Distress, Worry, and Functioning Following a Global Health Crisis: A National Study of Americans' Responses to Ebola

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Abstract

The 2014 Ebola crisis received unprecedented media attention in the United States, despite low risk of transmission. We examined theoretically derived correlates of psychological response to the crisis, including Ebola-related media exposure, prior mental health history, and stress response to a recent prior collective trauma (the 2013 Boston Marathon bombing, BMB). A national probability sample completed a survey 2–4 weeks post-BMB; 18 months later, the same sample reported responses to the Ebola crisis ($N = 3,447$). History of mental health diagnoses, acute stress response to the BMB, and Ebola-related media exposure were associated with greater psychological distress and functional impairment. Prior acute stress and Ebola-related media exposure were also associated with Ebola-related worry; individuals with higher BMB-related acute stress who consumed more Ebola-related media were more worried about contracting Ebola. Media coverage of the Ebola public health crisis was associated with negative psychological outcomes, even among individuals at low risk for contracting the disease.

As the recent Zika outbreak, the 2009 H1N1 pandemic, and the 2014 Ebola epidemic demonstrate, threats to public health often impact people worldwide in our globally interconnected modern society. This impact likely exceeds the actual threat to their physical heath. That is, the ubiquitous media coverage of these crises is often disproportionate to the actual risk indicated for many, resulting in untoward and unnecessary adverse psychological and social responses (Vasterman, Yzermans, & Dirkzwager, 2005). Despite the extremely low incidence of Ebola infection in the United States, the West African epidemic was the most closely followed news story in the United States in Fall 2014 (Hamel, Firth, & Brodie, 2014), and many Americans endorsed high concern about Ebola as a threat to their personal health. A Kaiser Health U.S. national tracking poll found that 64% of respondents reported high worry about a serious outbreak in the United States within the next year and 45% reported high worry that they or someone in their family would get sick from Ebola (Hamel et al., 2014). This

worry also manifested itself behaviorally—schools were closed and quarantines implemented for hundreds of individuals who *might* have been exposed to an individual who was sick with Ebola. Given that Ebola virus transmission requires contact with infected bodily fluids, the vast majority of these otherwise commonsense public health measures were grossly unnecessary, mimicking health anxiety symptoms (Hadjistavropoulos, Craig, & Hadjistavropoulos, 1998) on a societal scale.

This stark incongruence between risk appraisals of the Ebola virus and actual risk likely resulted in negative physical and mental health consequences beyond the impact of the actual biological agent. Persistent activation of the stress response has been associated with a wide

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variety of deleterious outcomes including depression (Grippo & Johnson, 2009) and decreased immune functioning (McEwen, 2004). After 9/11, acute stress response, compounded with ongoing worry about future acts of terrorism, was associated with increased incidence of new onset cardiovascular disease over the next 3 years, even for people geographically distant from the site of the attacks (Holman et al., 2008). Perseverative cognition more generally has numerous physiological concomitants (Ottaviani et al., 2016). Given these robust associations, it is imperative to better understand how psychological stress and anxiety are spread during a public health crisis (Faasse, Gamble, Cundy, & Petrie, 2012).

During the Ebola epidemic, it is likely that sensationalized media coverage contributed to the widespread worry and disproportionate behavioral responses exhibited in the United States (Bernstein et al., 2007; Silver et al., 2013), and individuals with preexisting mental health conditions may be particularly attentive and reactive to these media reports (cf., Holman & Silver, 2011; Silver et al., 2013). Moreover, repeated exposure to graphic images (e.g., injured or dead bodies)—which were prominent in Ebola crisis media coverage—is thought to be especially detrimental. In the wake of 9/11, people who reported high frequency of seeing television images of people falling or jumping to their death reported higher prevalence of posttraumatic stress disorder (PTSD; Ahern, Galea, Resnick, & Vlahov, 2004). Data from laboratory settings using functional magnetic resonance imaging (fMRI) suggest that viewing such traumatic imagery can elicit PTSD–like flashbacks similar to those typically expected from direct exposure to traumatic events (Bourne, Mackay, & Holmes, 2013).

Finally, distress responses to public health crises like the Ebola outbreak are likely correlated with a history of prior adverse responses to negative societal events. This is known as the sensitization hypothesis, which posits that prior stressful life events can have a deleterious effect on one's ability to cope with future stressors. For example, prior epidemiological research has suggested that repeated exposure to negative events is associated with increased likelihood of acute and posttraumatic stress responses (Breslau, Chilcoat, Kessler, & Davis, 1999; Garfin, Holman, & Silver, 2015). Furthermore, prior posttraumatic stress responses predict diagnoses of PTSD following exposure to future events (Breslau, Peterson, & Schultz, 2008). Both acute stress and posttraumatic stress reactions to 9/11 were significant predictors of posttraumatic stress reactions to the Iraq War (Silver et al., 2013). To date, however, this work has not been extended to examinations of the impact of public health crises, like the Ebola outbreak.

