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Traumatic event exposure and depression severity over time: results from a prospective cohort study in an urban area

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Abstract

Purpose—A substantial proportion of adults experience traumatic events each year, yet little is known about the effects of different types of traumatic events on depression severity over time. We prospectively assessed the effects of traumatic event exposure during a 1-year period on changes in depression severity during that period among a representative sample of adults living in Detroit, Michigan in the United States.

Methods—We used data from 1,054 participants in the first two waves of the Detroit Neighborhood Health Study (2008–2010). Depression severity was measured with the Patient Health Questionnaire-9 (PHQ-9). Negative binomial regression was used to estimate the effect of

traumatic event exposure on depression severity at Wave 2, adjusting for Wave 1 PHQ-9 score and potential confounders.

Results—The mean depression severity score at Wave 2 among those exposed to at least one traumatic event during follow-up was 1.71 times higher than among those with no traumatic event exposure [95 % confidence interval (CI) 1.27–2.29]. Also positively associated with depression severity at Wave 2 (vs. no traumatic events) were assaultive violence (mean ratio 2.49, 95 % CI 1.41–4.38), injuries and other directly experienced shocking events (mean ratio 2.59, 95 % CI 1.62–3.82), and three or more traumatic events (mean ratio 2.58, 95 % CI 1.62–4.09).

Conclusions—Violence, injuries, and other directly experienced traumatic events increase depression severity and may be useful targets for interventions to alleviate the burden of depression in urban areas.

Keywords

Depression; Traumatic events; Stressful events; Violence; Injuries

Introduction

Traumatic events are extreme occurrences that are “outside the range of usual human experience” [1], including the “direct personal experience of an event that involves actual or threatened death or serious injury, or other threat to one’s physical integrity,” as well as witnessing such an event or learning that such an event happened to a close friend or relative [2]. Despite their extreme nature, traumatic events are commonly experienced in US populations, with estimates of lifetime exposure to at least one traumatic event ranging from 39 % among 21–30 year-olds [3] to 51–69 % in US and regional adult samples [4–6] to 89 % among adults in the Detroit metropolitan area [7]. Although typically studied in relation to acute stress and posttraumatic stress disorders, traumatic experiences may also prompt depressive reactions [8]. In particular, the unpredictable and uncontrollable nature of traumatic events may lead to feelings of fear and loss of control and, subsequently, the helplessness and hopelessness that often mark the descent into depression [8–10]. With lifetime and past-year prevalence estimates of 3.0–16.2 and 1.7–8.6 %, respectively, depression affects a substantial proportion of the US population [11–14] and is a leading cause of disability and impaired functioning [15–17].

Although numerous studies have found high levels of depression resulting from specific traumatic events, including childhood physical and sexual abuse [18], natural and humanmade disasters [19–22], and exposure to combat and ongoing terrorism [23–26], most studies of traumatic events and depression suffer from a major limitation: Because of the unpredictable nature of exposure to traumatic events, data collection begins after the exposure occurs, with no pre-trauma measures of depression available [27–31]. Since individuals with a history of mental health problems are more vulnerable to experiencing traumatic events [28, 32–34], pre-existing psychological symptoms may at least partly explain observed higher levels of depression prevalence and severity among those exposed to traumatic events [35]. The relatively small number of studies that have used pre-trauma measures of mental health when assessing changes in depressive symptoms after

prospectively measured traumatic event exposure have largely been restricted to specific subgroups, like first responders [30, 36], or have focused only on isolated traumatic experiences, like exposure to a natural disaster [37–43] or violent victimization [35, 44]. Thus, these studies do not allow consideration of the differential effects of different types of traumatic events on changes in depression severity, or the effects of multiple versus single traumatic events in general population samples, despite increasing interest in isolating the effects of different types of events [45] and investigating the cumulative effects of trauma [23, 46–51].

The objective of this study was to examine the effects of traumatic events during a 1-year period on changes in depression severity during that same period, including the effects of different types and numbers of traumatic events, in a community-based sample in an urban area in the US. We investigated these questions using data from the first two waves of the Detroit Neighborhood Health Study (DNHS), which allowed prospective assessment of traumatic events during a 1-year period and measurement of change in depression severity relative to pre-trauma measures of depression.

Methods

Study population

Eligible DNHS participants were 18 years of age or older and were living in the city of Detroit, Michigan, at the time of the baseline interview. Information on the selection of study participants has been published previously [52, 53]. The study was approved by the Institutional Review Board of the University of Michigan, and oral informed consent was obtained from participants. Baseline (Wave 1) telephone interviews were conducted between September 9, 2008 and February 3, 2009 with 1,547 participants; 1,054 of these (68.1 %) completed a follow-up interview (Wave 2) approximately 1 year later, between September 21, 2009 and April 12, 2010. Analyses were restricted to the 1,054 individuals who completed both interviews.

