

# Post-traumatic Stress Disorder and Depression Among Older Adults After a Disaster: The Role of Ongoing Trauma and Stressors

*Melissa Tracy  
Sandro Galea*

There have been few studies that have explored the factors that may determine the risk of psychopathology among older adults after a disaster. Most studies have focused on age-group comparisons and have shown that older adults are at lower risk of adverse mental health consequences, when compared to younger age groups, after both natural and human-made disasters (Norris, et al. 2002). However, poor mental health among older adults may influence several other facets of well-being, including the trajectory of ongoing physical health problems, disruption of care-seeking behavior, and changes in social functioning. Therefore, greater understanding of the risk factors for psychopathology among older adults after disasters and the contribution of these risk factors to the longitudinal course of psychopathology is critical to the development of effective interventions that may mitigate the consequences of disasters among the elderly. To help guide our understanding of the consequences of disasters among older adults we analyzed data from a study of residents in the New York City (NYC) metropolitan area after the September 11, 2001 terrorist attacks in order to document the prevalence of post-traumatic stress disorder (PTSD) and depression in different age groups, and, importantly, to explore the characteristics and circumstances associated with the longitudinal course of PTSD and depression in the years after the attacks among adults aged 55 and older. In this article we present our findings and discuss their implications for protecting the mental health of older adults after disasters. These data may be helpful in planning the public health response to future disasters.

We conducted a telephone survey of residents of the NYC metropolitan area between March 25 and June 25, 2002. The study was designed to document population mental health in the aftermath of the September 11, 2001 terrorist attacks. All non-institutionalized adults (age 18 or older) living in the NYC metropolitan area were eligible for inclusion in the study. Adults living in lower Manhattan, near the World Trade Center site, were over-sampled, as demonstrated in Figure 1, which shows where survey respondents who were 55 years of age or older were living on September 11, 2001. More details on sample selection are available elsewhere (Galea, et al. 2003). Interviews were conducted in English, Spanish, Mandarin and Cantonese by trained interviewers using a computer-assisted telephone interview system. Contact information was obtained for respondents, their key family members, and other important contacts. At 6, 18, and 30 months after baseline, we conducted follow-up interviews, again using telephone surveying (September 25, 2002 – January 31, 2003; September 25, 2003 – February 24, 2004; December 15, 2004 – November 30, 2005, respectively); we were successful in contacting and completing at least one follow-up interview on 83% of baseline respondents. This work was reviewed and approved by the Institutional Review

Board of the New York Academy of Medicine.

For the purposes of this analysis we focused on PTSD and depression as indicators of mental health among older adults. We determined PTSD based on the presence of at least one re-experiencing symptom (e.g., intrusive memories, distressing dreams), at least three avoidance symptoms (e.g., efforts to avoid thoughts associated with a traumatic experience, loss of interest in significant activities), and at least two arousal symptoms (e.g., difficulty falling asleep or concentrating); symptoms were not required to be related to the September 11<sup>th</sup> attacks. To meet the criteria for probable depression, respondents had to report five or more depressive symptoms, one of which included depressed mood or loss of pleasure or interest, for a period of at least two weeks. After each of the three follow-up interviews, respondents were classified as to their probable PTSD and depression status for the time since the previous interview (i.e., between the baseline and first follow-up interviews, between the first and second follow-up interviews, and between the second and third follow-up interviews).

Information on demographic characteristics including age, gender, race/ethnicity, education, marital status, and household income was obtained from respondents during the baseline interview. Age was