The present study examined national responses to the Ebola public health crisis in three domains. Specifically, we assessed predictors of psychological distress, functional impairment, and ongoing worry about the Ebola crisis among a representative sample of Americans. Our design provided an unusual opportunity to examine the link between responses to the Ebola crisis and prior responses to collective trauma because the individuals in our sample had previously been evaluated for responses to the 2013 Boston Marathon bombing (BMB). We predicted that prior mental health difficulties, stress responses to this prior collective trauma, and exposure to media coverage of Ebola would be significant predictors of negative Ebola-related outcomes.

Methods

Design, sample, and data collection

Participants were drawn from the GfK KnowledgePanel, which uses address-based sampling methods to randomly sample and recruit individuals within U.S. households. To ensure panel representativeness, individuals receive compensation or free Internet as an incentive to participate on the panel and a computer (if needed) in exchange for completion of Web-based surveys. The individuals reported here had previously participated in a study about responses to the BMB, conducted between April 29 and May 13, 2013 (Holman, Garfin, & Silver, 2014). That study included 4,675 individuals, with oversamples of metropolitan Boston ($n = 846$) and New York City ($n = 941$), and the remainder representing the rest of the United States ($n = 2,888$; 79.1% response rate). For approximately 4 weeks starting December 29, 2014, all those still in the GfK panel ($N = 3,196$) or willing to be contacted despite having terminated from the panel ($N = 1,140$) were invited to participate in a study of their responses to Ebola ($N = 4,336$). (Three hundred and thirty-nine individuals had withdrawn from the GfK panel and requested no further contact from researchers.) To encourage participation, email, postcard, and telephone reminders were implemented. The final sample comprised 3,447 participants (79.5% participation; 73.7% retention). Overall, 3,114 individuals (90.3%) completed the survey online; 333 (9.7%) completed it via paper-and-pencil format and returned it to GfK in prepaid envelopes. All procedures for this study were approved by the Institutional Review Board of the University of California, Irvine.

Measures

Demographics and mental health history. Prior to the start of the study, participants from the GfK KnowledgePanel provided demographic (e.g., age, gender, ethnicity, education, income, employment, marital status) and mental health information. Prior mental health difficulties were assessed using two items modeled after the

U.S. Centers for Disease Control's National Center for Health Statistics annual National Health Interview Survey (NHIS; U.S. Department of Health and Human Services, 2001). Respondents reported whether a physician had ever diagnosed them with depression or anxiety disorders (coded 0 for no prior diagnoses, 1 for either anxiety or depression, and 2 for both). Just over 94% of respondents provided mental health histories prior to the Ebola outbreak. To retain sample representativeness, missing values for prior depression and anxiety diagnoses were imputed using Sequential Hot-Deck imputation (Holman et al., 2014). This measure of prior mental health diagnoses has been benchmarked against the NHIS, which itself has been validated against medical records (U.S. Department of Health and Human Services, 2001) and is considered a valid measure of mental health diagnoses in a U.S. sample.

Prior television habits. Prior to the start of the study, the television-watching habits of the majority of the sample (*n* = 3,266) were measured. Respondents reported the frequency with which they watched 117 broadcast and cable television networks over the previous 6 months on a 5-point scale. An index of prior television-watching habits was created representing the mean frequency across all channels a respondent reported having watched in the 6 months prior to the assessment.

Acute stress response to the BMB. BMB-related acute stress responses were assessed 2–4 weeks after the BMB using the Stanford Acute Stress Response Questionnaire (SASRQ; Cardeña, Koopman, Classen, Waelde, & Spiegel, 2000). Respondents used a 6-point scale from 0 (*not experienced*) to 5 (*very often experienced*) to describe how often they experienced 30 acute stress symptoms "since the Boston Marathon bombings and their aftermath."

Exposure to Ebola-related media. Participants reported the average number of hours per day spent consuming Ebola-related media from all sources ["(TV, radio, videos or text on Internet news sites, social media, mobile phones, newspapers and other print media)"] in October 2014. A categorical measure of Ebola-related media exposure was created, guided by prior work on media exposure to collective disasters (Silver et al., 2013). Participants could report being exposed to less than 1 hour, 1–3 hours, 4–6 hours, or more than 6 hours of Ebola-related media per day across all sources; the latter two groups were combined due to the small cell size in the 6+ hour group.

Psychological distress. The Brief Symptom Inventory (BSI-18; Derogatis, 2001) measured general psychological distress by assessing the severity of 18 symptoms of depression, anxiety, and somatization on a scale from 0 (*not at all*) to 4 (*extremely*). This measure displayed excellent internal consistency in the present sample (α = 0.93).

Functional impairment. The extent to which one's emotional and physical health interfered with social/work activities was assessed with four items adapted from the SF–36 Health Survey (Ware & Sherbourne, 1992) on a scale from 1 (*none of the time*) to 5 (*all of the time*). Items were recoded to 0–4 to give all variables a comparable baseline score. This measure displayed good internal consistency in the present sample (α = 0.87).

