

Expressing Thoughts and Feelings Following a Collective Trauma: Immediate Responses to 9/11 Predict Negative Outcomes in a National Sample

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Collective traumas can negatively affect large numbers of people who ostensibly did not experience events directly, making it particularly important to identify which people are most vulnerable to developing mental and physical health problems as a result of such events. It is commonly believed that successful coping with a traumatic event requires expressing one's thoughts and feelings about the experience, suggesting that people who choose not to do so would be at high risk for poor adjustment. To test this idea in the context of collective trauma, 2,138 members of a nationally representative Web-enabled survey panel were given the opportunity to express their reactions to the terrorist attacks of September 11, 2001, on that day and those following. Follow-up surveys assessing mental and physical health outcomes were completed over the next 2 years. Contrary to common belief, participants who chose not to express any initial reaction reported better outcomes over time than did those who expressed an initial reaction. Among those who chose to express their immediate reactions, longer responses predicted worse outcomes over time. Implications for myths of coping, posttrauma interventions, and psychology in the media are discussed.

Keywords: collective trauma, coping, expression, September 11 terrorist attacks, terrorism

The more they [Virginia Tech students] can talk about what they've lived through, the more that they can be encouraged to emote, that gives them some security and insulation against burying those feelings and then having them surprise them later in life. —Keith Ablow, M.D., NBC's Today television show, April 17, 2007

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It is commonly believed in clinical practice and public consciousness that expressing one's thoughts and feelings about a traumatic event is necessary for successful coping (e.g., Everly & Mitchell, 1999; see Wortman & Boerner, 2007; Wortman & Silver, 1989, 2001, for additional discussion). The mental and physical health benefits of experimental disclosure are supported by research findings (Frattaroli, 2006), but in the domain of early psychological intervention after trauma, widespread clinical application has outpaced rigorous research that has successfully demonstrated the efficacy of encouraging expression (McNally, Bryant, & Ehlers, 2003). The existing research into the benefits of expression has *not* addressed a closely related aspect of the assumption: choosing not to express in the early aftermath of a trauma is actively harmful if not pathological. If true, people who make a choice not to express when given an opportunity to do so should be at particularly high risk for poor outcomes over time. In contrast, if people who are more distressed are more likely to express (e.g., see Pennebaker, Zech, & Rimé, 2001), choosing not to express in the wake of a trauma may reflect resilience rather than vulnerability. This question has important implications for the relationship between expression and coping with trauma as well as for determining efficient allocation of clinical resources following large-scale community disasters with many affected survivors.

Such large-scale collective traumas are the focus of the present investigation. The terrorist attacks of September 11, 2001, represent a collective trauma in that people across the country suffered adverse effects, even though the vast majority of them did not

suffer direct and tangible losses (Marshall et al., 2007; Schlenger et al., 2002; Schuster et al., 2001; Silver, Holman, McIntosh, Poulin, & Gil-Rivas, 2002). In contrast to other traumas that may be experienced more intensely by a given individual than by the surrounding community (e.g., violent assault, death of a loved one), a collective trauma is more likely to create a similar situation across the community. Expression after an individual trauma is likely to be directed toward an audience of unaffected observers, whereas expression after a collective trauma is likely to be directed toward an audience that is also affected by the event (cf. Pennebaker & Harber, 1993).

Beliefs about the importance of expression hold a prominent place in the intersection between psychological science and public understanding. Keith Ablow, a psychiatrist featured on the nationally broadcast *Today* television show, exemplified this in his expression of the comments that opened this article, after a student gunman shot and killed 32 people on the campus of Virginia Polytechnic Institute and State University (Virginia Tech). Most members of the Virginia Tech community were not physically injured and did not directly witness the shootings, but they were nonetheless affected. Statements like this, which ostensibly represent the state of scientific knowledge, are likely to garner media attention, especially in the wake of a collective trauma.

Clear answers about expression and collective trauma are thus doubly important. First, it is not obvious which individuals among the large number who have not experienced "direct" loss in the immediate aftermath of a collective trauma should be most likely to experience lasting negative effects. Understanding the relationship between willingness to express and long-term outcomes can help to remedy this problem. Second, collective traumas are instances in which psychological science is not only relevant but also brought to the center of public attention. Faulty conclusions dispersed in the media may harm laypeople who act on them of their own accord as well as harm the field of psychology just as its practitioners strive to build a case for research support in times of limited governmental funding.

