Psychological Responses to the Sniper Attacks
Washington DC Area, October 2002

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Background: This study assessed the psychological and behavioral responses of residents of the Washington DC metropolitan area to the October 2002 sniper shootings, as well as the association between measures of exposure to the shootings and elevated traumatic stress symptoms.

Methods: Random-digit-dial telephone survey of 1205 adults living in Washington DC and two surrounding counties during the shootings, conducted May 2003. Main outcome measures included self-reports regarding traumatic stress symptoms, perceptions of safety, behavioral responses, and exposures to incidents.

Results: Forty-five percent of residents reported going to public spaces such as parks and shopping centers less than usual, and 5.5% reported missing at least 1 day of work because of the sniper attacks. Women who reported living within 5 miles of any shooting incident were significantly more likely to report elevated traumatic stress symptoms—consistent with a probable diagnosis of post-traumatic stress disorder—than women who reported living farther from incidents (odds ratio=4.2, 95% confidence interval=1.9–9.3). Among men, there was no significant association between reported residential proximity and elevated traumatic stress symptoms.

Conclusions: These results suggest the substantial behavioral and psychological impact that traumatic events such as these sniper shootings can have on communities. They support the importance of clinicians and community leaders addressing psychological functioning in the setting of such events that threaten a population. The results further suggest that women who report residing closest to such incidents are at greatest risk for experiencing elevated symptoms of traumatic stress, and perhaps warrant special attention.
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Introduction

From October 2 through October 24, 2002, 14 sniper shootings occurred in Washington DC, Maryland, and Virginia. Thirteen individuals were shot during this shooting spree, with ten fatally wounded. Nine of the 14 shootings were concentrated within a roughly 10-mile radius area in Washington DC and two neighboring Maryland counties. These attacks caused widespread fear among people for their own safety and for the safety of their families. Numerous studies have indicated that exposure to mass trauma is associated with a high prevalence of psychiatric morbidity[1–3] and can have a profound impact not only on those directly injured but also among those indirectly exposed.[4–9] Among survivors of the Oklahoma City bombing, one study reported a prevalence of post-traumatic stress disorder (PTSD) among individuals directly exposed to the bomb blast at 34.3%.[10] Higher severity of exposure, female gender, and pre-disaster psychiatric disorders were associated with increased prevalence of psychiatric sequelae.[10] In a study among Manhattan residents following the September 11 terrorist attacks, prevalence of symptoms consistent with PTSD was reported at 7.5% for the overall study population and 20.0% for those living closest to the attacks.[11] A national survey following these attacks found prevalence of probable PTSD at 11.2% for the New York City metropolitan area.[12] Direct exposure to the terrorist attacks, younger age, and female gender were associated with elevated traumatic stress symptom levels.[12]

The sniper attacks differed from these community traumas in the prolonged and intermittent nature of their occurrence. The shootings continued for approximately 3 weeks and took place across a densely popu-

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lated metropolitan area, evoking a heightened and sustained sense of vulnerability. The objectives of this study were to describe the range and prevalence of specific behavioral and psychological responses to these attacks among individuals in Washington DC and two neighboring Maryland counties.

Methods

Data Collection

A cross-sectional survey was conducted through random-digit-dial telephone interviews from May 2 to May 31, 2003. Survey data were collected from a random sample ($n=1205$) of adult residents living in Washington DC and Montgomery County and Prince Georges County, Maryland, during any portion of the period when the sniper shootings occurred. Interviewers from a survey firm who were trained in administering health-related surveys conducted computer-assisted telephone interviews in English. All households that had a listed mailing address associated with their telephone number (25.4% of valid records) were mailed a letter informing them of the survey several days before the beginning of interviewer calls. The response rate for the survey was 56.4%.[13]

The survey collected data on participants' responses to the sniper attacks, including behavioral responses, PTSD-spectrum symptoms, and perceptions of risk. The survey also collected data on demographic characteristics of respondents and their self-reported exposures to the incidents.

Primary Outcome

For assessing PTSD-spectrum symptoms, a seven-item screening instrument based on Breslau's short screening scale for PTSD was utilized.[14] A score of four or more (i.e., reporting four or more symptoms) on this seven-item screening scale has been evaluated to best capture positive cases of lifetime PTSD (sensitivity 80%, specificity 97%).[14] For the analysis presented in this paper, results from Breslau's short screening scale were collapsed into a dichotomous (yes/no) variable for elevated traumatic stress symptoms.

