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## The Burden of Loss: Unexpected death of a loved one and psychiatric disorders across the life course in a national study

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### Abstract

**Background**—Unexpected death of a loved one is common and associated with subsequent elevations in symptoms of multiple forms of psychopathology. Determining whether this experience predicts novel onset of psychiatric disorders and whether these associations vary across the life course has important clinical implications.

**Aims**—To examine associations of a loved one's unexpected death with first onset of common anxiety, mood, and substance disorders in a population-based sample.

**Methods**—Relation between unexpected death and first onset of lifetime DSM-IV disorders estimated using a structured interview of adults in the US general population (analytic sample size=27,534). Models controlled for prior occurrence of any disorder, other traumatic event experiences, and demographics.

**Results**—Unexpected death was the most common traumatic experience and most likely to be rated as the respondent's worst, regardless of other traumatic experiences. Increased incidence after unexpected death was observed at every point across the life course for major depressive episodes, panic disorder, and post-traumatic stress disorder. Increased incidence was clustered in later adult age groups for manic episodes, phobias, alcohol disorders, and generalized anxiety disorder.

**Conclusions**—The bereavement period is associated with elevated risk for the onset of multiple psychiatric disorders, consistently across the life course and coincident with the experience of the loved one's death. Novel associations between unexpected death and onset of several disorders, including mania, confirm multiple case reports and small studies, and suggest an important emerging area for clinical research and practice.

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## Keywords

unexpected death; bereavement; PTSD; comorbidity; life-course

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## Introduction

Population-based studies in the US show that unexpected death of a loved one is the most frequently reported potentially traumatic experiences (1, 2) making mental health consequences of unexpected death an important public health concern. Loss of a close relationship through death, especially one that is unexpected (3), is a stressful life event for both children and adults that is associated with the development of psychiatric disorders (4–7). Given the central role of close relationships through the life course (8), loss of close relationships is unique among stressful experiences. Close relationships influence a wide range of physical, cognitive, and emotional processes in everyday life (9). They can contribute importantly to a sense of identity and are often intertwined in a person's self-concept, and as such, the death of a close loved one has unique psychological sequelae.

Although any death of a loved one can be emotionally devastating, unexpected deaths provoke especially strong responses, as there is less time to prepare for and adapt to the death (10–12). Throughout the lifespan, unexpected death of a loved one is associated with the development of depression and anxiety symptoms, substance use, as well as other psychiatric disorders (3, 13, 14) and heightened risk for prolonged grief reactions (15). Despite this evidence that death of a loved one is associated with common psychiatric disorders and substance use, however, the impact of unexpected death in the general population remains understudied. Central unresolved issues regarding the association between unexpected death and psychiatric morbidity include whether certain disorders are more likely than others to occur in the wake of a loved one's death, whether death has different associations with mental disorders at different points across the life course, and whether a greater number of unexpected death experiences are associated with greater psychiatric disorder episodes. Studies to date have predominately examined death occurring in discrete developmental periods, such as early (e.g., (16)) or late childhood (e.g., (6)) or older adulthood (e.g., (3, 7)), yet traumatic experiences can have differential effects across developmental periods (17). Existing studies have considered a limited set of psychiatric outcomes, and outcomes such as mania have been rarely considered in population-based studies despite numerous case reports of onset during acute bereavement (18–26). Finally, it remains unclear whether a greater number of unexpected death experiences are associated with a greater number of psychiatric disorder episodes, or whether individuals become inoculated to the adverse effects of a loved one's death after many experiences of loss. Given the high prevalence of unexpected death experiences in the population, greater knowledge of the nature, magnitude, and breadth of psychiatric outcomes is necessary.

The present study uses U.S. population-based data to examine the association of unexpected death of a loved one with onset of mood, anxiety, and alcohol use disorders. Unexpected death is ascertained in this study by self-report regarding whether someone very close to the respondent died unexpectedly, such as an accident or terrorist attack, murder, suicide, or

through an acute medical condition such as a heart attack. We examine how the association between unexpected death and onset of common psychiatric disorders varies across different stages of the life course. Finally, we examine how the experience of multiple loved ones dying unexpectedly is associated with the number of psychiatric disorder episodes experienced across the life course.

