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Re-experiencing 9/11-Related PTSD Symptoms Following Exposure to Hurricane Sandy

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Abstract

Background: Understanding Pre-Existing Posttraumatic Stress Disorder (PTSD) symptoms and risk of PTSD following Hurricane Sandy (Sandy) has important implications for PTSD screening of persons exposed to multiple traumas. This study assessed the association between Sandy exposure and a subset of PTSD symptoms related to re-experiencing trauma from the events of the September 11, 2001 (9/11).

Methods: We studied 4,220 respondents from a random 8,870 person sample of adult World Trade Center Health Registry enrollees who completed a post-Sandy survey between March 28 and November 7, 2013. The symptom cluster of re-experiencing 9/11 was defined using 3 out of 5 questions in the intrusion domain of the PTSD Checklist. Multivariable logistic regression, adjusting for socio-demographics, social support and any post-9/11 life threatening events prior to Sandy, was performed separately in those symptomatic and non-symptomatic of re-experiencing 9/11 prior to Sandy.

Results: A total of 688 enrollees (16.3%) reported re-experiencing 9/11 symptoms after Sandy (58.8% in those symptomatic prior to Sandy, and 8.7% in those non-symptomatic). A significant association between Sandy exposure and re-experiencing 9/11 was observed only among those

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non symptomatic prior to Sandy (adjusted odds ratio (AOR)=1.7, 95% confidence interval=1.2–2.3 for moderate Sandy exposure; AOR=2.8, 2.0–4.0 for high Sandy exposure).

Conclusions: Individuals with a history of trauma should be considered for early screening and counseling for mental health after a subsequent traumatic event, regardless of PTSD status, especially in 9/11 exposed populations.

Keywords

9/11; Disaster; Hurricanes; Posttraumatic stress disorder (PTSD)

INTRODUCTION

On October 29, 2012, Hurricane Sandy (Sandy) struck New York City and surrounding areas, exposing large proportions of 9/11-exposed individuals to another potentially traumatic event. Sandy was the deadliest and most destructive hurricane of the 2012 Atlantic hurricane season, causing massive flooding, extensive and long lasting power outages, numerous deaths, and extensive damage to homes, schools, and businesses, as well as streets, tunnels, and other means of access to and from affected areas. Hundreds of thousands of individuals were forced to temporarily or permanently relocate (Report by City of New York, 2013). Since many of the areas affected by Sandy were also affected by the September 11th (9/11) terrorist attacks on the World Trade Center in New York City (NYC), people in those areas who experienced Sandy may have been vulnerable to or have triggered the memories of the 9/11 terrorist attacks.

Posttraumatic Stress Disorder (PTSD) symptoms are primarily divided into three separate clusters: re-experiencing, avoidance and hyperarousal. Re-experiencing, which can be precipitated by subsequent traumatic events, is the core component of PTSD and is a direct response to a traumatic event (Creamer et al., 1992). An increased risk of posttraumatic stress disorder (PTSD) following Sandy has been reported in people with prior exposure to the World Trade Center (WTC) disaster. Survey data one-month post-Sandy indicated Sandy exposure was significantly associated with PTSD symptoms among those with high level of recollections of the WTC disaster and past hurricanes, but not among those with low level of recollections (Palgi et al., 2014). The same survey data also reported that previous exposure to the WTC disaster moderated the relationship between Sandy exposure and PTSD symptoms (Shrira et al., 2014). Besides the data showing the PTSD is associated with prior and/or subsequent man-made or natural disaster, PTSD is often subsequently associated with increased physical morbidity (Jordan et al., 2011; Luft et al., 2012; Miller-Archie et al., 2014), significant decrement of health-related quality of life (Li et al., 2018), and life satisfaction and social support (Bromet et al., 2016). Therefore it is important to identify PTSD symptoms related to re experiencing trauma from the event of 9/11 for earlier diagnosis and preventive interventions in 9/11 exposed populations.

Preexisting mental health disorders may also increase vulnerability to subsequent trauma (Breslau et al. 2008; Caramanica et al., 2015; Bromet et al., 2017). A study of 9/11-exposed populations including WTC responders and non-responders found those with pre-Sandy 9/11-related PTSD symptoms were nearly 7 times more likely to report having Sandy-

related PTSD symptoms 5–12 months post-Sandy than those without pre-Sandy PTSD symptoms (Caramanica et al., 2015). A study assessing the prior trauma experience in combination with the presence of PTSD found that having PTSD symptoms in response to the prior trauma was significantly associated with increased risk of PTSD from subsequent trauma compared with no prior trauma exposure (Breslau et al., 2008). This study also showed prior trauma was not associated with the risk of PTSD from subsequent trauma when there was an absence of prior trauma-related PTSD. The mental health impact of Sandy was studied in a high risk cohort of WTC responders in a health-monitoring program; in the six months following Sandy, those with pre-Sandy probable 9/11-related PTSD were 33 times more likely to report having 9/11-related PTSD symptoms than those without (Bromet et al., 2017).