Ebola-related worry. Items assessing worry about the Ebola crisis were adapted from measures used in prior research conducted after 9/11 (Holman et al., 2008; Silver et al., 2002). Specifically, two items assessed the frequency of fear/worry in the last week about being personally affected by Ebola on a scale from 1 (*never*) to 5 (*all the time*). Items were recoded to 0–4 to give all variables a comparable baseline score. This measure displayed good internal consistency in the present sample (α = 0.84).

Data analysis

Statistical analyses were conducted using STATA 14 (Stata Corp, College Station, TX). Data were weighted to account for probability of selection into the Knowledge-Panel and differences in the demographic makeup of our sample compared to U.S. Census benchmarks, while accounting for systematic oversampling in Boston and New York (Holman et al., 2014). Summary scores were computed for prior acute stress response to the BMB, psychological distress, functional impairment, and Ebola-related worry to account for variability in each of these constructs (MacCallum, Zhang, Preacher, & Rucker, 2002).

Ordinary Least Squares (OLS) regression models were constructed to examine predictors of psychological distress, functional impairment, and Ebola-related worry. First, demographics (i.e., age, gender, ethnicity, education, income, employment status) were entered, followed by mental health history, prior television use, prior acute stress response to the BMB, and hours of Ebola-related media exposure. Models were trimmed for parsimony; marital status, income, and region (to account for systematic oversampling in Boston and New York City metropolitan areas) were not significant predictors and are not reported here. An interaction term for prior acute stress and Ebola-related media exposure was constructed and entered in an additional model examining predictors of Ebola-related worry.

Results

The composition of the final weighted sample ($N = 3,447$) closely matched U.S. population estimates (see Table SA in the Supplemental Materials available online for the weighted and unweighted demographic composition). The final weighted sample was 52.33% female, ranged in age from 18 to 94 (mean = 52.29, SD = 16.57), and was 68.01% White (non-Hispanic), 10.57% Black/African American, 13.45% Hispanic, and 7.97% other ethnicities (non-Hispanic). Almost 58% were married, 60.94% had at least some college education, and 62.77% had an annual income of $50,000 or more. Over 58% of the sample was currently employed ($n = 2,005$), either as a paid employee or self-employed. Almost 12% of the sample reported a prior diagnosis of either depression or anxiety ($n = 412$), 7% reported both diagnoses ($n = 235$), and 81% reported neither mental health diagnosis ($n = 2,800$). Most participants ($n = 2,555$; 73.40%) reported an average of less than 1 hour per day of Ebola-related media exposure; 740 participants (22.33%) reported exposure to 1–3 hours of Ebola-related media per day, and 108 participants (4.16%) reported exposure to 4 or more hours of Ebola-related coverage per day.

The three outcome measures in the present study were significantly correlated with one another. Psychological distress and functional impairment were highly correlated ($r = 0.73$, $p < .001$). Additionally, worry about the Ebola crisis was significantly associated with both psychological distress ($r = 0.32$, $p < .001$) and functional impairment ($r = 0.25$, $p < .001$).

Table 1 presents multivariate OLS regression analyses examining predictors of psychological distress, functional impairment, and Ebola-related worry. Adjusting for demographics (age, gender, ethnicity, education, income, employment status), BMB-related acute stress predicted all three outcomes. Controlling for prior television consumption habits, increased daily hours of Ebola-related media exposure were significantly associated with incremental increases in all three outcomes. Prior mental health status was a significant predictor of both psychological distress and functional impairment, but not Ebola-related worry. Standardized regression coefficients for prior mental health, prior acute stress response to the BMB, and Ebola-related media for each outcome measure are plotted in Figure 1a.

There was a significant interaction between prior acute stress and Ebola-related media exposure on Ebola-related worry. For individuals who reported low acute stress following the BMB, the association between Ebola-related media exposure and Ebola worry was very small. However, individuals who reported high acute stress and high Ebola-related media exposure also reported the greatest Ebola-related worry. Thus, the relationship between Ebola-related media exposure and worry about Ebola was strongest for individuals who also reported high acute stress in the aftermath of a previous collective trauma ($p < .001$; see Fig. 1b).

It is possible that these analyses are tapping anxiety sensitivity among individuals who are seeking threat-relevant information in the media and reporting a great deal of worry. Data from a subsequent survey of this panel were used to test this possibility. Approximately 18 months following the Ebola survey, a subsample of these respondents participated in another wave of data collection ($n = 2,861$). This survey assessed trait neuroticism using the two-item Neuroticism subscale of the Ten Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003). When included in the models, neuroticism was a significant predictor of psychological distress ($\beta = .24$, $p < .001$), functional impairment ($\beta = .17$, $p < .001$), and Ebola-related worry ($\beta = .10$, $p = .001$). However, its inclusion did not account for the relationships between prior mental health diagnoses, prior acute stress responses, and media exposure to Ebola with any of the outcome measures. Moreover, when controlling for trait neuroticism, the interaction between prior acute stress responses and Ebola-related media exposure on Ebola-related worry remained significant ($\beta = .32$, $p < .001$).