Measures

Depressive symptoms—Depressive symptoms were assessed using the Patient Health Questionnaire-9 (PHQ-9) [54–56], which includes nine items corresponding to the nine DSM-IV-TR criteria for major depressive disorder [2]. During the Wave 1 interview, study participants were asked whether there was ever a 2-week period in their lifetime in which they were bothered by each of these nine symptoms (e.g., “Little interest or pleasure in doing things”, “Feeling tired or having little energy”). If so, they were asked how often in that 2-week period they were bothered by each of the symptoms (1 = several days; 2 = more than half the days; 3 = nearly every day) and whether that occurred in the past 30 days. At the Wave 2 interview, the PHQ-9 was repeated with symptoms assessed for a 2-week period since the last interview and in the past 30 days. The total PHQ-9 score in the past 30 days at Waves 1 and 2 was calculated by summing respondent frequency ratings of the nine items (coded 0–3) for a total score ranging from 0 to 27. The PHQ-9 score indicates depression severity, with scores of 0–4 reflecting minimal or no depression, scores of 5–9 reflecting mild depression, 10–14 moderate, 15–19 moderately severe, and 20–27 severe depression

[54]. Cron-bach's alpha for the past month PHQ-9 score was 0.87 at Wave 1 and 0.85 at Wave 2 in the study sample. The PHQ-9 has been extensively validated [54, 57], including in general population and diverse samples [58, 59] and via telephone administration [60]. Furthermore, changes in the PHQ-9 total score have been shown to reflect changes in depression diagnostic status [61].

Traumatic events—Information about 19 potentially traumatic events experienced by participants in their lifetime was obtained during the Wave 1 interview using a subset of DSM-IV Criterion A traumatic events that has been used in prior research in the Detroit metropolitan area [62]. These events can be grouped into four broad categories, following the example of Breslau and colleagues [62]: (1) “assaultive violence” events are characterized by intentional violence towards the respondent by a perpetrator (e.g., rape or other sexual assault, being shot or stabbed); (2) “other injuries or shocking experiences” are encountered directly by the respondent but involve an external threat like nature, illness, or injury (e.g., serious motor vehicle accident, natural disaster) or witnessing violence directed at someone else; (3) “learning of traumatic events to close friends or relatives” (e.g., learning that a close friend or relative was seriously physically attacked) was added as a qualifying traumatic event in the DSM-IV [63] and is distinguished from events that were experienced directly by participants; and (4) the “sudden, unexpected death of a close friend or relative”, which tends to be quite common and is thus considered separately [7, 62].

During the Wave 2 interview, respondents were asked whether any of these traumatic events had occurred since the last interview and three measures of interest were calculated to fully examine the association between traumatic event exposure and changes in depression severity. First, we created a dichotomous variable indicating whether any of the events had occurred. Second, we created a five-category nominal variable identifying the type of traumatic event that occurred, using the four categories described above and a fifth category for no traumatic events during the follow-up period. Individuals who reported events of more than one type were assigned to the category deemed to be most severe (with assaultive violence considered most severe, and sudden death of someone close considered least severe). This is similar to categorizations used in other studies, which distinguish between those who have experienced traumatic loss only, non-interpersonal events only, and interpersonal violence [45, 64–66]. Third, the number of distinct events reported (e.g., rape, motor vehicle accident, natural disaster) was calculated and grouped into four categories (0, 1, 2, and 3 or more).

Potential confounders—Potential confounders of the relation between traumatic event exposure and depressive symptoms include sociodemographic characteristics [4, 5, 14, 16, 62, 67, 68], prior traumatic events and stressors [18, 29, 46, 50, 66, 69–75], heavy alcohol use [76–79], and social support [50, 80–85]. During the Wave 1 interview, information was obtained on the gender, age, marital status, race/ethnicity, educational attainment, and household income of study participants, as well as the occurrence of nine non-traumatic stressors in their lifetime. These stressors were modified from previous studies [86, 87], and included a divorce or “break up” with a significant other, losing one’s job, and serious financial problems. Alcohol consumption in the month prior to the Wave 1 interview was

also assessed, including participant's reports of the usual number of drinks they had on the days that they drank. Heavy alcohol use was defined as 5 or more drinks for men or 4 or more drinks for women per drinking day [88]. Social support in the 12 months prior to the Wave 1 interview was assessed with three items from the Postdeployment Social Support Scale [89] evaluating the emotional and material support available from friends and relatives (i.e., "Among my friends or relatives, there is someone who makes me feel better when I am feeling down"; "Among my friends or relatives, there is someone I go to when I need good advice"; "My friends or relatives would lend me money if I needed it"). Participants with total social support scores in the bottom third of the sample were categorized as having low social support.