divided into three groups [18-34 years, 35-54 years, and  $\geq 55$  (55+) years] for the analysis. We assessed *social support* by asking about emotional support (e.g., “having someone to love you and make you feel wanted”), instrumental support (e.g., “someone to help you if you were confined to bed”), and appraisal support (e.g., “someone to give you good advice in a crisis”) in the six months prior to the September 11 attacks, summing responses and dividing the resulting social support score into thirds (low, medium, high) for the analysis. Respondents were also asked about the occurrence of any of nine *traumatic events* (natural disaster, serious accident, being attacked with a weapon, being attacked without a weapon, unwanted sexual contact, serious injury, situations leading to fear of death or serious injury, seeing someone seriously injured or violently killed, any other extraordinarily stressful situation or event) in their lifetime (before the baseline interview) and in the time period between each interview. Additionally, respondents were asked about the occurrence of eight *life stressors* (death of spouse or mate, divorce or separation from mate, death of close family member other than spouse, serious injury or illness, marriage, family problems with spouse or child, problems at work, loss of job) in their lifetime and in the time period between each interview. The numbers of traumatic events and stressors were categorized according to whether respondents experienced zero, one, or two or more. Finally, at each follow-up interview, respondents were asked to report the number of days in the past thirty days during which their physical health was not good; responses were categorized as less than a week (0-6 days) or one week or more (7 or more days) for the analysis.

This analysis was restricted to survey respondents who participated in at least one of the three follow-up interviews, for a total sample size of 2,282 respondents.

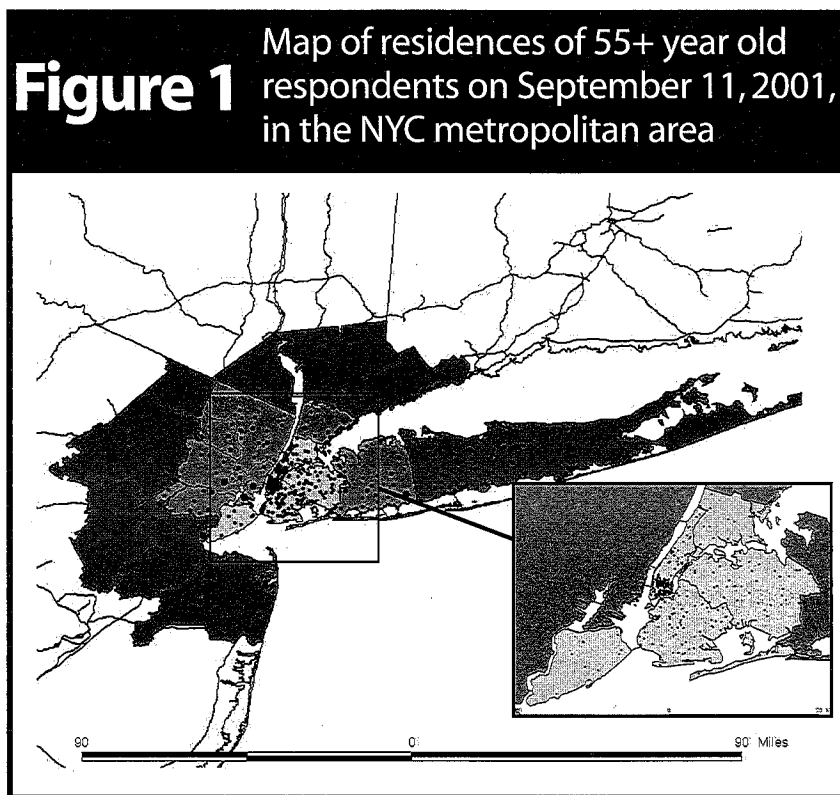
We calculated the cumulative prevalence of probable PTSD and depression in the three age groups using data from all follow-up interviews. Generalized estimating equations (GEE) were used to assess bivariate relations between respondent characteristics and probable PTSD and depression among individuals aged 55 years and older, accounting for repeated measures on individuals who participated in more than one follow-up interview. Multivariable GEE models were also constructed to determine the factors that remained associated with probable PTSD and depression among older respondents when simultaneously adjusting

for all respondent characteristics found to be statistically significant ( $p$ -value  $< 0.05$ ) in bivariate analyses.

We found that older adults had the lowest cumulative prevalence of probable PTSD, with the youngest age group experiencing the highest prevalence (15.0% among 18-34 year olds, 13.8% among 35-54 year olds, and 12.2% among 55+ year olds). Similarly, older adults had the lowest prevalence of probable depression, with the middle age

group experiencing the highest depression prevalence (12.9% among 18-34 year olds, 14.3% among 35-54 year olds, and 10.6% among 55+ year olds). However, these age differences were not statistically significant ( $p=0.493$  for PTSD,  $p=0.178$  for depression).