Discussion

Findings demonstrated that extensive Ebola-related media exposure and stress responses to a prior collective trauma were key indicators of negative psychological responses to the Ebola public health crisis. Having a history of mental health diagnoses was also a significant predictor of outcomes, although this did not mediate or moderate significant relationships between other variables. There was a significant interaction between Ebola-related media exposure and prior BMB-related acute stress on Ebola worry, such that the relationship between media exposure and worry about Ebola was augmented in individuals who reported greater acute stress responses 18 months earlier. These associations held even when controlling for patterns of prior television use, employment status, income, and trait neuroticism. This suggests that individuals who have the strongest reactions to collective traumas are at the greatest risk for distress that can follow extensive media exposure to subsequent distressing events, in support of the sensitization hypothesis (cf., Silver et al., 2013). This conclusion is also supported by research suggesting that it is individuals who have previously been diagnosed with PTSD who are most likely to develop psychopathology following subsequent exposures (Breslau et al., 2008). As prior work has demonstrated, these

Table 1. Predictors of Psychological Distress, Functional Impairment, and Worry About Ebola (*N* = 3,447)

Predictor variable	Psychological distress B [95% CI]	β	Functional impairment B [95% CI]	β	Ebola worry Model 1 B [95% CI]	β	Ebola worry Model 2 B [95% CI]	β
Age	−0.04 [−0.07, −0.02]	−0.08**	−0.01 [−0.01, 0.01]	−0.02	−0.01 [−0.01, 0.01]	−0.01	0.00 [−0.01, 0.01]	0.00
Gender	−0.29 [−1.08, 0.51]	−0.02	−0.17 [−0.43, 0.08]	−0.03	0.02 [−0.11, 0.15]	0.01	0.03 [−0.10, 0.16]	0.01
Ethnicity								
Black	−0.09 [−2.14, 1.97]	−0.01	0.01 [−0.53, 0.56]	0.01	0.16 [−0.14, 0.46]	0.03	0.15 [−0.15, 0.45]	0.03
Hispanic	2.76 [1.27, 4.25]	0.11***	0.71 [0.24, 1.18]	0.08**	0.31 [0.06, 0.55]	0.07*	0.30 [0.05, 0.54]	0.07*
Other	2.49 [0.61, 4.37]	0.07*	0.42 [−0.09, 0.92]	0.04	0.77 [0.46, 1.08]	0.14***	0.76 [0.45, 1.06]	0.14***
Education								
High school	0.09 [−1.64, 1.81]	0.01	−0.62 [−1.42, 0.18]	−0.10	−0.31 [−0.69, 0.06]	−0.10	−0.32 [−0.69, 0.04]	−0.11
Some college	0.58 [−1.19, 2.34]	0.03	−0.50 [−1.31, 0.30]	−0.08	−0.21 [−0.59, 0.16]	−0.07	−0.21 [−0.58, 0.16]	−0.07
Bachelor's or more	0.22 [−1.50, 1.94]	0.01	−0.35 [−1.16, 0.46]	−0.06	−0.42 [−0.79, −0.05]	−0.14*	−0.42 [−0.78, −0.06]	−0.14*
Income	−0.21 [−0.32, −0.10]	−0.11***	−0.08 [−0.12, −0.04]	−0.13***	−0.01 [−0.03, 0.01]	−0.03	−0.01 [−0.03, 0.01]	−0.03
Employment status	−0.64 [−1.52, 0.24]	−0.04	−0.51 [−0.80, −0.22]	−0.09***	−0.13 [−0.28, 0.02]	−0.05	−0.13 [−0.28, 0.02]	−0.04
Prior mental health	4.22 [3.31, 5.14]	0.29***	1.46 [1.16, 1.76]	0.30***	0.01 [−0.11, 0.13]	0.01	0.02 [−0.10, 0.14]	0.01
Prior media use	0.80 [0.20, 1.39]	0.06**	0.17 [−0.01, 0.35]	0.04	0.12 [0.02, 0.22]	0.06*	0.11 [0.01, 0.22]	0.06*
BMB acute stress	0.09 [0.07, 0.12]	0.22***	0.03 [0.02, 0.03]	0.18***	0.02 [0.01, 0.02]	0.26***	0.00 [−0.01, 0.01]	0.05
Ebola-related media exposure								
1–3 hours	0.74 [−0.26, 1.75]	0.04	0.22 [−0.11, 0.55]	0.03	0.49 [0.31, 0.67]	0.14***	0.36 [0.17, 0.55]	0.11***
4+ hours	4.19 [0.79, 7.60]	0.09*	1.42 [0.48, 2.37]	0.09**	1.03 [0.57, 1.48]	0.13***	0.55 [0.08, 1.01]	0.07*
Ebola Media × BMB AS interaction	—	—	—	—	—	—	0.01 [0.00, 0.01]	0.25**
Constant	5.34 [2.26, 8.42]		2.29 [1.16, 3.42]		0.66 [0.09, 1.24]		0.74 [0.16, 1.31]	
Model statistics	*F*(15, 3,208) = 19.27*** R^2 = 0.24		*F*(15, 3,204) = 19.13*** R^2 = 0.24		*F*(15, 3,207) = 14.20*** R^2 = 0.19		*F*(16, 3,206) = 15.02*** R^2 = 0.20	