Statistical analyses

First, we compared the baseline characteristics of the analysis sample ($n = 1,054$ who participated in both Waves 1 and 2) to the full baseline sample ($n = 1,547$). Second, we calculated the percentage that reported experiencing each of the 19 traumatic events between Waves 1 and 2. Third, we conducted bivariable Chi-square tests of the associations between potential confounders and each of the three measures of traumatic events during the follow-up period (i.e., any event, type of event, and number of events). Fourth, we used negative binomial regression to estimate associations between traumatic events during the follow-up period and changes in depression severity. The outcome of these models was the total PHQ-9 score in the past month at Wave 2; controlling for the total PHQ-9 score in the past month at Wave 1 allowed us to examine associations with change in depression severity. The PHQ-9 score at Wave 2 was skewed right, with a mean of 3.44 but a median of 0 (indeed, approximately 50 % of the scores were zero) and a variance greater than the mean (i.e., overdispersion); hence, negative binomial regression models were used [90, 91], as in prior studies of symptom scores including the PHQ-9 [26, 42, 92, 93]. The exponentiated regression coefficients from the fitted negative binomial models can be interpreted as the ratio of the mean PHQ-9 score among those in one category of the predictor versus the reference category (for a categorical predictor), or the ratio of the mean PHQ-9 score among those separated by one unit of a continuous predictor. We use the term "mean ratio" to refer to these estimates hereafter.

All analyses were weighted to account for unequal probabilities of selection into the study across participants, by number and types of telephone numbers and number of adults in households. Post-stratification weights were also incorporated to ensure comparability between the study sample and the population of the city of Detroit according to the 2005–2007 American Community Survey [94]. Attrition weights were also developed using the inverse probability of censoring method [95] to account for differences between respondents who participated in the Wave 2 interview and the full baseline sample. Attrition weights were defined as the inverse of the probability of participating in the follow-up interview, predicted in a logistic regression equation from baseline characteristics. This method allocates greater weight to individuals with characteristics associated with loss to follow-up; the weighted results then reflect what would have been observed if the lost individuals had been included, assuming there are no unmeasured or unspecified variables that predict loss to follow-up in this study population [96]. Finally, we created five imputed datasets using the

Sequential Regression Imputation method implemented in IVEware [97, 98] to account for missing household income information for 118 participants (11.2 %). All analyses were conducted in Stata (Version 12, Stata Corporation, College Station, TX, USA), appropriately accounting for the weights, the complex sampling design, and the multiple imputation.

Results

After applying sampling, post-stratification, and attrition weights, the Wave 2 sample was similar to the full baseline sample on socio-demographic characteristics, lifetime traumatic events, stressors, heavy alcohol use, and social support, and lifetime and past month depression severity at Wave 1 (Table 1). The majority of participants were African American (86.7 %) and reported household income under \$35,000 in the year prior to the baseline interview (61.1 %).

Exposure to traumatic events in the roughly one-year period between the Wave 1 and Wave 2 interviews was common, with more than half of the sample (54.3 %) reporting at least one traumatic event (Table 2). The sudden, unexpected death of a close friend or relative was most frequently reported (38.1 %), followed by learning of traumatic events to close friends or relatives (19.4 %), other injuries or shocking experiences (17.7 %, including 6.7 % who reported witnessing someone being killed or seriously injured), and assaultive violence events (7.3 %, including 4.8 % who reported being mugged or threatened with a weapon). Overall, 33.4 % of adult Detroit residents experienced one traumatic event during the follow-up period, 11.1 % experienced two events, and 9.8 % experienced three or more events.

