methodology, Project administration, Writing – original draft. **Kristin Turney:** Conceptualization, Methodology, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssmmh.2026.100673.

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