In bivariate analyses assessing the factors associated with probable PTSD among adults aged 55 and older, traumatic events and life stressors emerged as significant predictors. The cumulative prevalence of probable PTSD increased with increasing number of traumatic events and stressors in this age group (although the association between the number of traumatic events that occurred in the respondent’s lifetime prior to the baseline interview and probable PTSD was not statistically significant ( $p=0.177$ )). In a multivariable model, after adjustment for other characteristics associated with PTSD in bivariate



analysis, the number of ongoing traumatic events that occurred during the study period was no longer significantly associated with probable PTSD ( $p=0.101$ ). However, both lifetime stressors ( $p=0.002$ ) and ongoing stressors that occurred during the study period ( $p=0.013$ ) remained statistically significant in predicting probable PTSD. Education ( $p=0.009$ ) and prior history of PTSD ( $p<0.001$ ) were also significant predictors of probable PTSD among respondents aged 55 years and older.

Regarding predictors of depression, as discussed above for probable PTSD, the cumulative prevalence of probable depression increased with increasing number of traumatic events and life stressors reported; again, these relations were statistically significant for all but lifetime traumatic events occurring before the baseline interview ( $p=0.658$ ). However, in multivariable models simultaneously adjusting for traumatic events, life stressors, health status, and socio-demographic characteristics, stressors were no longer significantly associated with probable depression ( $p=0.065$  for lifetime stressors;  $p=0.299$  for ongoing stressors). Only ongoing traumatic events ( $p=0.025$ ), poor physical health ( $p<0.001$ ) and prior history of depression ( $p=0.001$ ) remained significantly associated with probable depression among survey respondents aged 55 years or older.

Our analysis showed that adults aged 55 years or older in the NYC metropolitan area had a lower cumulative prevalence of probable PTSD and depression than other age groups after the September 11 terrorist attacks, with the 18-34 year olds experiencing the highest prevalence of PTSD, and 35-54 year olds experiencing the highest prevalence of depression. These findings are consistent with previous studies that have found the middle-aged or the youngest to be at highest risk of adverse mental health outcomes after exposure to disaster (Norris et al., 2002), but they differ from one study that found no difference in mental health outcomes by age in a national sample of adults in Israel exposed to nineteen months of ongoing terrorism after the Al-Aqsa Intifada in September 2000 (Bleich et al., 2005). It has been suggested that the prior experiences of older adults may contribute to their reduced risk of psychopathology after a disaster, mediated in part by higher levels of preparedness (Norris et al., 2002) or improved coping skills (Kohn et al., 2005) gained from past experiences. Middle-aged individuals have been found to be at higher risk for psychopathology, as was demonstrated for depression in our sample, in part because of greater chronic stress in this age group (e.g., from care-giving roles) (Norris et al., 2002).

A history of stressors, as well as ongoing stressors, was a significant predictor of probable PTSD among older adults throughout the study period, up to 30 months after the events of September 11, 2001. The impact of life stressors has been noted in previous studies assessing risk of psychopathology in all age groups combined (Norris et al., 2002; Galea et al., 2005). For example, life stressors predicted symptoms of psychological distress among adults six and 30 months after Hurricane Andrew (Norris et al., 1999), but our results highlight the importance of life stressors for the risk of PTSD among older adults after a human-made disaster. Although many stressful life events (e.g., death of a spouse) cannot be anticipated or prevented, targeting older individuals who are experiencing ongoing stressful life circumstances (e.g., economic hardship) for receipt of additional support may be important to mitigate the effects of disasters on psychopathology among the elderly.