## Methods

### Sample

Data were drawn from the National Epidemiologic Survey on Alcohol and Related Conditions, a face-to-face survey of non-institutionalized adults living in households and group quarters. There were two points of data collection: 2001–2001 (N=43,093) and 2004–2005 (N=34,653) (cumulative response rate: 70.2%); we include individuals who participated in the second wave, as lifetime unexpected death, other potentially traumatic experiences, and PTSD were assessed only at the second wave. We removed individuals from analysis for whom the worst traumatic event was related to 9/11 (see below) except if a loved one died, thus the total sample for the present analysis was 27,534. Sample demographics and distributions of study variables are provided in Online Tables 1 and 2

### Measures

**Potentially traumatic experiences**—We considered exposure to unexpected death based on two questions: “Did someone very close to you ever die in a terrorist attack”, and “Not counting a terrorist attack, did someone very close to you ever die unexpectedly, for example, they were killed in an accident, murdered, committed suicide, or had a fatal heart attack?” Follow-up questions assessed the age of first exposure, the total number of exposures, and age of most recent exposure. The age of first unexpected death experience was on average 19.3 years prior to the time of the survey (SD=2.3, interquartile range 6–30). Other potentially traumatic experiences included interpersonal violence (e.g., rape, physical assault), accidents and injuries (e.g., auto accidents), network events (e.g., traumatic event to a loved one), and witnessing events (e.g., observing death or serious injury). Respondents were also asked to identify the experience that they considered to be the worst potentially traumatic experience. For the purpose of this study, respondents who endorsed any potentially traumatic experience other than unexpected death of a loved one are described as reporting “other potentially traumatic experiences.”

Other than death of a loved one during the terrorist attack on September 11, 2001 (9/11), we did not include other experiences related to 9/11 in our count of potentially traumatic experiences, as one-time large-scale traumatic experiences such as 9/11 can distort examinations of more general, ongoing traumatic experiences (27). For example, 76.5% of the sample reported indirect exposure to 9/11 (e.g., watching TV reports of the events), and 22.2% of the sample reported indirect exposure to 9/11 as their worst experience. Individuals for whom exposure to 9/11 was the worst traumatic event experienced were removed from the analysis.

**Psychiatric disorders**—The onset of nine lifetime DSM-IV mood, anxiety and alcohol use disorders was assessed by lay interviewers using the Alcohol Use Disorder and Associated Disabilities Interview, Schedule IV (28–30). Respondents who endorsed lifetime criteria for a disorder were asked to estimate age of onset of the first episode, the number of episodes, and the age of the most recent episode. Because age of each episode was not assessed, we focused on estimating risk of first episode onset by age.

Mood disorders included major depressive episode, dysthymia, and manic episodes. As per DSM-IV, major depressive episodes were diagnosed only if the respondent reported that symptoms did not occur within two months of a loved one's death. Anxiety disorders included panic disorder (with or without agoraphobia), social phobia, specific phobia, generalized anxiety disorder, and PTSD. Alcohol use disorders included DSM-IV alcohol abuse or dependence. Test-retest reliability for these diagnoses range from fair ( $\kappa=0.42$ , panic disorder) to excellent ( $\kappa=0.84$ , alcohol dependence) (28–30). These estimates are similar to other large-scale psychiatric epidemiological surveys using lay-administered instruments (31, 32).

For each disorder, among those with a diagnosis, respondents reported the age of onset of symptoms, and the number of distinct periods in which they experienced symptoms of the disorder. The average number of years between the age of the time of the survey and the age of reported onset of disorder symptoms ranged from 10.9 years (manic episodes) to 27.5 years (specific phobia). Clear instructions were given to instructed respondents to count disorder episodes that were separated by periods of improvement. A total count of the number of episodes of each disorder was created, as well as the total number of episodes of all psychiatric disorders for those with multiple disorders.