Table 3 shows unadjusted associations between demographic characteristics, socioeconomic status, lifetime traumatic events and stressors, heavy alcohol use, social support, and depression severity at baseline with three measures of traumatic events during the one-year period between Waves 1 and 2. Larger percentages of individuals with a history of traumatic events and stressors experienced a traumatic event during follow-up (e.g., 66.6 % of those with seven or more prior traumatic events vs. 38.2 % of those with no prior history of traumatic events). Younger individuals were more likely than older individuals to fall victim to assaultive violence events (16.8 % of 18–24 year olds vs. 1.3 % of those 65 years or older), as were never married individuals (11.5 vs. 3.2 % of married individuals). Individuals with the highest education level and those in the highest income category were less likely than those with less education and income to experience most types of trauma (e.g., 1.5 % of those with household income of \$50,000 or more reported assaultive violence vs. 11.9 % of those with less than \$15,000 income). Larger proportions of those with a prior history of more traumatic events and stressors experienced three or more traumatic events during follow-up (e.g., 20.0 % for those with seven or more prior traumatic events vs. 0.9 % among those with no prior history of trauma). Finally, more individuals with moderate to severe depression at baseline reported three or more traumatic events during follow-up (23.1 vs. 8.2 % of those with only minimal or mild depression).

The mean depression severity score in the past month was 2.82 [standard error (SE) 0.27] at Wave 1 and 3.44 (SE 0.27) at Wave 2. Experiencing a traumatic event during the follow-up

period was positively associated with depression severity at Wave 2 in negative binomial regression models adjusting only for the Wave 1 depression severity score [mean ratio 2.12, 95 % confidence interval (CI) 1.54–2.91] as well as for potential confounders (mean ratio 1.71, 95 % CI 1.27–2.29) (Table 4, Models 1 and 2). Individuals reporting assaultive violence (mean ratio 2.49, 95 % CI 1.41–4.38) as well as those reporting other injuries and shocking events (mean ratio 2.49, 95 % CI 1.62–3.82) exhibited increased depression severity, when compared to those with no traumatic event exposure during follow-up (Table 4, Model 3). Participants reporting two (mean ratio 2.26, 95 % CI 1.36–3.74) and three or more traumatic events during follow-up (mean ratio 2.58, 95 % CI 1.62–4.09) also demonstrated increased depression severity compared to those with no traumatic event exposure (Table 4, Model 4). Other predictors of depression severity included female gender, prior history of four or more traumatic events, and low levels of social support at baseline (results not shown).

Discussion

Using a measure of pre-trauma depression severity and a general population sample from an urban area, we found positive associations between traumatic event exposure during a 1-year follow-up period and increased depression severity, controlling for potential confounders. Increases in depression severity were highest for those who reported assaultive violence events such as sexual assault and being threatened with a weapon and for those who reported injuries and other directly experienced shocking events like a serious accident or witnessed violence. The number of traumatic events experienced during follow-up was also positively associated with depression severity.

Study participants reported high levels of exposure to traumatic events during the 1-year follow-up period, with more than half experiencing at least one event. Few studies have reported the incidence of traumatic events during a specific period, but available estimates of 6–21 % of study samples experiencing a traumatic event in a 1-year period [4, 99] suggest that traumatic event exposure was unusually high in our study population. This high incidence was driven largely by the sudden, unexpected death of a close friend or relative, reported by over one-third of our study sample. Other studies reporting a lower percentage of “tragic death” (4.9 %) have restricted such deaths to those from an accident, homicide, or suicide [4]. Reports of assaultive violence in the past year were also higher in the present study (7.3 % of the sample) than in previous reports (e.g., 2.8–4.8 %) [4, 100]. Thus, the higher incidence of traumatic events in this study may reflect both the assessment of a broader range of experiences compared to other studies, as well as high levels of exposure to violence (personally, as witnesses, and occurring to loved ones) in Detroit, which have been documented in other studies as well [52, 62].

Correlates of exposure to traumatic events during the 1-year follow-up period were consistent with other studies, as men, younger adults, non-married individuals, and those of lower socioeconomic status were more likely to report experiencing assaultive violence and multiple traumatic events [4, 99–101]. Strong associations between a prior history of traumatic events and the occurrence of new traumatic events during the follow-up period were also observed, consistent with prior work [99, 102, 103]. A history of non-traumatic

stressors and moderate to severe depression was also associated with traumatic events during follow-up, as in prior studies [34, 75, 104, 105].