Note: CI = confidence interval. Table presents both standardized (β) and unstandardized (*B*) regression coefficients. Mental health was coded as follows: 0 = no anxiety or depression; 1 = depression or anxiety; 2 = both depression and anxiety. The reference groups for gender, race, education, and employment status were males, Whites, "less than high school," and not employed, respectively. The reference group for Ebola-related media exposure is "less than 1 hour." The interaction term represents the interaction of hours of Ebola-related media exposure and Boston Marathon bombing acute stress (BMB AS).
*$p < .05$. **$p < .01$. ***$p < .001$.

incremental effects of cumulative exposures, ubiquitous in daily media coverage in contemporary society, correlate with increased distress responses across the population (see Garfin et al., 2015). Moreover, while the group of individuals who reported being exposed to 4 or more hours of Ebola-related media per day during the Ebola outbreak was a relatively small proportion of the present sample (approximately 4%), this may represent as many as 13 million Americans when referring to population estimates. Though not everyone is exposed to extensive media during a crisis, many are, and it is important to understand the implications of this exposure.
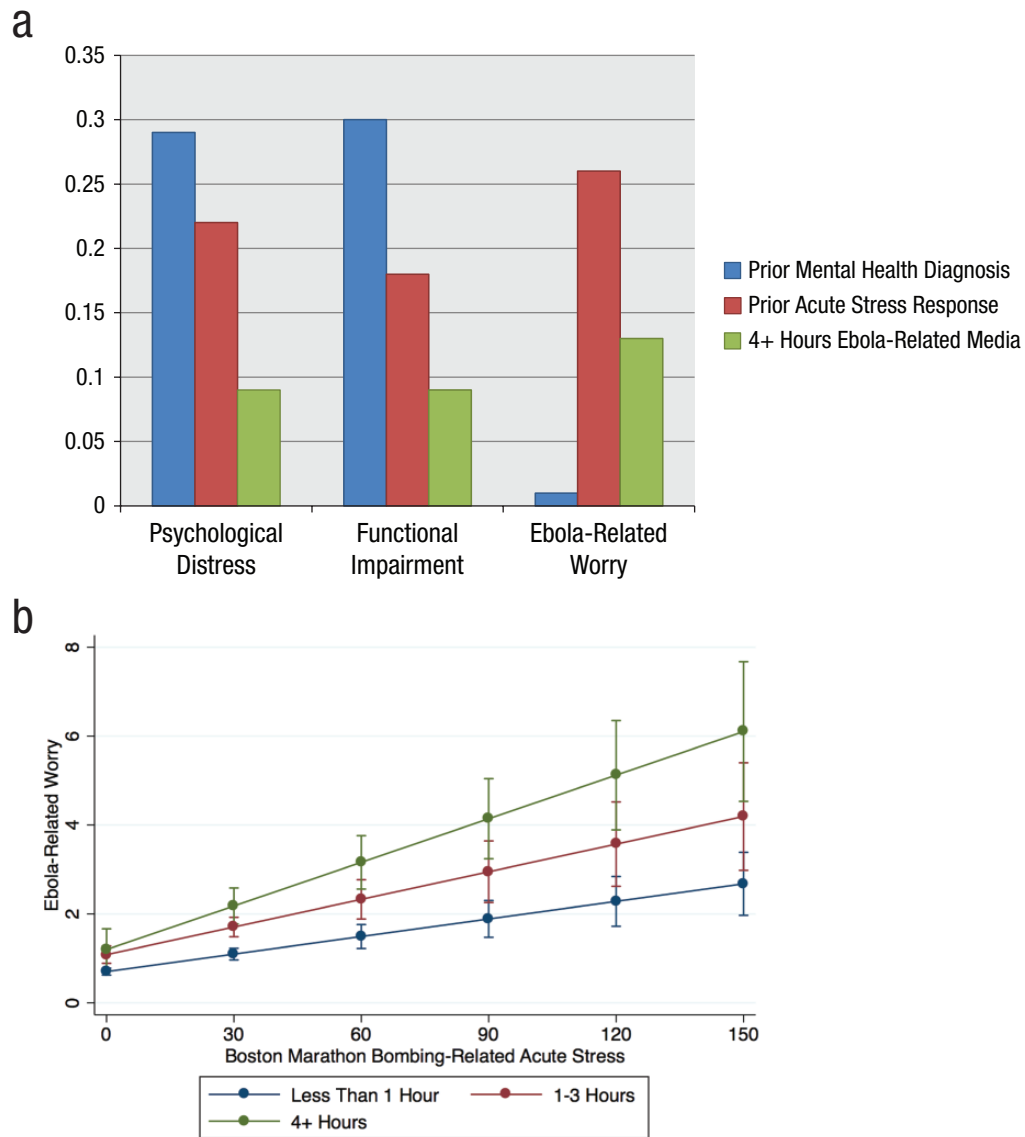
a