While other studies have found a strong association between prior trauma and pre-existing PTSD symptoms with PTSD symptoms following subsequent trauma, the question remains whether and to what extent those without pre-existing PTSD symptoms are also at risk for PTSD following subsequent trauma. Using the data from World Trade Center Health Registry, with information on exposures from both 9/11 and Sandy, and repeated measurements of 9/11-related PTSD symptoms pre- and post-Sandy (Brackbill et al., 2014; Caramanica et al., 2015), we examined the risk of PTSD symptoms following Sandy exposure overall, and stratified by 9/11 related PTSD symptomatic status measured prior to Sandy. We hypothesized that Sandy exposure may trigger PTSD symptoms that were related to the 9/11 terror attacks in this high risk cohort regardless of pre-existing status of PTSD symptoms.

MATERIALS and METHODS

Study Sample

The World Trade Center Health Registry (Registry) is a prospective cohort of individuals with high likelihood of exposure to the 9/11 terror attacks. The Registry was established in 2002 to monitor the health consequences of exposure to 9/11. Over 68,000 adults voluntarily enrolled and completed an initial interview in 2003–04 (Wave 1) (Farfel et al., 2008). Subsequently two followup questionnaires were completed in 2006–07 (Wave 2) (Brackbill et al., 2009), and in June 20, 2011-March 18, 2012 (Wave 3).

Seven months after the Wave 3 survey was completed, Hurricane Sandy hit NYC on October 29, 2012. To assess the health impact of Sandy among those who lived in Sandy–flooded areas and elsewhere, a survey of 8,870 adult Registry enrollees who participated in Wave 3 survey was conducted between March 28 and November 7, 2013, 5 to 12 months after Sandy (Caramanica et al., 2015). Detailed descriptions of survey sampling and methods are described elsewhere [Brackbill et al., 2014]. In brief, all Registry enrollees who lived within the Tri-State area (NYC, Long Island, New Jersey, and Connecticut), an area defined by the Federal Emergency Management Agency's Modeling Task Force as a hurricane 'inundation zone' (n=4,435), and the same number of randomly sampled enrollees who lived in the Tri-State area outside the inundation zone were offered participation in the study. A total of 4,558 (51.4% response rate) study subjects completed web or paper surveys eliciting comprehensive information about exposures, experiences, and perceptions before, during,

and after Sandy, as well as standard screening instruments for mental health sequelae of disasters. The final sample for this analysis was restricted to those who provided complete outcome data in both Wave 3 (pre-Sandy) and Sandy surveys (post-Sandy) (N=4,220, 93% of 4,558).

Measures

Re-experiencing 9/11—Re-experiencing 9/11 was assessed separately for the Wave 3 and Sandy Surveys, using PTSD Checklist (PCL) (Weathers, et al., 1991). The PCL is a 17-item self-report checklist of PTSD symptoms, corresponding to the three PTSD symptom clusters (re experiencing, avoidance, hyperarousal) from the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (APA 1994). The PCL is a well-validated measure and has good temporal stability, internal consistency (α>0.75), test–retest reliability (correlation coefficient, r=0.66), and high convergent validity (r=0.58–0.93) (Wilkins et al., 2011).

In this study we focused on the re-experiencing symptoms related specifically to the event of 9/11. Enrollees were asked to rate the degree to which they were bothered by the following symptoms in the past 30 days from 1 (not at all) to 5 (extremely): “Repeated, disturbing memories, thoughts, or images of the events of 9/11?” “Repeated disturbing dreams of the events of 9/11?” and “Suddenly acting or feeling as if events of 9/11 were happening again (as if you were reliving it)?” Responses to the 3 items were summed, for a total score of 3 to 15. In the present sample, the internal consistency of the 3 items was excellent (Cronbach’s alpha=0.90). An enrollee with a score of >7 was defined as having symptoms of re-experiencing 9/11. As this was done for each survey, variables were generated to reflect the presence or absence of re-experiencing 9/11 both Pre-Sandy (using Wave 3 data, referred to as the W3 symptomatic/non-symptomatic group) and Post-Sandy (using Sandy data, referred to as re-experiencing 9/11). This repeat measurement provided an opportunity to look at the cumulative effect of exposure to a traumatic event, on a group of individuals without symptoms in the intervening time.