Measures of Exposure

For measures of exposure, four dichotomous proximity exposure variables were created: residential exposure, work exposure, exposure while performing one's daily routines, and exposure on the day of the shootings. For each of these four settings, respondents were asked to report whether any of the shootings occurred within 5 miles; >5 but within 10 miles; or >10 miles from that setting (e.g., from their residence). For analysis purposes, self-reported proximity measures were collapsed into levels of within 5 miles and >5 miles.

Potential Confounders

Potential confounders were chosen based on the broader PTSD literature. These potential confounders included demographic variables of gender, age group, race/ethnicity, marital status, education level, mental health history, and having known someone injured/killed in the shootings. In addition, to evaluate the possible impact of the advance mailing, a dichotomous study design variable was included to indicate whether a respondent had read the mailing.

Statistical Analysis

Chi-square tests were conducted to assess the relationship between the primary outcome variable (elevated traumatic stress symptoms) and each of the various measures of self-reported proximity to the sniper attacks (the exposure variables). Logistic regression modeling was conducted to determine the robustness of associations that were significant in bivariable analysis. Initial models included measures of exposure, demographic variables, and other potential confounders as described above, along with all two-way interactions between each of these variables and the exposure. The final model was derived by removing, in a backward stepwise manner, nonsignificant interaction terms using the Wald chi-square statistic.

Data were weighted and post-stratified to the combined population distribution of the jurisdictions by gender, age group, and race/ethnicity. Data were analyzed using SUDAAN, version 9.0 (Research Triangle Institute, Research Triangle Park NC, 2004) to accommodate the complex sample design. Analyses were conducted in 2003 and 2004.

Results

Behavioral Responses

The demographic characteristics of the study population are shown in Table 1. Over half of residents reported feeling less safe in their neighborhood (Table 2). Over one third of residents reported leaving their household less than usual due to concerns about the sniper, with 16.4% reporting that for ≥1 entire days they did not leave their residence because of the shootings. Sixty-six percent reported feeling less safe at other public areas, such as shopping centers and parks. Almost half reported going to these public spaces less than usual. Among residents who reported employment outside the home, 5.5% reported having missed ≥1 days of work because of the sniper shootings.

Traumatic Stress Symptoms

Bivariable analysis. Forty-four percent of residents reported at least one of seven traumatic stress symptoms subsequent to the sniper shootings. Seven percent reported four or more such symptoms, corresponding to the Breslau scale's cutoff for elevated traumatic stress symptoms and consistent with a probable diagnosis of PTSD. Bivariable analysis suggested that residents who self-reported living within 5 miles of a shooting incident were significantly more likely to report elevated traumatic stress symptoms (odds ratio [OR]=2.0, 95% confidence interval [CI]=1.1–3.6) than those living >5 miles away (10.0% vs 5.4%, respectively). Bivariable analyses for other measures of exposure did not reach statistical significance. Additionally, all other variables evaluated for association with probable PTSD were

Table 1. Demographic characteristics of sampled population (n = 1205)

Categories	Sample frequency	Weighted[a] percent (95% confidence interval)
Gender		
Male	517	43.0 (39.6–46.4)
Female	688	57.0 (53.6–60.4)
Race/ethnicity		
African American, non-Hispanic	329	40.9 (37.4–44.4)
White, non-Hispanic	686	41.8 (38.6–44.9)
Hispanic	59	5.5 (3.9–7.0)
Other	131	11.9 (9.7–14.1)
Age (years)		
18–29	197	18.8 (16.0–21.6)
30–44	382	31.4 (28.3–34.4)
45–59	354	27.4 (24.4–30.5)
60–93	272	22.4 (19.5–25.3)
Jurisdiction		
Washington DC	291	26.1 (23.0–29.3)
Prince Georges County, MD	372	35.0 (31.8–38.2)
Montgomery County MD	542	38.9 (35.9–41.9)

[a]Weighted and poststratified to the combined population of the three jurisdictions.

nonsignificant, including the demographic variables of gender, age, race/ethnicity, marital status, and education level.