Although our finding of an association between traumatic event exposure and increased depression severity seems intuitive and logical, only a small number of prior prospective studies have investigated the influence of traumatic events on changes in depression status or severity, with somewhat conflicting results. For example, new experiences of violence, including physical or sexual assault or witnessed violence, during a 2-year follow-up period were not associated with past-year major depression in the National Women's Study when controlling for baseline major depression, demographic characteristics, and lifetime exposure to violence (although new exposure to violence was associated with increases in PTSD and substance use problems) [44, 100]. Similarly, exposure to life-threatening events during a 1-year follow-up period was not associated with depressive symptoms among police officers [36]. Most prospective studies of mental health after natural and humanmade disasters have found associations between greater exposure to the disaster and increased depressive symptoms [37–41, 106], although a few have found little or no association [43, 107]. Our study advances this prior work by including a broader range of traumatic experiences beyond violence and disasters and a general population sample to demonstrate a clear association between incident traumatic events and changes in depression severity. Levels of comorbidity between PTSD and depression were more moderate in our study population than have been observed in other studies (17.6 % of individuals with probable depression at Wave 2 also met criteria for probable PTSD, compared to comorbidity estimates as high as 40 % in other studies) [108]. The association between traumatic event exposure and increases in depression severity and the presence of these exclusive cases of depression together reinforce the importance of assessing depressive symptoms in addition to PTSD symptoms after traumatic event exposure to more fully capture individuals who may be suffering adverse consequences and in need of intervention.

The assessment of a broad range of traumatic events in this study also allowed us to compare the effects of different types of trauma on increases in depression severity. Most prior studies have focused on lifetime exposure to traumatic events in relation to lifetime mental health problems, with assaultive violence events consistently linked to the highest prevalence of PTSD and depression [4, 5, 45, 62, 64, 65, 109–111]. Our study extends these findings to show that assaultive violence and other injuries are associated with greater increases in depression severity over a 1-year period when compared to those with no trauma exposure, while those who experienced traumatic events only indirectly (i.e., learning of traumas to others, sudden death of a loved one) experienced increases in depression severity that were more similar to those with no trauma exposure. These results suggest that a focus on assaultive versus non-assaultive traumatic events [45, 66] may obscure the effects of directly experienced events other than interpersonal violence; traumatic events may be more usefully categorized as direct, personal experiences versus learning about a traumatic experience or the sudden death of a loved one. The increased depression severity associated with injuries is particularly salient since previous studies have indicated that survivors of traumatic physical injuries are not always reached by psychological interventions [112, 113].

Finally, our finding of a strong positive relation between the number of incident traumatic events during a 1-year follow-up period and change in depression severity corroborates prior evidence of dose-response relations between the number of lifetime traumatic events and depression [23, 46–51] as well as between more general measures of stressful life events and increased depression [114]. These results highlight the central importance of cumulative trauma as a risk factor for increased mental health problems, suggesting that traumatic events should not be considered in isolation.

Several limitations of this study should be considered when interpreting the results. First, about 30 % of the Wave 1 DNHS participants did not complete the Wave 2 interview. Baseline participants lost to follow-up were younger, less educated, more likely to be unemployed, and unmarried [53]. Attrition weights based on the inverse probability of censoring [95] were calculated to address these differences, but this method may not fully control for bias due to selective attrition. Second, we did not obtain information on the exact timing of traumatic events or onset of depressive symptoms during the follow-up period. Using a measure of depression severity focused on the 30 days prior to the Wave 2 interview ensured that the vast majority of traumatic events experienced by the study population during the 1-year follow-up period would likely have occurred prior to the time for which depression was assessed, but not necessarily prior to the change in depression between waves. Additionally, since the onset of depression usually occurs shortly after traumatic event exposure [115], with some resolution after several months [108], we may be failing to capture increases in depression severity in response to traumatic events that occurred at the start of the follow-up period which have resolved by the time of the depression assessment. Third, we did not collect information on the number of times a specific traumatic event occurred in the participant's lifetime or during the follow-up period, potentially leading to misclassification of the number of events experienced by study participants. Fourth, the recall and reporting of traumatic events may have been influenced by the participant's level of depressive symptoms at the time of the interviews [116]. However, the traumatic events assessed in this study are objective events of serious magnitude; therefore, reporting of such events is less likely to be influenced by changing perceptions of past experiences influenced by current depressive symptoms [117]. Fifth, we did not collect information on other potential confounders of the relation between traumatic event exposure and depression, including traumatic brain injury and substance abuse beyond heavy alcohol use [118, 119]. Finally, this work was conducted with adult residents of Detroit, who were primarily African American, of relatively low socioeconomic status, and with high levels of traumatic event exposure. The city of Detroit has sustained major social and economic changes over the past several decades that may have uniquely influenced residents' experiences and outlooks [120, 121]; therefore, these results may not be generalizable to other populations in other areas.

Despite these limitations, this study demonstrates a clear association between traumatic event exposure and increased depression severity, using a prospective design including pre-trauma measures of depression among a representative sample of an urban population exposed to high levels of traumatic events. The use of a broad assessment of different types of traumatic events highlighted the influence of directly experienced events and multiple events on increased depression severity over a 1-year period, suggesting that individuals

with these trauma histories should be targeted for interventions aimed at alleviating depression.