Traumatic events had a substantial impact on depression among older adults in this sample. Most studies of trauma and psychopathology after disasters have focused on exposure to the disaster or terrorist act itself or have assessed the role of traumatic events experienced prior to the disaster in determining post-disaster mental health risk. For example, a study of Asian and Middle Eastern immigrants two years after the Oklahoma City bombing found that prior traumatic experiences were significantly related to bombing-related PTSD symptoms, highlighting the effects of "re-traumatization" (Trautman et al., 2002). However, our findings suggest that, among older adults, traumatic events in the time after a disaster also substantially influence the course of mental health. Again, although these traumatic events cannot often be prevented through any systematic intervention, individuals experiencing traumatic events may be at particular risk for adverse mental health outcomes and should be provided with additional support.

A prior history of psychopathology was a strong risk factor for PTSD and depression among older adults in our sample. This relation has been demonstrated consistently in numerous studies after disasters (Galea et al., 2005), including one recent study of adults 60 years of age and older in Honduras after Hurricane Mitch (Kohn et al., 2005). These findings suggest that particular attention should be given to individuals with prior psychiatric symptoms when planning post-disaster mental health interventions.

There are several important considerations to keep in mind when interpreting the above findings. We used lay-administered telephone interviews to identify cases of probable PTSD and depression

among residents of the NYC metropolitan area after the September 11 terrorist attacks; these “probable” cases may not have received a full diagnosis of PTSD or depression in clinician-administered in-person interviews, and thus our results are not strictly comparable to findings from studies using clinician diagnoses of psychopathology. Furthermore, this study was conducted among residents living in a large metropolitan area influenced by a large-scale terrorist attack and, as such, our findings with regard to the determinants of PTSD and depression among older adults may not be generalizable to other settings or to natural disasters.

Notwithstanding these limitations, this analysis shows that although older adults may be at lower risk for adverse mental health consequences of disasters than younger age groups, ongoing stressful life circumstances and traumatic events may increase the risk of psychopathology among older adults after disasters. These findings suggest that, in the aftermath of a mass disaster, public health strategies aimed at mitigating the consequences of these events among older adults should particularly target efforts on older adults who are experiencing other ongoing life traumas and stressors.

*Melissa Tracy, MPH, is a Research Analyst in the Department of Epidemiology at the University of Michigan School of Public Health. Sandro Galea, MD, DrPH, is an Associate Professor of Epidemiology at the University of Michigan School of Public Health.*

### References

- Bleich, A., Gelkopf, M., Melamed, Y., and Z. Solomon. (2005). “Emotional impact of exposure to terrorism among young-old and old-old Israeli citizens.” *American Journal of Geriatric Psychiatry*, 13, 705-712.
- Galea, S., Nandi, A., and D. Vlahov. (2005). “The epidemiology of post-traumatic stress disorder after disasters.” *Epidemiologic Reviews*, 27, 78-91.
- Galea, S., Vlahov, D., Resnick, H., Ahern, J., Susser, E., Gold, J., Bucuvalas, M., and D. Kilpatrick. (2003). “Trends of probable post-traumatic stress disorder in New York City after the September 11 terrorist attacks.” *American Journal of Epidemiology*, 158, 514-524.
- R. Tamashiro. (2005). “Prevalence, risk factors and aging vulnerability for psychopathology following a natural disaster in a developing country.” *International Journal of Geriatric Psychiatry*, 20, 835-841.
- Norris, F.H., Friedman, M.J., Watson, P.J., Byrne, C.M., Diaz, E., and K. Kaniasty. (2002). “60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981-2001.” *Psychiatry*, 65, 207-239.
- Norris, F.H., Perilla, J., Riad, J., Kaniasty, K., and E. Lavizzo. (1999). “Stability and change in stress, resources, and psychological distress following natural disaster: Findings from Hurricane Andrew.” *Anxiety, Stress, and Coping*, 12, 363-396.
- Trautman, R., Tucker, P., Pfefferbaum, B., Lensgraf, S.J., Doughty, D.E., Buksh, A., and P.D. Miller. (2002). “Effects of prior trauma and age on posttraumatic stress symptoms in Asian and Middle Eastern immigrants after terrorism in the community.” *Community Mental Health Journal*, 38, 459-474.
- Kohn, R., Levav, I., Garcia, I.D., Machuca, M.E., and