Sandy Exposure—Sandy exposure was the main exposure of interest, and referred to the composite Sandy exposure scale that was used and described in detail in our previous study by Caramanica et al. (2015). In brief, the scale was comprised of 7 exposure items: experienced ≥ 4 individual Sandy trauma items (e.g., stranded during or after the storm; feared for life or safety; unsure about safety or whereabouts of others; family or friends injured or killed; witnessed terrible events; personally threatened/robbed/assaulted; family or friends threatened/robbed/assaulted; home broken into/robbed; or unable to communicate with others), evacuated home ≥ 7 days, flooded living area with ≥ 3 feet of water, damaged home, loss of >1 possessions, financial cost of damage ≥ $25,000, and any injury sustained in the first week after Sandy (Caramanica et al., 2015). The total number of exposures (range: 0–7) was categorized into low (0 exposure), medium (1–2) and high (3–7), representing level of exposure to Sandy.

Caramanica’s study found PTSD prevalence was higher in the inundation zones (11.3%) compared to the non-inundation zones (4.4%) (Caramanica et al., 2015). Therefore, inundation zone was also included as a potential risk factor in this analysis.

Additional Study Variables—Additional variables included in the analyses were demographics at Wave 3 (age, gender, race/ethnicity (non-Hispanic Black, non Hispanic White, Hispanic, other), and annual household gross income (≤ $75,000, >$75,000)), having experienced post-9/11 potentially life-threatening event(s) prior to Wave 3, perceived social support reported at Wave 3, and exposure to the 9/11 attacks.

Any post-9/11 potentially life-threatening event prior to Wave 3 referred to: a natural or human-made disaster; a serious accident at work, in a car or somewhere else; an attack with a gun, knife or some other weapon; an attack without a weapon, but with the intent to kill or seriously injure; a situation where someone used physical force or threat of force to make one have some type of unwanted sexual contact; being seriously injured or feared being killed; or witnessed someone seriously injured or violently killed; or having a life threatening illness.

Social support (low, 0–14 scores *vs.* high, 15–20 scores) was derived by dichotomizing summed responses to Likert scale items about availability of someone to 'take you to the doctor', 'have a good time with', 'hug you', 'prepare your meals if you are unable to do it yourself', and 'understand your problems'.

Exposure to the 9/11 attacks was the sum of the 5-WTC exposure items that were experienced during or shortly after the attacks, and were grouped as 0 exposure, 1 exposure, and 2–5 exposures. The 5-WTC exposure experiences included: 1) being in the North or South WTC towers at the time of the attack; 2) witnessing three or more events (seeing planes hit, buildings collapsed, people fall or jump from buildings, people injured, or people running); 3) exposure to dust/debris cloud on 9/11; 4) sustaining injury more serious than eye irritation/injury; and 5) being a rescue/recovery worker.

Statistical Analyses—Bivariate analyses between Sandy exposure, other covariates and re-experiencing 9/11 were examined to determine to what extent the covariate is associated with the outcome of interest. Covariates associated with re-experiencing 9/11 at $p<0.15$ in bivariate analyses were considered for inclusion in multivariable analyses. Multivariable logistic regression models were used to assess the association between Sandy exposure and re-experiencing 9/11 after adjustment for covariates. We also performed the multivariable analysis separately in those W3 symptomatic and non-symptomatic groups. To further rule out the potential impact of PTSD history on the association between Sandy and re-experiencing 9/11 in W3 non-symptomatic group we then repeated the multivariable analysis stratified by prior PTSD history, defined as yes if enrollees had screened positive for probable 9/11-related PTSD assessed in Wave 1 or any self-reported physician-diagnosed PTSD prior to Wave 3. All tests were 2-sided, and assessed significance at 5% type I error. Analyses were conducted using SAS, version 9.4, and SAS Enterprise Guide, version 7.1 (SAS Institute, Cary, NC).

RESULTS

The final sample included 4,220 enrollees, comprising 53.6% and 46.4% of targeted inundation zone and non- inundation zone residents, respectively. Following exposure to Sandy, the prevalence of re-experiencing 9/11 symptoms was 16.3% among study enrollees.