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Table 1

Characteristics of the study population at Wave 1, Detroit Neighborhood Health Study (2008–2010)

	<u>Included in Wave 1 sample</u>		<u>Included in both Waves 1 and 2</u>	
	<i>n</i>	Weighted %	<i>n</i>	Weighted %
Total	1,547		1,054	
Demographic characteristics				
Sex				
Male	650	46.0	426	47.2
Female	897	54.0	628	52.8
Race				
White or other race	241	13.8	169	13.3
African American	1,306	86.2	885	86.7
Age (years)				
18–24	132	19.8	56	19.3
25–34	143	12.5	78	12.5
35–44	261	14.7	164	14.8
45–54	355	23.8	247	24.1
55–64	349	15.8	263	15.7
65	307	13.3	246	13.5
Marital status				
Married	406	28.8	280	28.8
Divorced, separated, or widowed	550	26.4	414	26.2
Never been married	591	44.9	360	44.9
Socioeconomic status				
Education				
<High school	201	15.4	133	15.2
High school or equivalent	490	43.3	301	42.9
Some college	521	26.5	370	26.8
College degree or graduate work	335	14.7	250	15.0
Household income in past year				
<\$15,000	515	34.2	335	33.7
\$15,000–\$34,999	416	26.9	294	27.4
\$35,000–\$49,999	225	16.2	157	17.5
\$50,000	391	22.7	268	21.4
Lifetime traumatic events and stressors				
Number of lifetime traumatic events				
0	193	13.6	117	13.0
1–3	518	31.7	370	33.0
4–6	411	26.0	289	25.6
7 or more	425	28.7	278	28.4
Number of lifetime stressors				
0	252	17.8	166	17.2

	<u>Included in Wave 1 sample</u>		<u>Included in both Waves 1 and 2</u>	
	<i>n</i>	Weighted %	<i>n</i>	Weighted %
1–2	392	23.2	276	24.0
3–5	532	35.3	351	33.3
6 or more	371	23.7	261	25.4
Alcohol consumption at Wave 1				
Heavy alcohol use in past month				
No	1,445	92.6	999	94.1
Yes	102	7.4	55	5.9
Social support at Wave 1				
Low social support in past 12 months				
No	1,095	71.7	748	72.1
Yes	452	28.3	306	27.9
Depression severity at Wave 1				
PHQ-9 score, lifetime (mean, SE)	4.96 (0.24)		4.98 (0.31)	
Depression severity, lifetime ^a				
Minimal	922	62.7	623	61.1
Mild	278	15.6	189	17.3
Moderate	169	10.7	120	10.9
Moderately severe	100	7.2	73	6.8
Severe	59	3.7	39	3.9
PHQ-9 score, past month (mean, SE)	2.84 (0.21)		2.82 (0.27)	
Depression severity, past month ^a				
Minimal	1,206	78.4	831	78.9
Mild	170	10.5	112	10.2
Moderate	77	5.3	55	5.2
Moderately severe	50	3.3	34	3.0
Severe	28	2.6	14	2.7

^aDepression severity was measured with the Patient Health Questionnaire-9 (PHQ-9). A total PHQ-9 score of 0–4 indicates minimal depression during the time period of interest, whereas a score of 5–9 indicates mild depression, 10–14 moderate, 15–19 moderately severe, and 20–27 severe depression

Table 2
Percentage reporting traumatic events between Waves 1 and 2 ($n = 1,054$ included in both waves)

	<i>n</i>	Weighted %	Standard error of weighted %
Assaultive violence	58	7.3	1.5
Military combat or exposure to war	6	0.7	0.4
Raped	2	0.1	0.04
Other kind of sexual assault or unwanted sexual contact	12	1.5	0.7
Shot or stabbed	2	0.3	0.3
Held captive, tortured, or kidnapped	1	0.04	0.04
Mugged, held up, or threatened with a weapon	37	4.8	1.2
Badly beaten up	12	1.3	0.6
Other injury or shocking experience	178	17.7	2.0
Serious car or motor vehicle crash	26	3.4	1.1
Any other kind of serious accident or injury	34	4.1	1.0
Fire, flood, earthquake, or other natural disaster	15	1.3	0.5
Diagnosed with a life-threatening illness or had a serious operation	53	3.5	0.7
Child of yours diagnosed with a life-threatening illness	22	1.1	0.3
Witnessed someone being killed or seriously injured	54	6.7	1.4
Unexpectedly discovered a dead body	21	1.5	0.5
Learning of traumas to others	185	19.4	2.1
Learned that a close friend or relative was raped or sexually assaulted	56	6.8	1.4
Learned that a close friend or relative was seriously physically attacked	90	8.8	1.4
Learned that a close friend or relative was seriously injured in a motor vehicle crash	76	7.5	1.3
Learned that a close friend or relative was seriously injured in any other accident	44	5.2	1.2
Sudden, unexpected death of a close friend or relative	394	38.1	2.5
Any traumatic event	539	54.3	2.5
Number of traumatic events (mean, SE)	0.97 (0.07)		
0	515	45.7	2.5
1	320	33.4	2.4
2	124	11.1	1.6
3 or more	95	9.8	1.5