### **Socio-demographic Factors**

Socio-demographic factors included as covariates included sex, race/ethnicity (non-Hispanic White, non-Hispanic Black, non-Hispanic Asian or Pacific Islander, non-Hispanic Native American or Alaska Native, and Hispanic), marital status (never married, widowed/separated/divorced, married), personal income at the time of interview (<\$19,999, \$20–\$34,999, \$35–\$69,999, \$70,000+), and highest level of completed education (less than high school, high school, or more than high school).

### **Statistical analysis**

First, we examined the proportion of respondents who reported unexpected death of a loved one as their worst stressful experience, as a function of exposure to other potentially traumatic experiences. Second, we examined the association between timing of earliest unexpected death and first onset of each disorder. We grouped age into 5-year intervals ranging from age 5 to 69 years and 70+. We used a series of conditional logistic regressions to estimate the incidence of disorder at each five-year age interval, conditional on never having experienced the disorder at a prior age interval, as a function of exposure to the first unexpected death at the same age interval relative to those who did not experience unexpected death during that interval. Respondents for whom the age of onset of the focal psychiatric disorder was prior to first age of unexpected death were excluded from the

analysis for that disorder. Models controlled for socio-demographic variables, onset of any disorder that was not the focal outcome of that model prior to the first experience of unexpected death, and number of lifetime potentially traumatic experiences (0, 1–2, 3–4, 5+). Sensitivity analyses explored the potential for retrospective reporting biases by limiting the sample to those who experienced their first unexpected death within 10 years of the interview (removing 8,218 individuals from the analysis). Finally, we examined how multiple deaths of loved ones contributes to the number of psychiatric disorder episodes experienced across the life course. Based on preliminary analyses, we divided the number of unexpected death experiences into four categories: 0 deaths (n=13,478), 1 death (n=7,872), 2–3 deaths (n=3,936), and 4+ deaths (n=1,949). We used Poisson regression with the count of episodes as the outcome after creating a sum of all episodes across mood, anxiety and alcohol use disorders (median=4.0 episodes). All analyses were conducted using SAS-callable SUDAAN software.

## Results

### Experiences of unexpected death, other potentially traumatic events, and lifetime prevalence of psychiatric disorders

Respondent demographics are included in Online Table 1. A total of 50.3% of respondents reported ever experiencing the unexpected death of a loved one (see Online Table 2). Exposure to other potentially traumatic experiences ranged from 16.5% with no reported exposure to 15.7% with exposure to five or more events. The most common lifetime psychiatric disorder was alcohol use disorders (35.9%) and major depressive episode (23.7%), with mean age of onset 28.6 and 32.8 years, respectively. Lifetime prevalence estimates of psychiatric disorders are higher than in previous reports (e.g., (33)), due to removal of individuals for whom the worst potentially traumatic experience was related to 9/11.

### Worst experience: unexpected death compared to other potentially traumatic experiences

The proportion of individuals who report unexpected death as their worst experience across levels of total lifetime experiences is shown in Table 1. Among those with at least four potentially traumatic experiences, more than 30% reported that unexpected death of a loved one was the worst event that they experienced. Among those with at least 5 and upwards of at least 11 potentially traumatic experiences, more than 20% reported unexpected death of a loved one as worst. A higher proportion reported unexpected death as their worst experience than for any other traumatic experience assessed in the survey, at every level of exposure (data not shown, available upon request).

### Incidence of mood, anxiety and alcohol use disorders in the context of unexpected death

Table 2 shows the conditional adjusted odds of disorder onset at each age, comparing those experiencing their first unexpected death experience at that age to those who did not experience unexpected death at that age. Incidence proportions and sample sizes that form the basis of comparison for each age group and each disorder are given in Online Table 3.

As shown in Table 2, unexpected death was associated with increased odds of each mood and alcohol use disorder examined in at least one age group, with significant associations tending to cluster in older age groups. Increased odds of major depressive episodes were observed in 12 of 14 age groups, dysthymia in 6 age groups, manic episodes in 5 age groups, and alcohol disorders in the six age groups occurring after age 45.