Table 1 shows the distributions of exposure and demographic variables of the study sample. The majority of study subjects were between 25 and 59 years of age, and non-Hispanic white at W3, seven months prior to Sandy. Those with post-Sandy symptoms of re-experiencing 9/11 were more likely to be nonwhite race or Hispanic, symptomatic at W3, and to have lower household income, low social support, prior PTSD history, and post-9/11 life-threatening events prior to W3.

In bivariate analysis (Table 2), re-experiencing 9/11 was significantly associated with increased age, non-white race, low household income, low social support, prior PTSD history, post9/11 life-threatening events prior to W3, being symptomatic at W3, as well as both 9/11 and Sandy exposures. In multivariable analysis where W3 symptomatic status was included along with other covariates, the association between intensity of Sandy exposure and re-experiencing 9/11 remained significant (Adjusted OR (AOR)=2.2, 95% CI, 1.6–2.9 for high level of exposure); being symptomatic at W3 was 9 times greater odds of re-experiencing 9/11 (AOR=9.1, 95% CI 7.3, 11.3) than non-symptomatic at W3. Living in the inundation zone was not significantly associated with re-experiencing 9/11, after adjustment of covariates (AOR=1.0, 95% CI, 0.8–1.3).

Table 3 shows the multivariable analysis of association between Sandy and re-experiencing 9/11, stratified by W3 symptomatic status. In the W3 non-symptomatic group, increased Sandy exposure was significantly associated with re-experiencing 9/11 (AOR=2.8, 95% CI, 2.0–4.0 for high exposure level; AOR=1.7, 95% CI, 1.2–2.3 for medium level), as was 9/11 exposure. However, among those in the W3 symptomatic group, neither Sandy nor 9/11 exposures were associated with re-experiencing 9/11.

Further analysis stratifying by their PTSD history prior to W3 in the W3 non-symptomatic group found that the magnitude of association between Sandy exposure and re-experiencing 9/11 remained the same regardless of PTSD status prior to W3 (For comparison of high *vs.* low Sandy exposure: AOR=2.6, 95% CI=1.4–4.8 in those with history of PTSD prior to Wave 3; AOR=2.8, 95% CI=1.8–4.3 in those without PTSD history) (data not shown).

DISCUSSION

This study evaluated risk factors for re-experiencing a prior disaster, namely 9/11, after having been involved in a subsequent disaster, namely Hurricane Sandy. As would be expected and consistent with other studies (Caramanica et al., 2015; Bromet et al., 2017), persons who had previously reported re-experiencing 9/11 symptoms were nine times more likely to have symptoms of re-experiencing 9/11 following Sandy than those who did not have reported prior symptoms of re-experiencing 9/11. This association was independent of Sandy exposure and other risk factors. Importantly, we found that it was not necessary to have reported re-experiencing 9/11 symptoms (for those with either 9/11 related or Hurricane Sandy exposure) before Hurricane Sandy to re experiencing 9/11 symptoms after Hurricane Sandy. This suggests that persons who have experienced a prior trauma regardless of prior symptoms are vulnerable to re-experiencing when they are subjected to a subsequent disaster related trauma.

The significant association between Sandy exposure and re experiencing 9/11 among those non-symptomatic prior to Sandy supports a hypothesis that re-experiencing symptoms in response to trauma emerges as a direct response to the traumatic event (Creamer et al., 1992). Our findings also support the potential sensitization effect of prior trauma which confers a greater responsiveness to subsequent trauma or stressors (Dykman et al., 1997, Post and Weiss 1998), given that re-experiencing 9/11 was also associated with 9/11 exposure. In addition, among those non symptomatic prior to Sandy, a history of PTSD was not necessary for re-experiencing 9/11 symptoms after Sandy. This finding suggests that Sandy exposure can sufficiently trigger memories of 9/11, highlighting the vulnerability of 9/11-exposed population to subsequent trauma. Nevertheless, the question of how long this short-term effect of Sandy on re-experiencing 9/11 lingers remains to be studied further. Having intrusive re-experiencing of a traumatic event does not mean the person will develop PTSD, and early counseling with medical or mental health professionals along with assessment of intrusive symptoms may lessen the likelihood of PTSD development.

For the most part pre-existing PTSD symptoms predict an increased risk of PTSD-related symptoms to a subsequent trauma or disaster (Breslau et al., 2008; Caramanica et al., 2015; Bromet et al., 2017). Even though we found this to be the case overall, it does not appear that exposure to a new trauma (Hurricane Sandy) significantly increases the risk of re-experiencing 9/11 among those with pre-existing PTSD symptoms. There is at least one possible explanation for the non-significant findings; our study endpoint was defined based on only 3 out of the 17-item PCL.