Table 3

Bivariable associations between demographics, socioeconomic status, lifetime traumatic events and stressors, social support, and depression severity at Wave 1 and traumatic events between Waves 1 and 2 ($n = 1,054$)

	Any traumatic event		Type of traumatic event				Number of traumatic events			
	Any traumatic event ($n = 539$)	p value ^a	No trauma ($n = 515$)	Sudden death of someone close ($n = 217$)	Learned of trauma to someone close ($n = 115$)	Other injury or shocking event ($n = 149$)	Assaultive violence ($n = 58$)	1 event ($n = 320$)	2 events ($n = 124$)	3 or more events ($n = 95$)
	%		%	%	%	%	%	%	%	%
Total	54.3		45.7	22.8	10.0	14.3	7.3	33.4	11.1	9.8
Depression severity, past month at Wave 1										
Minimal/mild	52.9	0.088	47.1	22.7	10.5	13.3	6.4	33.6	11.1	8.2
Moderate/moderately severe/severe	65.9		34.1	22.7	6.0	22.5	14.7	31.5	11.4	23.1
Demographic characteristics										
Sex										
Male	54.5	0.954	45.5	19.3	9.3	15.3	10.6	29.8	13.1	11.7
Female	54.2		45.8	25.9	10.6	13.4	4.4	36.7	9.3	8.1
Race										
White or other race	49.3	0.453	50.7	20.1	7.4	18.7	3.0	30.0	9.4	9.9
African American	55.1		44.9	23.3	10.3	13.6	8.0	34.0	11.3	9.8
Age (years)										
18–24	62.4	0.076	37.6	27.5	10.3	7.8	16.8	39.0	12.9	10.6
25–34	48.3		51.7	11.8	13.1	15.1	8.4	24.1	10.3	14.0
35–44	48.9		51.1	16.5	14.9	13.8	3.8	30.4	9.5	9.0
45–54	61.0		39.0	26.0	9.6	19.0	6.3	34.7	15.0	11.2
55–64	54.5		45.5	26.3	8.3	15.2	4.8	36.4	8.9	9.2
65	42.1		57.9	23.3	3.7	13.8	1.3	31.7	6.7	3.8
Marital status										
Married	50.2	0.454	49.8	20.5	7.1	19.3	3.2	29.7	10.0	10.5
Divorced, separated, or widowed	53.8		46.2	27.4	9.2	12.6	4.6	36.8	10.3	6.8

	Any traumatic event		Type of traumatic event				Number of traumatic events			
	Any traumatic event (n = 539)	p value ^a	No trauma (n = 515)	Sudden death of someone close (n = 217)	Learned of trauma to someone close (n = 115)	Other injury or shocking event (n = 149)	Assaultive violence (n = 58)	1 event (n = 320)	2 events (n = 124)	3 or more events (n = 95)
	%		%	%	%	%	%	%	%	p value ^a
Never been married	57.3		42.7	21.6	12.2	12.1	11.5	33.9	12.3	11.1
Socioeconomic status										
Education										
<High school	48.8	0.148	51.2	23.3	6.4	15.0	4.1	29.2	8.2	11.4
High school/ equivalent	55.2		44.8	22.1	6.5	16.6	10.0	31.9	14.6	8.7
Some college	61.1		38.9	26.7	14.2	12.3	7.9	39.2	9.2	12.7
College degree/ graduate work	45.1		54.9	17.2	15.9	10.4	1.6	31.8	7.2	6.1
Household income in past year										
<\$15,000	56.7	0.667	43.3	27.4	6.1	11.4	11.9	37.9	6.0	12.9
\$15,000–\$34,999	57.2		42.8	17.9	12.7	17.8	8.8	27.2	17.7	12.3
\$35,000–\$49,999	48.5		51.5	19.8	7.9	17.5	3.3	31.8	13.7	3.0
\$50,000	51.6		48.4	24.2	14.2	11.7	1.5	35.8	8.6	7.2
Lifetime traumatic events and stressors										
Number of lifetime traumatic events										
0	38.2	0.005	61.8	25.9	1.2	4.6	6.5	34.2	3.1	0.9
1–3	50.4		49.6	26.9	8.4	13.4	1.7	37.7	8.4	4.3
4–6	52.3		47.7	19.3	12.5	8.8	11.7	30.2	13.5	8.6
7 or more	66.6		33.4	20.2	13.0	23.7	9.7	31.5	15.1	20.0
Number of lifetime stressors										
0	43.2	0.003	56.8	24.9	6.5	5.8	6.0	33.4	7.6	2.3
1–2	45.7		54.3	23.1	9.8	11.1	1.8	33.6	8.5	3.6
3–5	55.4		44.6	22.7	9.8	14.7	8.1	32.9	11.9	10.6
6 or more	68.6		31.4	21.2	12.7	22.5	12.3	34.0	14.9	19.7
Alcohol consumption at Wave 1										
Heavy alcohol use in past month										