b

Fig. 1. Associations between prior mental health, prior acute stress, Ebola-related media exposure, and distress, functioning, and worry. (a) Standardized regression coefficients for predictors of psychological distress, functional impairment, and Ebola-related worry. (b) Graph of the interaction between BMB-related acute stress and hours of Ebola media on Ebola-related worry.

These results are consistent with analyses conducted shortly after the BMB demonstrating that media exposure was a powerful predictor of event-related acute stress responses; effect size indicators for the highest levels of media exposure were stronger than direct exposure to the bombing or subsequent lockdown (Holman et al., 2014). Taken together, our findings bolster the suggestion that media is an important purveyor of distress. Moreover, findings suggest that those with preexisting mental health conditions and those who responded with acute stress to a previous community trauma may exhibit higher distress following media exposure to subsequent community-wide stressful events (Garfin et al., 2015; Silver et al.,

2013). This worry may translate into measureable consequences for individual and public health (Holman et al., 2008; Ottaviani et al., 2016).

Despite our longitudinal design, a number of key findings are correlational, prohibiting causal inferences. Yet demographic information, mental health history, and acute stress responses to the BMB were assessed 18 months prior to the assessment of Ebola-related outcomes, providing important temporal information about associations that is not available in cross-sectional studies. Moreover, the unparalleled media attention to Ebola, coupled with the preexisting large representative national sample on which we had already collected valuable

information, provided a unique opportunity to examine adjustment processes in the absence of methodological limitations that are frequent in research on disasters (e.g., lack of pre-event data; retrospective data collection; small, demographically homogenous samples; Silver et al., 2006). It should also be noted that there are limitations with some of our measures. Specifically, our measure of mental health is rather narrow in that it only captures prior diagnoses of depression and anxiety by a medical professional; a measure assessing severity of anxiety and depressive symptomatology more generally would provide a broader assessment of prior mental health. Additionally, our measure of neuroticism was very brief and was assessed approximately 18 months following the Ebola data collection period. Nonetheless, the TIPI has adequate test–retest reliability and convergent validity when compared to other longer personality inventories (Gosling et al., 2003), and personality traits are considered relatively stable in adult samples (Costa & McCrae, 1988).

Finally, it should be acknowledged that Ebola-related media exposure was measured concurrently with psychological distress, functional impairment, and worry about Ebola, and so the causal direction of these relationships remains to be more fully explicated. Future studies should attempt to disentangle the interrelationships between individuals consuming a great deal of negative media and increased distress that then may lead to more media exposure that elicits more distress. Furthermore, although we made every attempt to control for possible third variable explanations, it is still possible that the associations reported here may be explained by another factor that we were unable to capture (e.g., trait anxiety not captured by neuroticism or prior mental health diagnoses). Other cognitive and psychological mediators of these relationships likely exist and should be explored in future research. For example, more experimental work is needed to assess the impact of media exposure outside a context in which individuals self-select into media exposure categories. Regardless, our findings suggest an important link between exposure to media coverage of stressful content and distress—something individuals may want to remember when making their own media consumption decisions.

Our findings have several important implications. Distress responses to the Ebola crisis likely posed considerable detriment to public health above and beyond those presented from the biological Ebola virus. First, public response in the United States likely diverted essential financial and human resources from locations most directly impacted by the virus (Cohen, 2014). Second, unfounded worry may unnecessarily burden healthcare providers. Such ramifications occurred in the midst of the 2009 outbreak of influenza H1N1, resulting in an increase in emergency department visits, even during a period without actual H1N1 influenza in the community (McDonnel, Nelson, & Schunk, 2012). Conversely, people's fear of being infected during visits to health clinics can also prevent them from seeking necessary health care. For example, the Severe Acute Respiratory Syndrome (SARS) epidemic in 2003 correlated with a substantial decrease in health care utilization in areas most affected by the epidemic (Chang et al., 2004).

We were unable to differentiate among different types of media sources (e.g., traditional vs. "new" media) in the present analyses. Although the demographic differences among users of various media types are well documented (Kohut, Doherty, Dimock, & Keeter, 2012), we do not yet know whether the experience of getting one's news from these sources also differs across platforms. For example, perhaps the act of seeking out news stories on the Internet results in a different experience than passively consuming news presented on the television. Future research should consider how differences among users and experiences of using these various media sources might impact the relationship between media use and crisis-related distress.