To this end, the current study tested the relationship between *immediate* posttrauma expression choices and 2-year longitudinal mental and physical health outcomes in a nationally representative sample following a collective trauma: the terrorist attacks of September 11, 2001. The critical issue is whether lack of expression in the face of a collective trauma reflects vulnerability or resilience.

Expressing After Trauma

Myths of Coping

In their reviews of coping with loss, Wortman and Silver (1989, 2001) concluded that "myths of coping" exist, based on the observation that several common assumptions about the process of coping with bereavement are unsupported by empirical data. Bereavement and trauma typically overlap (Stroebe, Schut, & Stroebe, 1998); when extending these arguments to the context of coping with traumatic events, two elements are particularly relevant: (a) failing to exhibit distress is problematic; and (b) it is important to "work through" or come to terms with the negative experience. Expressing one's thoughts and feelings about a trauma should play a key role in both of these elements, which suggests that failing to express should predict poor adjustment. Despite

assertions that lack of observable grief is pathological (e.g., Horowitz, 1990), and frequent endorsement among clinicians of the existence of "delayed grief reactions" in which initial denial or inhibition of distress results in later maladaptive resurgence (Middleton, Moylan, Raphael, Burnett, & Martinek, 1993), such beliefs are not supported by empirical evidence (Wortman & Boerner, 2007; Wortman & Silver, 2001). Indeed, there is little evidence that expression of emotions has any beneficial effect following bereavement (Stroebe, Stroebe, Schut, Zech, & van den Bout, 2002), and there is some evidence that it may even impede successful coping (Bonanno & Keltner, 1997).

Benefits of Experimental Disclosure

Nonetheless, a growing body of research has demonstrated benefits of experimental disclosure, in which participants typically are randomly assigned either to express their thoughts and feelings about a personally meaningful topic (e.g., a traumatic event) or to perform a control task. Pennebaker and Beall (1986) conducted the seminal study in this tradition, showing that participants in a trauma-expression condition reported fewer illness-related doctor visits than others did. In a recent meta-analysis, Frattaroli (2006) reviewed 146 randomized disclosure studies. Results revealed an overall benefit of expression. Breaking down the existing research into categories by dependent variable further revealed the following: (a) an overall benefit for psychological health, including specific benefits for distress, depression, positive functioning, anger, and anxiety; and (b) an overall benefit for reported physical health, including benefits for specific disease outcomes and illness behaviors.

Two points important for the domain of early coping with trauma are noteworthy. First, no significant effects emerged in Frattaroli's (2006) meta-analysis for the general psychological "stress" category of dependent variables or its component, post-traumatic stress (PTS) symptoms, which is a key trauma-related outcome. Second, the mean amount of time between the target event and disclosure was 15 months, well beyond the timeframe of early intervention. These points indicate that this meta-analysis and the research on which it is based do not provide a definitive statement applicable to the immediate posttrauma context.

Early Posttrauma Intervention

Empirical evidence regarding the effectiveness of early posttrauma intervention designed to facilitate expression may help shed light on expression's value. Psychological debriefing is the most common type of intervention, and within this category of techniques, critical-incident stress debriefing (CISD; Mitchell, 1983) is the most widespread (McNally et al., 2003). An essential objective of psychological debriefing in general and CISD in particular is to encourage expression of one's thoughts and feelings about a traumatic event soon after it happens. Indeed, expression is thought to be a necessary component of successful coping. Engaging in it should thus reduce the risk of subsequent mental health problems resulting from the trauma, including posttraumatic stress disorder (PTSD; Everly & Mitchell, 1999; Mitchell, 1983; for additional discussion, see McNally et al., 2003).

Despite the frequent application of single-session CISD in clinical practice, reviews of methodologically rigorous studies have

failed to support its utility. In a meta-analysis, van Emmerik, Kamphuis, Hulsbosch, and Emmelkamp (2002) found that CISD did not significantly improve PTS or other trauma-related symptoms (e.g., general anxiety and depression) and did not differ from no intervention at all. In a narrative review, McNally et al. (2003) similarly concluded that there exists a lack of convincing evidence to support the use of psychological debriefing.