The main limitation of this study is that the outcome of interest was based on available data on three of five PCL-17 items that comprise the re-experiencing domain, and that we lacked data on post-Sandy 9/11-related PTSD symptoms that relate to the PCL-17 domains of avoidance and hyper arousal. Without having measured avoidance and/or hyper arousal symptoms, we were unable to examine whether there was an increase in these PTSD symptoms as a result of a subsequent trauma. Our findings may have been affected by partial assessment of PTSD symptoms and indicators of other domains of PTSD may have provided additional insight into our study findings.

This study is also subject to limitations similar to other studies drawn from the same Sandy survey sample among WTCHR enrollees (Brackbill et al., 2014; Caramanica et al., 2015). The 51.4% response rate to the Sandy survey may bias the findings because participants were slightly more likely than non-participants to be female, and non-Hispanic white. Other limitations to this study include the self-reported nature of exposure and outcome assessments, and the possibility of recall and/or other forms of response bias inherent in data of this type.

Strengths of this study include its use of a longitudinal cohort of individuals exposed to both 9/11 and Sandy that included detailed assessments of exposure to both disasters. It also includes pre- and post-Sandy assessments of re-experiencing 9/11 symptoms, assessment of other post-WTC traumatic events prior to Sandy, and sizeable groups defined by Sandy exposure status between which comparisons could be made.

Despite some limitations, the present study contributes important information on the PTSD re-experiencing symptoms related to 9/11 attacks in individuals following exposure to Sandy. We found that re-experiencing 9/11 symptoms was associated with Sandy exposure only among those non-symptomatic prior to Sandy. Our findings highlight the impact of subsequent disaster or trauma exposure on symptoms of re-experiencing 9/11 especially among non-symptomatic individuals who were previously exposed to the WTC disaster, and emphasize the need for continuing health surveillance of those affected by the WTC disaster, including after subsequent traumatic events regardless of the presence or absence of pre-existing PTSD symptoms. Early clinical recognition of a subset of PTSD symptoms related to re-experiencing prior trauma may not only reduce the likelihood of PTSD development, but also prevent other mental or physical health consequence of PTSD. Further, prior PTSD diagnosis or PTSD symptoms may not always be the best clinical indicator of risk for future PTSD or PTSD symptoms after a new trauma. Healthcare providers should assess history of previous trauma when evaluating trauma-exposed individuals.

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ABBREVIATIONS:

(Sandy)	Hurricane Sandy
(PTSD)	Posttraumatic Stress Disorder
(WTC)	World Trade Center
(Registry)	World Trade Center Health Registry

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Table 1.

Distribution of selected socio-demographic characteristics and disaster exposures of study sample and participants with re-experiencing 9/11 after Sandy, WTCHR, 2011–2013 (N=4,220)

Socio-demographics at Wave 3 (prior to Sandy, 2011–2012)	All participants* (N=4,220)		Participants with re-experiencing 9/11 symptoms (N=688)		
	N	(%)	N	(%)	*P*-value
Age, years					
<25	38	(0.9)	6	(15.8)	0.215
25 to 59	2938	(69.6)	460	(15.7)	
>=60	1244	(29.5)	222	(17.8)	
Sex					
Male	2389	(56.6)	352	(14.7)	0.002
Female	1831	(43.4)	336	(18.4)	
Race/ethnicity					
Non-Hispanic white	3056	(72.4)	434	(14.2)	<0.001
Non-Hispanic black	387	(9.2)	75	(19.4)	
Hispanic	459	(10.9)	120	(26.1)	
Other	318	(7.5)	59	(18.6)	
Total household income, $					
≤ 75,000	1670	(39.6)	410	(24.6)	<0.001
>75,000	2376	(56.3)	246	(10.4)	
Social support					
Low	1931	(45.8)	411	(21.3)	<0.001
High	2208	(52.3)	263	(11.9)	
Experienced any post-9/11 life-threatening events prior to Wave 3					
No	2827	(67.0)	400	(14.1)	<0.001
Yes	1371	(32.5)	278	(20.3)	
History of PTSD prior to Wave 3					
No	3194	(75.7)	308	(9.6)	
Yes	1026	(24.3)	380	(37.0)	<0.001
Wave 3 symptomatic status					
Non-symptomatic	3577	(84.8)	310	(8.7)	<0.001
Symptomatic	643	(15.2)	378	(58.8)	
9/11 exposure scale					
0 exposure	604	(14.3)	52	(8.6)	<0.001
1 exposure	1639	(38.8)	203	(12.4)	
2–5 exposures	1977	(46.8)	433	(21.9)	
Composite hurricane Sandy exposure scale					
0 exposure (Low)	2495	(59.1)	299	(12.0)	<0.001
1–2 exposures (Medium)	1002	(23.7)	217	(21.7)	