Multivariable analysis. Multivariable modeling was used to test the robustness of the relationship between probable PTSD and reported proximity of residence to the shootings. The final model controlled for gender, age group, race/ethnicity, education level, previous mental health care, previous trauma, having known someone injured/killed in the attacks, having read the advance mailing, and interaction between reported residential proximity and gender. Because of the significant interaction between the exposure and gender, the association between probable PTSD and reported residential proximity is presented separately for men and women. Women who reported living within 5 miles of any incident were over four times more likely to endorse elevated traumatic stress symptoms than women who reported living farther away (OR=4.2, 95% CI=1.9–9.3). There was no significant association between reported residential proximity and elevated traumatic stress symptoms among men.

Discussion and Conclusions

The results of this study suggest the substantial social and economic burden that events such as these sniper shootings can have on communities. In particular, the results support the notion that members of these communities were experiencing symptoms consistent with PTSD above the expected prevalence levels. The 7.0% prevalence of probable PTSD found in this study for these jurisdictions suggests that an estimated 122,494 residents would likely have met the criteria for a diagnosis of PTSD at the time of this survey. Using a face-to-face, structured diagnostic interview, the National Comorbidity Survey Replication has estimated the prevalence of PTSD in its nationally representative sample to be 3.5%.[15] Many other studies have similarly suggested a relatively high prevalence of traumatic stress symptoms subsequent to community trauma, such as the Oklahoma City bombings,[10] the September 11 terrorist attacks,[11,16] and terrorist attacks in Israel.[17] Further, the results show that women who self-reported residing within 5 miles of one of these shootings were over four times more likely to report symptoms consistent with a diagnosis of PTSD than women who reported residing farther away. No such relationship was found among men. Multiple studies have suggested an association between female gender and elevated traumatic stress symptoms subsequent to traumatic exposure.[10,11,17] In addition, despite controlling for several potential confounders, including differences in lifetime history of trauma and sexual abuse, studies have

Table 2. Perceived safety in community settings (n = 1205, except for workplace category where n = 876)

Degree of safety	In neighborhood % (95% CI)	At workplace and surrounding area % (95% CI)	At other public places % (95% CI)	At gas stations % (95% CI)
A lot less safe	21.5 (18.7–24.2)	22.7 (19.2–26.1)	30.6 (27.5–33.7)	38.6 (35.4–41.9)
A little less safe	35.7 (32.4–38.9)	31.5 (27.9–35.4)	35.3 (32.1–38.5)	31.1 (27.9–34.2)
As safe as usual	42.4 (39.0–45.8)	45.6 (41.6–49.5)	32.0 (28.8–35.2)	26.8 (23.7–30.0)
"Don't know" and refusals	0.5	0.2	2.1	3.5

CI, confidence interval.

suggested that an association between female gender and increased risk of developing PTSD subsequent to a trauma persists nonetheless.[18,19]

Limitations for this study include the potential influences of recall bias and reporting bias. The survey was not fielded until several months after the shooting incidents. Much of the survey asked respondents to report on subjective experiences of these shootings, including perceptions of distance and vulnerability. The influences of potential systematic biases in recall or reporting are difficult to know with certainty. However, one can hypothesize that for different individual respondents, the temporal distance from these incidents could lead to either exaggerated or under-estimated assessments of the degree of their responses at the time. It should also be emphasized that the Breslau scale can provide only an indication for those who might be at risk for PTSD and does not indicate a true diagnosis of PTSD as determined by comprehensive clinical assessment.

This study was also subject to the limitations common to telephone survey methodologies, including declining response rates and inability to reach individuals who do not have landline telephones. Residents represented in this survey tended to have a higher level of education and greater wealth than what would have been expected based on U.S. Census figures for these jurisdictions; they also over-represented married individuals. In addition, as an English-language–only survey, the results of this study would not capture any possible unique responses among non–English-speaking communities. Despite these limitations, the study showed a robust association among women between probable PTSD and reported residential proximity.

These findings suggest the need for the development and evaluation of messages for the public on the range of behavioral and psychological reactions to community traumas. These would include not only information about typical or expected reactions, but also information about when one might need to seek the assistance of a clinician. Finally, the findings suggest the need for routine, ongoing public health surveillance to monitor the psychological consequences of community traumas and to capture pre-event, during-event, and post-event data. Such surveillance would establish a better understanding not only of those factors associated with debilitating outcomes such as PTSD, but also those factors associated with psychological resiliency.

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