Choosing Not to Express

The evidence reviewed thus far supports general benefits of expressing one's thoughts and feelings about a trauma. However, these benefits are evident with relatively distant, rather than recent, traumas and have not supported mitigation of PTS symptoms. Rimé and colleagues (for reviews, see Pennebaker et al., 2001, and Rimé, Finkenauer, Luminet, Zech, & Philippot, 1998) have further investigated social sharing about a negative event. They have found that most people do share their emotions with others. Although such sharing leads individuals to report perceived benefits, it does not predict actual emotional recovery from the event (e.g., Zech & Rimé, 2005). Four broad types of research have been conducted that support these conclusions: (a) creating an emotional experience in the laboratory (e.g., watching a disturbing video), (b) asking participants about an event from their past that they find most troubling, (c) daily diary methodology in which participants report on the everyday events they have just experienced, and (d) contacting participants after they experience an emotional event (e.g., childbirth). These approaches provide important insight but do not directly address expression in the immediate aftermath of a collective trauma. In addition, when longitudinal data were collected in these studies, it was typically for a matter of weeks with small samples, which may not be long enough or powerful enough to find possible delayed reactions.

In sum, existing research has left unanswered important questions regarding the relationship between expressing thoughts and feelings and coping success. Consistent with Wortman and Silver's (1989, 2001) myths of coping, McNally et al. (2003) raised the key issue that "professionals working with trauma survivors may have too quickly concluded that the initial disinclination of survivors to discuss their trauma constitutes a form of dysfunctional avoidance likely to hinder recovery" (p. 66). Importantly, although experimental manipulations certainly have their place, they do not address the matter of self-selection in posttrauma expression: What does it mean when people choose to express versus not to express, and what implications does this have for subsequent mental and physical health outcomes?

If expression is beneficial, individuals who choose not to express immediately after a collective trauma should exhibit greater mental and physical health symptoms over time compared with those who do express their feelings. However—consistent with Rimé's findings (e.g., Pennebaker et al., 2001; Rimé et al., 1998)—if belief in the value of expression is nothing more than an unsupported assumption about coping, choosing not to express may represent a true lack of trauma-related distress rather than pathological denial. In other words, when compared with less distressed individuals, those who experience more intense distress after a trauma should be more likely to express their feelings. This greater distress, in turn, should predict greater long-term symptoms.

The Current Investigation

Challenges of Trauma Research

Investigating the role of immediate posttrauma expression choices in coping outcomes poses several challenges. Silver et al. (2006) identified a number of problems typical of trauma research. First, small and nonrepresentative samples (e.g., natural disaster survivors in a particular area) are the norm, potentially limiting generalizability and clinical applicability. Second, data collection often begins too late, without pretrauma measures of functioning or immediate posttrauma responses. This complicates interpretation of subsequent outcomes and precludes access to rich sources of data. Third, studies are often not longitudinal, and when they are, they often do not follow participants for longer than 12 months, potentially missing long-term effects.

Terrorist Attacks of September 11, 2001

By investigating responses to this collective trauma in particular, the present study was able to avoid several limitations. First, the national scope of the event made it possible to draw a large and diverse national sample. Second, using an existing survey panel (see Method for details) allowed assessments of pretrauma mental and physical health as well as immediate posttrauma reactions. Third, respondents could be followed for 2 years posttrauma.

Overview

Beginning on September 11, 2001, respondents had the opportunity to provide their reactions to the terrorist attacks by using an open-ended prompt. With these responses, two questions were tested: (a) Did choosing to express thoughts and feelings by responding to the prompt versus choosing not to express (i.e., not responding) predict mental and/or physical health outcomes over the following 2 years? (b) Among individuals who expressed, did length of response predict longitudinal outcomes?

It was possible to generate competing predictions. If choosing not to express at all or expressing only minimally in the immediate aftermath of a collective trauma is harmful and reflects vulnerability to poor adjustment, then individuals who did not respond or submitted shorter responses should exhibit higher symptoms over time, relative to those who responded and submitted longer responses. In contrast, if choosing not to express is not harmful and reflects resilience and a true lack of posttrauma distress, not responding or submitting shorter responses should be associated with lower symptoms over time.