Table 3 shows associations between age of first unexpected death experience and onset of anxiety disorders. Of the 14 age groups tested, odds of disorder onset was heightened in all 14 age groups for PTSD, 13 age groups for panic disorder, 7 age groups for generalized anxiety disorder (all after age 40), 5 age groups for specific phobia (all after age 40), and age groups for social phobia.

To assess the role of reporting bias in these associations, we conducted a sensitivity analysis by removing 8,218 individuals who reported their first unexpected death experience more than 10 years before the time of the survey. Results are shown in Online Table 4. We could not estimate incidence for age 5–9, though for other age groups, results were robust and stronger associations were often observed compared with the results from the total sample.

### **Age-of-onset distributions for each disorder by age of first unexpected death experience**

In the online supplementary figures, we show the proportion of respondents with a given psychiatric disorder onset at each age interval separately for respondents with no unexpected death experiences and for those with an experience at that same age interval. That is, among those who had a lifetime diagnosis of PTSD (eFigure 1), for example, we show the proportion with onset at age 5–9, 10–14, 15–19, etc., among those with the first unexpected death of a loved one at age 5–9. We then show the distribution of onset by age among those with an unexpected death at age 10–14, and then the distribution among those with an unexpected death at age 15–19, continuing through age 70+. We also show the distribution among those with no unexpected death experience. We show these age-of-onset distributions for dysthymia (efigure 2), depressive episode (efigure 3), manic episodes (efigure 4), panic disorder (efigure 5), generalized anxiety disorder (efigure 6), alcohol disorders (efigure 7), social phobia (efigure 8), and specific phobia (efigure 9). For most disorders, a marked increase was observed in onset frequency in the time period during which the unexpected death occurred, with the exception of social and specific phobia for which little association with unexpected death was observed.

### **Associations between number of unexpected death experiences and number of episodes of psychiatric disorders**

Table 4 shows the associations between number of unexpected deaths and number of episodes of each psychiatric disorder as well as total number of psychiatric disorder episodes across all disorders. Increasing exposure to unexpected death was associated with a monotonic increase in number of total psychiatric disorder episodes. Compared to those with no unexpected deaths, individuals with 1, 2–3, and 4+ deaths had 1.18 (95% C.I. 1.09–1.72), 1.25 (95% C.I. 1.12–1.41), and 1.72 (95% C.I. 1.44–2.04) times the number of total psychiatric disorder episodes, based on a Poisson distribution. When examined separately

for each disorder, increases in episode frequency were particularly notable for major depression and PTSD episodes (see Table 4).

## Discussion

Unexpected death of a loved one is most frequently cited as the most severe potentially traumatic experience in one's life, even among individuals with a high burden of lifetime stressful experiences. Unexpected death is associated with heightened vulnerability for onset of virtually all commonly occurring psychiatric disorders that we assessed. This heightened incidence risk is observable from childhood through late adulthood for major depression, PTSD, and panic disorder, and is particularly concentrated in older age groups for manic episodes, phobias, and alcohol use disorders. However, it is also notable that the majority of individuals in the present study did not have the onset of any disorder in the wake of unexpected death of a loved one.

There are several pathways through which experiencing a loved one's death may influence psychiatric disorders. Bereavement is a major life stressor, and stressful life experiences in general are associated with later onset of many physical and mental disorders (34–36). A variety of cognitive, affective, and neurobiological mechanisms linking stress exposure to the onset of mental disorders have been identified (37) and work in this area in relation to death of a loved one is ongoing (11). There may also be mechanisms associated specifically with the consequences of bereavement, given that attachment relationships play a critical role in human experience (9). Available evidence indicates that lack of social support is an important predictor of depression (38); sudden loss of social support may thus engender increased psychiatric sequelae. Further, evidence indicates that bereavement following hospitalization of a loved one in an Intensive Care Unit has significant effects on a wide range of psychological and biological measures (39). Loss of a romantic partner regularly engenders separation distress, with yearning and longing for the loved one, disruption of self concept (e.g. (40)) and these could potentially trigger the onset of a mood or anxiety disorder. Among children, in particular, the death of an attachment figure can have important maladaptive consequences (41). Sudden death of a loved one might therefore have consequences specific to attachment loss as well as those explainable by stress mechanisms. Death is the most obviously permanent and extreme form of loss, and sudden death is one of the more difficult forms of bereavement. It remains to be seen whether and how other types of loss, e.g. abandonment, incarceration, separation, deportation, might be similar or different from the response to sudden death. Moreover, several important time-varying constructs such as attachment loss, disruption of sense of self, loss of social support and stress reactivity likely interact to impact mental health and well-being; future research could be enhanced by explanatory models to guide us in understanding and testing intersecting associations among these important relationship-centered experiences.