Communicating with the public about the dangers of Ebola and other health crises in order to raise awareness without propagating excessive worry is imperative (Fischhoff, 2011) and must be a discussion for those in the field of traumatic stress, public health policy, media reporting, and service provision (Lubens, 2015). For example, news stories with potentially stressful content should focus on providing tangible information rather than sensationalized reports of worst-case scenarios. At the individual level, mental health professionals should be aware that their patients' anxiety or other psychopathology may be exacerbated by these external social phenomena. Our findings provide support for growing evidence that media reports of collective crises are associated with distress among many individuals, a problem that will only increase with the proliferation of portable technologies (e.g., smartphones). Responsible media reporting before, during, and following stressful events should be considered an important topic to address before future crises arise. In order to maintain the mental and physical health of our communities, it is crucial that a balance be struck between responsible dissemination of information and overly sensationalized coverage that may be proliferating distress responses.

Author Contributions

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Declaration of Conflicting Interests

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References

Ahern, J., Galea, S., Resnick, H., & Vlahov, D. (2004). Television images and probable posttraumatic stress disorder after September 11. *The Journal of Nervous and Mental Disease*, *192*, 217–226. http://doi.org/10.1097/01.nmd.0000116465.99830.ca

Bernstein, K. T., Ahern, J., Tracy, M., Boscarino, J. A., Vlahov, D., & Galea, S. (2007). Television watching and the risk of incident probable posttraumatic stress disorder: A prospective evaluation. *The Journal of Nervous and Mental Disease*, *195*, 41–47. http://doi.org/10.1097/01.nmd.0000244784.36745.a5

Bourne, C., Mackay, C. E., & Holmes, E. A. (2013). The neural basis of flashback formation: The impact of viewing trauma. *Psychological Medicine*, *43*, 1521–1532. http://doi.org/10.1017/S0033291712002358

Breslau, N., Chilcoat, H. D., Kessler, R. C., & Davis, G. C. (1999). Previous exposure to trauma and PTSD effects of subsequent trauma: Results from the Detroit Area Survey of Trauma. *The American Journal of Psychiatry*, *156*, 902–907. http://dx.doi.org/10.1176/ajp.156.6.902

Breslau, N., Peterson, E. L., & Schultz, L. R. (2008). A second look at prior trauma and the posttraumatic stress disorder effects of subsequent trauma. *Archives of General Psychiatry*, *65*, 431–437. doi:10.1001/archpsyc.65.4.431

Cardeña, E., Koopman, C., Classen, C., Waelde, L. C., & Spiegel, D. (2000). Psychometric properties of the Stanford Acute Stress Reaction Questionnaire (SASRQ): A valid and reliable measure of acute stress. *Journal of Traumatic Stress*, *13*, 719–734. http://doi.org/10.1023/A:1007822603186

Chang, H. J., Huang, N., Lee, C. H., Hsu, Y. J., Hsieh, C. J., & Chou, Y. J. (2004). The impact of the SARS epidemic on the utilization of medical services: SARS and the fear of SARS. *American Journal of Public Health*, *94*, 562–564. doi:10.2105/AJPH.94.4.562

Cohen, J. (2014). *Is Ebola diverting resources from other neglected diseases?* Retrieved from http://theconversation.com/is-ebola-diverting-resources-from-other-neglected-diseases-34475

Costa, P. T., & McCrae, R. R. (1988). Personality in adulthood: A six-year longitudinal study of self-reports and spouse ratings on the NEO Personality Inventory. *Journal of Personality and Social Psychology*, *54*, 853–863. http://doi.org/10.1037/0022-3514.54.5.853

Derogatis, L. R. (2001). *BSI 18, Brief Symptom Inventory 18: Administration, scoring and procedures*. Minneapolis, MN: NCS Assessments.

Faasse, K., Gamble, G., Cundy, T., & Petrie, K. J. (2012). Impact of television coverage on the number and type of symptoms reported during a health scare: A retrospective pre–post observational study. *BMJ Open*, *2*(4). http://doi.org/e001607

Fischhoff, B. (2011). Communicating about the risks of terrorism (or anything else). *American Psychologist*, *66*, 520–531. http://doi.org/10.1037/a0024570

Garfin, D. R., Holman, E. A., & Silver, R. C. (2015). Cumulative exposure to prior collective trauma and acute stress responses to the Boston Marathon bombings. *Psychological Science*, *26*, 675–683. http://doi.org/10.1177/0956797614561043

Gosling, S. D., Rentfrow, P. J., & Swann, W. B. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality*, *37*(6), 504–528. http://doi.org/10.1016/S0092-6566(03)00046-1

Grippo, A. J., & Johnson, A. K. (2009). Stress, depression and cardiovascular dysregulation: A review of neurobiological mechanisms and the integration of research from preclinical disease models. *Stress*, *12*(1), 1–21. http://doi.org/10.1080/10253890802046281