Method

Data Collection With a Web-Enabled Panel

The study sample, provided by Knowledge Networks Inc. (KN), an online survey research company, was drawn from a nationally representative Web-enabled panel that was created through traditional probability methods (i.e., using random-digit dialing [RDD]; for details, see Silver et al., 2002, 2006). To ensure representation of population segments that would not otherwise have Internet access, KN provides panel households with an Internet connection and Web TV to serve as a computer monitor. In exchange, panel

members agree to complete 3–4 short surveys a month sent through their password-protected e-mail addresses. Unlike typical Internet panels, in which people who already have Internet access choose to opt in, no one can volunteer for the KN panel; all participants are selected with RDD. Thus, the KN probability-based, Web-enabled panel is demographically comparable with samples that are obtained by RDD survey methodology. Krosnick and Chang (2001) reported an empirical comparison of the KN panel to a traditional RDD sample and found it to be comparable in terms of both demographics and “psychographics” (e.g., self-perceptions, civic attitudes, political attitudes, and behavior). The recruitment response rate for the current study was approximately 53%—comparable with traditional RDD samples (Krosnick & Chang, 2001). Once participants have been selected for the panel, responding to any given survey is voluntary, and the provision of Internet service is not dependent on completion of any specific survey. Even though panel members complete surveys regularly, there are no significant differences over time in responses given by “seasoned” participants from “naïve” ones (Dennis, 2001).

Demographic variables are assessed for all individuals when they enroll in the KN panel. On entry into the KN panel and prior to September 11, 2001, respondents also completed a survey of their mental and physical health history that assessed whether a physician had ever diagnosed them with any of 35 physical and mental health problems, including depression and anxiety disorder.

Respondents were informed about the study and its risks and benefits prior to completing each survey; subsequent completion of the surveys was considered informed consent to participate. The research was conducted in compliance with the university’s Internal Review Board.

Current Sample

On September 11, 2001, KN e-mailed its panelists the following open-ended prompt: “If you would like, please share your thoughts on the shocking events of today.” Panel members were allowed to provide written responses to the open-ended prompt until September 21, 2001. Approximately 36,000 KN panel members were available to receive surveys at that time; of these, 19,593 opened the e-mail containing the prompt and 13,958 responded. Independently, in the years following the 9/11 attacks, our research team collected longitudinal data from a nationally representative sample of the adult United States population randomly selected from the KN panel (see Silver et al., 2002, 2006); 3,170 respondents completed subsequent waves of data over the following 2 years. Within this group, a subsample of 2,138 respondents also read the open-ended prompt immediately after 9/11. Of this sample, 1,559 chose to write a response to the open-ended prompt; the remaining 579 saw the prompt but chose not to respond (for more details on the subsample who responded, see Chu, Seery, Ence, Holman, & Silver, 2006).

Measures

Response to open-ended prompt. Two variables were created from responses to the open-ended prompt described above: (a) a dichotomous measure of whether or not participants responded to the prompt and (b) a measure of the length of response (in characters) provided by those who did respond.

Long-term adjustment. Respondents completed longitudinal assessments at five points in time: approximately 2 months, 6 months, 12 months, 18 months, and 24 months post-September 11, 2001. These assessments were administered by KN online or via paper-and-pencil follow-up surveys mailed to respondents. Participants completed measures of generalized distress, PTS symptoms, and physical health ailments. Generalized distress was assessed with the Brief Symptom Inventory (BSI-18; Derogatis, 2001) at 6, 12, 18, and 24 months posttrauma ($\alpha = .92-.93$). PTS symptoms were assessed with the Impact of Event Scale—Revised (IES-R; Weiss & Marmar, 1997) at 2 and 6 months posttrauma ($\alpha = .94$ & $.95$, respectively); and the PTSD Checklist (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993), a conceptually similar measure with overlapping items, at 12, 18, and 24 months posttrauma ($\alpha = .92-.94$). Reports of physician-diagnosed physical and mental health ailments were assessed at 12 and 24 months posttrauma by using the identical measure from pre-September 11, 2001.