We observed heightened risk for onset of a range of mood, anxiety and alcohol use disorders after the unexpected death of a loved one all along the life course. Previous research in children (6), widows (7), survivors of disasters (42), and older adults (43) suggests that the risk of depression and PTSD is elevated following the death of a loved one. However, the association between unexpected death and a range of psychiatric disorders across the life

course has not previously been examined using population-based data. We found robust and pervasive associations between unexpected death and other mood and anxiety disorders as well as alcohol use disorders, with many of these associations clustered among those in older age groups. First incidence of a psychiatric disorder is relatively rare in old age compared with younger ages; these data indicate that psychiatric disorder onset in older age is commonly concomitant with the death of a loved one. The underlying developmental mechanisms that underlie this clustering of risk at older ages are an important area for future research. However, we note that unexpected death was associated consistently with elevated odds of new onsets of PTSD, panic disorder, and depressive episodes at all stages of the life course. It is particularly notable that these pervasive associations between unexpected death and onset of specific disorders are maintained even after adjustment for psychiatric comorbidity.

The present study also provides novel data supporting an association between unexpected death and onset of manic episodes in a general population sample across the life course. An increase in risk of manic episodes after death of a loved one has been suggested by a number of case reports (18–26), and a study based on the Danish psychiatric register found that suicide of a mother or sibling was strongly associated with increased risk for mania/mixed episodes (44). Our results suggest that unexpected death of a loved one may be a substantial risk factor for the onset of a manic episode, especially among older adults, and even among those with no prior history of mood, anxiety, or alcohol disorders. The observation of mania in response to traumatic events has been discussed in the literature for over a century (45), yet the specific mechanisms for this association remains unclear. Our findings should alert clinicians to the possible onset of mania after an unexpected death in otherwise healthy individuals.

We further document that the number of lifetime episodes of mood, anxiety, alcohol disorders increases as the number of unexpected deaths experiences increases. This suggests that prior unexpected death experiences do not offer protection from mental health problems following a later unexpected death experience; rather, each unexpected death experience is associated with similar elevations in risk for novel onsets of mood, anxiety, and alcohol disorder episodes (46).

We note several limitations to the present study that should be addressed in future research. Grief symptoms (47) were not assessed in the National Epidemiologic Survey on Alcohol and Related Conditions. A loved one's death typically evokes a recognizable grief reaction, characterized by yearning and longing, intense sorrow and emotional pain, preoccupation with thoughts and memories of the deceased, a sense of disconnection from ongoing life, and disturbance of self concept and sense of self (8, 47). Grief can resemble major depression and PTSD (48), and it is now clear that some bereaved individuals develop aberrant grief reactions (43). Further, we did not have information on the nature of the relationship between the respondent and the deceased loved one or the circumstances of the death. Grief intensity, frequency and duration as well as ensuing psychiatry morbidity might vary depending on the relationship to the deceased (49). For example, among children, death of a parent is especially difficult (50), and among adults, death of a child or a spouse is especially difficult (3). Therefore, it is possible that these specific types of close