Hadjistavropoulos, H. D., Craig, K. D., & Hadjistavropoulos, T. (1998). Cognitive and behavioral responses to illness information: The role of health anxiety. *Behaviour Research and Therapy*, *36*, 149–164. http://dx.doi.org/10.1016/S0005-7967(98)00014-X

Hamel, L., Firth, J., & Brodie, M. (2014). *Kaiser health policy news index: Special focus on Ebola*. Retrieved from http://kff.org/global-health-policy/poll-finding/kaiser-health-policy-news-index-special-focus-on-ebola/

Holman, E. A., Garfin, D. R., & Silver, R. C. (2014). Media's role in broadcasting acute stress following the Boston Marathon bombings. *Proceedings of the National Academy of Sciences of the USA*, *111*, 93–98. http://doi.org/10.1073/pnas.1316265110

Holman, E. A., & Silver, R. C. (2011). Health status and health care utilization following collective trauma: A 3-year national study of the 9/11 terrorist attacks in the United States. *Social Science and Medicine*, *73*, 483–490. http://doi.org/10.1016/j.socscimed.2011.06.018

Holman, E. A., Silver, R. C., Poulin, M. J., Andersen, J., Gil-Rivas, V., & Mcintosh, D. N. (2008). Terrorism, acute stress, and cardiovascular health: A 3-year national study following the September 11th attacks. *Archives of General Psychiatry*, *65*, 73–80. doi:10.1001/archgenpsychiatry.2007.6

Kohut, A., Doherty, C., Dimock, M., & Keeter, S. (2012). In changing news landscape, even television is vulnerable.

Retrieved from http://www.people-press.org/2012/09/27/in-changing-news-landscape-even-television-is-vulnerable/

Lubens, P. (2015). Journalists and public health professionals: Challenges of a symbiotic relationship. *Disaster Medicine and Public Health Preparedness*, *9*, 59–63. http://doi.org/10.1017/dmp.2014.127

MacCallum, R. C., Zhang, S., Preacher, K. J., & Rucker, D. D. (2002). On the practice of dichotomization of quantitative variables. *Psychological Methods*, *7*, 19–40. http://doi.org/10.1037/1082-989X.7.1.19

McDonnel, W. M., Nelson, D. S., & Schunk, J. E. (2012). Should we fear "flu fear" itself? Effects of H1N1 influenza fear on ED use. *American Journal of Emergency Medicine*, *30*, 275–282. http://doi.org/10.1016/j.ajem.2010.11.027

McEwen, B. S. (2004). Protection and damage from acute and chronic stress: Allostasis and allostatic overload and relevance to the pathophysiology of psychiatric disorders. *Annals of the New York Academy of Sciences*, *1032*(1), 1–7. http://doi.org/10.1196/annals.1314.001

Ottaviani, C., Thayer, J. F., Verkuil, B., Lonigro, A., Medea, B., Couyoumdjian, A., & Brosschot, J. F. (2016). Physiological concomitants of perseverative cognition: A systematic review and meta-analysis. *Psychological Bulletin*, *142*, 231–259. http://doi.org/http://dx.doi.org/10.1037/bul0000036

Silver, R. C., Holman, E. A., Andersen, J. P., Poulin, M. J., Mcintosh, D. N., & Gil-Rivas, V. (2013). Mental- and physical-health effects of acute exposure to media images of the September 11, 2001, attacks and the Iraq War. *Psychological Science*, *24*, 1623–1634. https://doi.org/10.1177/0956797612460406

Silver, R. C., Holman, E. A., McIntosh, D. N., Poulin, M., & Gil-Rivas, V. (2002). Nationwide longitudinal study of psychological responses to September 11. *JAMA: The Journal of the American Medical Association*, *288*, 1235–1244. doi:10.1001/jama.288.10.1235

Silver, R. C., Holman, E. A., McIntosh, D. N., Poulin, M., Gil-Rivas, V., & Pizarro, J. (2006). Coping with a national trauma: A nationwide longitudinal study of responses to the terrorist attacks of September 11th. In Y. Neria, R. Gross, R. Marshall, & E. Susser (Eds.), *9/11: Mental health in the wake of terrorist attacks* (pp. 45–70). New York: Cambridge University Press.

U.S. Department of Health and Human Services. (2001). *National Center for Health Statistics: National Health Interview Survey Questionnaire 2000*. Hyattsville, MD: U.S. Department of Health and Human Services.

Vasterman, P., Yzermans, C. J., & Dirkzwager, A. J. E. (2005). The role of the media and media hypes in the aftermath of disasters. *Epidemiologic Reviews*, *27*, 107–114. https://doi.org/10.1093/epirev/mxi002

Ware, J. E., & Sherbourne, C. D. (1992). The MOS 36-Item Short-Form Health Survey (SF–36): I. Conceptual framework and item selection. *Medical Care*, *30*, 473–483. http://doi.org/10.1097/00005650-199206000-00002