Socio-demographics at Wave 3 (prior to Sandy, 2011–2012)	All participants* (N=4,220)		Participants with re-experiencing 9/11 symptoms (N=688)		
	N	(%)	N	(%)	*P*-value
3–7 exposures (High)	723	(17.1)	172	(23.8)	
Lived in inundation zone					
No	1960	(46.4)	280	(14.3)	
Yes	2260	(53.6)	408	(18.1)	0.001

* indicates may not sum to 100% due to missing values.

Table 2.

Bivariate and multivariable analyses of the associations between characteristics, disaster exposures and re-experiencing 9/11 after Sandy, WTCHR, 2011–2013 (N=4,220)

Socio-demographics at Wave 3 (prior to Sandy, 2011-2012)	Unadjusted		Adjusted*	
	OR	95% CI	OR	95% CI
Age, years	1.02	1.01–1.03	1.0	1.01–1.03
Sex				
Male	0.8	0.7–0.9	1.0	0.8–1.2
Female	Referent		Referent	
Race/ethnicity				
Non-Hispanic white	Referent		Referent	
Non-Hispanic black	1.5	1.1–1.9	1.2	0.8–1.7
Hispanic	2.1	1.7–2.7	1.2	0.9–1.7
Other	1.4	1.0–1.9	1.1	0.8–1.7
Total household income, $				
≤ 75,000	2.8	2.4–3.3	1.9	1.6–2.4
>75,000	Referent		Referent	
Social support				
Low	2.0	1.7–2.4	1.1	0.9–1.3
High	Referent		Referent	
Experienced any post-9/11 life-threatening events prior to Wave 3				
No	Referent		Referent	
Yes	1.5	1.3–1.8	1.1	0.9–1.4
History of PTSD prior to Wave 3				
No	Referent		Referent	
Yes	5.5	4.6–6.6	2.7	2.2–3.3
Wave 3 symptomatic status				
Non-symptomatic	Referent		Referent	
Symptomatic	15.0	12.4–18.3	9.1	7.3–11.3
9/11 exposure scale				
0 exposure	Referent		Referent	
1 exposure	1.5	1.1–2.1	1.3	0.9–1.9
2–5 exposures	3.0	2.2–4.0	1.6	1.1–2.3
Composite hurricane Sandy exposure scale				
0 exposure (Low)	Referent		Referent	
1–2 exposures (Medium)	2.0	1.7–2.5	1.4	1.1–1.8
3–7 exposures (High)	2.3	1.9–2.8	2.2	1.6–2.9
Lived in inundation zone				
No	Referent		Referent	

Socio-demographics at Wave 3 (prior to Sandy, 2011-2012)	Unadjusted		Adjusted*	
	OR	95% CI	OR	95% CI
Yes	1.3	1.1–1.6	1.0	0.8–1.3

OR: Odds Ratio; CI: Confidence Interval.

* indicates adjusted for variables listed in this Table

Table 3.

Adjusted odds ratios (OR) and 95% confidence intervals (CI) for re-experiencing 9/11 following Sandy in relation to disaster exposures by Wave 3 symptomatic group prior to Sandy, WTCHR, 2011–2013 (N=4,220)*

	Wave 3 Symptomatic Group (N=643)		Wave 3 Non-symptomatic Group (N=3,577)	
	Adjusted OR	**95% CI**	**Adjusted OR**	**95% CI**
9/11 exposure scale				
0 exposure	Referent		Referent	
1 exposure	1.1	0.5–2.3	1.4	0.9–2.1
2–5 exposures	1.4	0.7–2.9	1.5	1.0–2.4
Composite hurricane Sandy exposure scale				
0 exposure (Low)	Referent		Referent	
1–2 exposures (Medium)	1.1	0.7–1.7	1.7	1.2–2.3
3–7 exposures (High)	1.4	0.9–2.3	2.8	2.0–4.0
Lived in inundation zone				
No	Referent		Referent	
Yes	0.9	0.6–1.3	1.1	0.8–1.4

* indicates adjusted for age, gender, race/ethnicity, household income, social support, post-9/11 life threatening events prior to Wave 3, history of PTSD prior to Wave 3, and variables listed in this Table