relationships account for the increased in risk observed in these data. Further, the assessment did not distinguish between violent and non-violent unexpected death. According to DSM-5, only unexpected violent death of a loved one can be coded as an inciting potential trauma. It is possible that violent death accounts for the relations we found between unexpected death and PTSD or other disorders. However, the literature indicates that PTSD symptoms do occur following nonviolent death (4). Future studies with information regarding between violent and non-violent death will be helpful in understanding these relations further; for example future research might contrast psychiatric sequelae after unexpected versus anticipated death to determine the extent to which the suddenness of a loved one's death impacts psychiatric disorders. The description of a death as 'unexpected,' is a subjective judgment and we do not have information about reliability or validity of this judgment. However, a subjective judgment is commonly used in studies of unexpected death. The age of both unexpected death and onset of psychiatric disorder is retrospectively reported, which introduces reporting biases. However, analyses restricted to those who reported a first unexpected death experience within 10 years of the interview showed similar or slightly stronger results than among the whole sample, mitigating against reporting bias as an explanation for our findings. Finally, diagnoses were not confirmed by clinicians and were assessed with lay interviewers using structured questionnaires.

The diagnosis of PTSD in this data also deserves comment. Two issues are noteworthy. First, the National Epidemiologic Survey on Alcohol and Related Conditions followed DSM-IV and permitted unexpected death to qualify as a potential traumatic event. DSM-5 requires that the death be directly witnessed or both violent and unexpected, thus some cases identified here may not meet DSM-5 criteria. However, this has been a controversial issue in the field and we believe it is useful to know the prevalence of PTSD diagnoses after unexpected death more generally. The second issue is that not all respondents had a lifetime occurrence of an event that qualified as a potential trauma. A large majority of the sample (80%) did experience a potential trauma, though this was not consistent across different age groups. Therefore, our estimates of the association between unexpected death of a loved one and the development of PTSD include individuals who were not at risk for PTSD. However, the estimates we report in the present paper are overall population-average estimates of PTSD risk following unexpected death, thus of clinical interest.

In summary, we found a significant relationship between the onset of a mood, anxiety and alcohol use disorder and the unexpected death of a loved one. These results suggest bereavement may be a useful lens in examining the etiology of psychiatric illness. Clinically, our results highlight the importance of considering a possible role for loss of close personal relationships through death in assessment of psychiatric disorders, especially among older adults without a prior history of mental disorder. Clinicians should query the loss of key relationships through death over the patient's life course, and especially around the period of onset of symptoms. It may be important to address the patient's response to death of a loved one in order to optimize treatment outcome and reduce the likelihood of illness recurrence.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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**Table 1**

Proportion of respondents reporting unexpected death of a loved one as the worst potentially traumatic experience in their lifetime

	Number of lifetime potentially traumatic experiences	N	Proportion who identify unexpected death as the worst potentially traumatic experience
			% (SE)
Total number of potentially traumatic experiences	>1	21,937	30.7 (0.4)
	>2	17,327	31.5 (0.4)
	>3	12,330	31.7 (0.5)
	>4	8,350	30.1 (0.5)
	>5	5,427	28.2 (0.6)
	>6	3,450	26.3 (0.7)
	>7	2,196	24.2 (0.9)
	>8	1,342	23.3 (1.0)
	>9	825	22.6 (1.4)
	>10	467	22.1 (1.7)
	>11	276	21.6 (2.3)

**Table 2**

Association between age of first unexpected death of a loved one and onset of major depressive episode, dysthymia, manic episode, and alcohol disorder compared with those who did not experience unexpected death of a loved one (N=27,534).