Any traumatic event		Type of traumatic event				Number of traumatic events			
Any traumatic event (<i>n</i> = 539)		No trauma (<i>n</i> = 515)	Sudden death of someone close (<i>n</i> = 217)	Learned of trauma to someone close (<i>n</i> = 115)	Other injury or shocking event (<i>n</i> = 149)	Assaultive violence (<i>n</i> = 58)	1 event (<i>n</i> = 320)	2 events (<i>n</i> = 124)	3 or more events (<i>n</i> = 95)
%	<i>p</i> value ^a	%	%	%	%	%	%	%	%
No	53.8	46.2	23.0	10.0	13.3	7.5	33.7	11.0	9.2
Yes	62.2	37.8	18.6	9.3	29.8	4.5	29.4	13.6	19.2
Social support at Wave 1									
Low social support in past 12 months									
No	53.4	46.6	23.9	9.2	13.4	6.9	34.7	10.4	8.2
Yes	56.8	43.2	19.9	11.9	16.6	8.3	30.0	12.8	13.9

^a *p* values from two-tailed Chi-square tests

Table 4

Adjusted effects (mean ratio and 95 % confidence interval) of traumatic events between Waves 1 and 2 on past month depression severity (PHQ-9) score at Wave 2: results of negative binomial regression analyses ($n = 1,054$)

	Model 1: adjusted only for Wave 1 depression severity score ^a		Adjusted Model 2: including any traumatic event ^b		Adjusted Model 3: including type of traumatic event ^b		Adjusted Model 4: including number of traumatic events ^b	
	Mean ratio ^c	95 % CI	Mean ratio ^c	95 % CI	Mean ratio ^c	95 % CI	Mean ratio ^c	95 % CI
Traumatic events between Waves 1 and 2								
Any traumatic event								
No	1	Ref	1	Ref	–	–	–	–
Yes	2.12	1.54–2.91	1.71	1.27–2.29	–	–	–	–
Type of traumatic event								
No traumatic events	1	Ref	–	–	1	Ref	–	–
Sudden death of someone close	1.55	1.01–2.38	–	–	1.13	0.77–1.66	–	–
Learned of trauma to someone close	1.49	0.92–2.39	–	–	1.46	0.90–2.38	–	–
Other injury or shocking event	2.91	1.90–4.47	–	–	2.49	1.62–3.82	–	–
Assaultive violence	3.17	1.78–5.65	–	–	2.49	1.41–4.38	–	–
Number of traumatic events								
0 traumatic events	1	Ref	–	–	–	–	1	Ref
1 traumatic event	1.67	1.14–2.46	–	–	–	–	1.30	0.92–1.84
2 traumatic events	2.62	1.55–4.42	–	–	–	–	2.26	1.36–3.74
3 or more traumatic events	3.05	2.03–4.58	–	–	–	–	2.58	1.62–4.09

^aSeparate models adjusting only for past month Wave 1 PHQ-9 score

^bAdjusted for past month Wave 1 PHQ-9 score, sex, race, age, marital status, education, household income, number of lifetime traumatic events, number of lifetime stressors, heavy alcohol use in the past month at baseline, and low social support in the past 12 months at baseline

^cRatio of the mean past month Wave 2 PHQ-9 score in the category of interest compared to the reference category. Mean ratios are calculated by exponentiating the regression coefficients from negative binomial models