Age of first unexpected death experience	N (total <sup>***</sup> )	Major depression (N=7,881)		Dysthymia (N=2,051)		Manic episode (N=1,855)		Alcohol disorder (N=11,197)	
		OR*	(95% C.I.)	OR*	(95% C.I.)	OR*	(95% C.I.)	OR*	(95% C.I.)
5-9	750	3.56	(1.54-8.23)	2.84	(0.59-13.58)	1.22	(0.48-3.11)	1.81	(0.73-4.53)
10-14	1,397	1.62	(1.05-2.52)	0.91	(0.35-2.34)	0.93	(0.60-1.45)	0.93	(0.77-1.13)
15-19	2,164	1.24	(0.94-1.63)	0.77	(0.41-1.46)	0.94	(0.56-1.56)	1.11	(0.86-1.44)
20-24	1,685	1.47	(1.12-1.93)	1.37	(0.72-2.59)	0.69	(0.36-1.32)	1.3	(0.90-1.88)
25-29	1,426	1.5	(1.10-2.03)	2.41	(1.17-4.94)	1.08	(0.50-2.35)	0.93	(0.60-1.44)
30-34	1,297	1.53	(1.13-2.06)	1.91	(1.04-3.51)	2.14	(1.19-3.83)	1.27	(0.86-1.87)
35-39	1,145	2.25	(1.61-3.16)	1.31	(0.59-2.91)	2.08	(1.05-4.13)	1.36	(0.90-2.05)
40-44	1,033	1.43	(0.97-2.11)	1.24	(0.61-2.54)	2.65	(1.32-5.31)	1.12	(0.66-1.90)
45-49	787	4.33	(3.03-6.17)	3.78	(1.74-8.22)	2.01	(0.85-4.79)	3.01	(1.80-5.03)
50-54	620	2.94	(1.86-4.65)	4.67	(2.33-9.34)	5.71	(1.85-17.56)	2.68	(1.03-6.99)
55-59	440	5.77	(3.31-10.06)	4.07	(1.63-10.17)	1.99	(0.24-16.21)	4.94	(2.07-11.81)
60-64	313	7.45	(3.93-14.12)	6.77	(2.24-20.53)	--	--	7.89	(2.62-23.80)
65-69	201	10.66	(4.42-25.70)	--	--	4.71	(0.89-24.94)	3.14	(1.25-7.92)
70+	324	2.47	(1.26-4.82)	2.14	(0.37-12.34)	5.66	(1.12-28.54)	3.23	(2.02-5.16)

Unexpected death occurrence at age compared to no lifetime unexpected death experience\* :

\* There were 294 missing responses on age of first unexpected death experience

\*\* Each regression model includes a different denominator, as each model assesses the association between age of unexpected death and onset of the focal psychiatric disorder among those with no onset at a prior age. All individuals with onset of a psychiatric disorder prior to the age of unexpected death are also removed from the analysis. Dashed lines indicate that sample size was not sufficient to estimate a robust association.

\*\*\* Models were controlled for sex, age, race/ethnicity, income, education, marital status, number of lifetime potentially traumatic experiences, and onset of a psychiatric disorder prior to the focal disorder.

**Table 3**

Association between age of first unexpected death of a loved one and onset of generalized anxiety disorder, PTSD, social phobia, specific phobia, and panic disorder compared with those who did not experience unexpected death of a loved one (N=27,534).

Age of first unexpected death experience	N (total)*	GAD (N=2,646)		PTSD (N=3,423)		Social Phobia (N=2,332)		Specific phobia (N=5,197)		Panic disorder	
		OR*	(95% C.I.)	OR*	(95% C.I.)	OR*	(95% C.I.)	OR*	(95% C.I.)	OR*	(95% C.I.)
5-9	750	2.57	(0.89-7.42)	4.50	(3.38-6.00)	0.96	(0.60-1.54)	0.76	(0.58-1.01)	3.64	(1.56-8.50)
10-14	1397	0.65	(0.20-2.04)	4.04	(3.18-5.12)	0.95	(0.71-1.27)	0.83	(0.63-1.09)	2.08	(1.08-4.02)
15-19	2,164	0.71	(0.38-1.33)	4.36	(3.48-5.49)	0.80	(0.59-1.09)	1.15	(0.89-1.49)	1.57	(1.10-2.24)
20-24	1,685	1.24	(0.73-2.13)	8.60	(6.74-10.98)	0.92	(0.49-1.72)	0.88	(0.56-1.37)	1.62	(1.15-2.28)
25-29	1,426	1.41	(0.78-2.53)	7.38	(5.69-9.59)	1.51	(0.67-3.39)	1.46	(0.88-2.16)	1.65	(1.11-2.44)
30-34	1,297	1.27	(0.75-2.17)	8.07	(5.81-11.21)	0.90	(0.35-2.33)	1.40	(0.87-2.23)	1.88	(1.27-2.78)
35-39	1,145	1.53	(0.94-2.48)	11.08	(8.09-15.19)	1.02	(0.39-2.72)	1.12	(0.69-1.82)	2.42	(1.58-3.72)
40-44	1033	2.02	(1.15-3.56)	9.36	(6.40-13.70)	1.80	(0.79-4.09)	1.87	(1.12-3.12)	1.22	(0.72-2.06)
45-49	787	2.01	(1.18-3.41)	12.47	(8.37-18.58)	2.72	(1.29-5.78)	2.49	(1.57-3.96)	3.03	(1.82-5.03)
50-54	620	2.25	(1.26-4.02)	20.08	(12.38-32.58)	3.50	(1.53-7.89)	2.50	(1.31-4.76)	2.00	(1.05-3.79)
55-59	440	2.82	(1.45-5.46)	31.36	(17.42-56.45)	--	--	2.29	(0.98-5.35)	6.17	(2.49-15.26)
60-64	313	6.18	(2.47-15.49)	37.24	(16.22-85.54)	--	--	8.41	(3.18-22.28)	3.68	(1.12-12.10)
65-69	201	9.65	(3.81-24.46)	11.35	(5.52-23.35)	--	--	4.78	(2.48-9.20)	--	--
70+	324	3.58	(1.77-7.28)	13.61	(6.45-28.70)	--	--	--	--	5.42	(2.14-13.74)

\* There were 294 missing responses on age of first unexpected death experience

\*\* Each regression model includes a different denominator, as each model assesses the association between age of unexpected death and onset of the focal psychiatric disorder among those with no onset at a prior age. All individuals with onset of a psychiatric disorder prior to the age of unexpected death are also removed from the analysis. Dashed lines indicate that sample size was not sufficient to estimate a robust association.

\*\*\* Models were controlled for sex, age, race/ethnicity, income, education, marital status, number of lifetime potentially traumatic experiences, and onset of a psychiatric disorder prior to the focal disorder.

**Table 4**  
 Association between number of unexpected deaths of loved ones and number of episodes of psychiatric disorders (N=27,534).

	N	All measured psychiatric disorders			Major depressive episode		Dysthymia		Manic episodes	
		Median number of episodes	IDR* (95% C.I.)	IDR* (95% C.I.)	IDR* (95% C.I.)	IDR* (95% C.I.)	IDR* (95% C.I.)	IDR* (95% C.I.)	IDR* (95% C.I.)	
Number of unexpected losses*	4+	6	1.72 (1.44, 2.04)	1.52 (1.16, 1.99)	1.08 (0.89, 1.32)	1.34 (0.91, 1.98)				
	2-3	5	1.25 (1.12, 1.41)	1.22 (0.97, 1.52)	1.04 (0.86, 1.27)	1.05 (0.70, 1.57)				
	1	5	1.18 (1.09, 1.27)	1.01 (0.88, 1.16)	0.93 (0.81, 1.07)	1.05 (0.79, 1.40)				
	0	4	1	1	1	1				
		<b>GAD</b>	<b>Social phobia</b>	<b>Specific phobia</b>	<b>PTSD</b>	<b>Alcohol disorders</b>				
		IDR* (95% C.I.)	IDR* (95% C.I.)	IDR* (95% C.I.)	IDR* (95% C.I.)	IDR* (95% C.I.)				
Number of unexpected losses*	4+	1.42 (0.72, 2.78)	1.03 (0.69, 1.54)	0.89 (0.63, 1.25)	1.39 (1.09, 1.78)	1.11 (0.93, 1.33)				
	2-3	0.89 (0.67, 1.18)	1.22 (0.89, 1.67)	0.83 (0.63, 1.10)	1.1 (0.88, 1.37)	0.95 (0.84, 1.07)				
	1	1.04 (0.80, 1.34)	1.06 (0.80, 1.39)	0.92 (0.70, 1.21)	1.02 (0.85, 1.22)	0.99 (0.88, 1.11)				
	0	1	1	1	1	1				

\* IDR= Incidence density ratio from Poisson regression. Models controlled for age, sex, race/ethnicity, marital status, income, education, number of lifetime potentially traumatic experiences, and each psychiatric disorder that was not the focal psychiatric disorder of the model

\* There were 119 missing responses on number of unexpected deaths