Exposure to the 9/11 attacks. Items modified from prior research on disaster exposure (Holman & Silver, 1998; Koopman, Classen, & Spiegel, 1994) assessed respondents’ 9/11-related exposure. Individuals were categorized into one of three levels of exposure: *direct exposure*—in the World Trade Center (WTC) or Pentagon, seeing or hearing the attacks in person, or having a close relationship with someone in the targeted buildings or airplanes; *live media exposure*—watching the attacks on television live as they occurred; and *no live exposure*—seeing video replay or learning of the attacks only after they had occurred. United States Postal Service residential zip codes were used to compute distance from the WTC, categorized into groups representing individuals who lived within 25 miles; 25–100 miles; 100–500 miles; 500–1,000 miles; and over 1,000 miles from the WTC.

Other potential explanatory covariates. An index of physician-diagnosed mental health problems with values of 0 (*no diagnoses*) or 1 (*depression, anxiety, or both*) was created from the pre-9/11 health survey. A count of pre-9/11 physician-diagnosed physical health ailments was also created from the health diagnosis checklist and used as a covariate in all analyses.

Acute stress responses were assessed 2 weeks post-attacks by using the Stanford Acute Stress Reaction Questionnaire (Cardena, Koopman, Classen, Waelde, & Spiegel, 2000). Items were revised to a 6.5 grade Kincaid reading level, and respondents reported whether they “experienced” or “did not experience” 9/11 stress-related symptoms ($\alpha = .88$). At the same time, respondents completed the Brief COPE (Carver, 1997), a measure of 14 different coping strategies (e.g., active coping, denial, emotional support seeking, self-blame). Participants indicated on a 4-point scale the frequency with which they used each strategy to cope with the 9/11 terrorist attacks.

Participants also completed a modified version of the World Assumptions Scale (Janoff-Bulman, 1989), a measure that assesses beliefs about the benevolence and meaningfulness of the world, in each of the surveys administered between 2 and 24 months post-9/11. This measure had good reliability across all waves ($\alpha = .79-.87$).

Lifetime exposure to stressful events was assessed by asking participants whether they ever experienced each of 37 negative events (e.g., child abuse, divorce) and the age(s) at which they occurred. This measure was modified from the Diagnostic Inter-

view Schedule trauma section (Robins, Helzer, Croughan, Williams, & Spitzer, 1981), was expanded to include a wider variety of stressful events by using primary care patients' reports of lifetime stress (Holman, Silver, & Waitzkin, 2000), and has provided rates of specific events comparable with those in other community samples (Breslau et al., 1998; Kessler, Sonnega, Bromet, & Nelson, 1995). A continuous variable was computed representing the total number of pre-9/11 stressors. Finally, 18 months post-September 11, 2001, participants completed the Ten-Item Personality Inventory (Gosling, Rentfrow, & Swann, 2003), a brief measure of the Big Five personality domains.

Analytic Strategy

Analyses. Analyses were conducted with generalized estimating equations (GEE), a population-averaged analysis appropriate for longitudinal survey data that accommodates missing data and provides necessary adjustments of standard errors. The analysis combines assessment points for a given dependent variable, yielding a single significance test for each predictor across all assessments. Because two different scales were used to assess PTSD symptoms (the IES-R at 2 and 6 months posttrauma; and the PCL at 12, 18, and 24 months posttrauma), the two spans of time corresponding to each scale were analyzed separately. All analyses were conducted with STATA for Macintosh (Version 9.2), specifying the robust option.

Covariates. All analyses controlled for the following (hereafter referred to as the standard covariates): demographics (gender, ethnicity, age, income, marital status, and education); degree of exposure to and distance from the attacks; and pre-9/11 mental and physical health history. To establish that results were not driven primarily by respondents who were distant from or relatively unexposed to the trauma, interactions between the primary predictors and distance and exposure were also tested. There were 1,779 respondents with complete data on all covariates of interest, constituting the sample used for these analyses.

As previous research has demonstrated that acute stress is a risk factor for subsequently developing PTSD (e.g., Brewin, Andrews, & Rose, 2003; Ozer, Best, Lipsey, & Weiss, 2003), separate analyses tested whether the predictive effects of responding to the prompt were independent of acute stress symptoms assessed 2 weeks post-attacks. We also conducted secondary analyses to rule out plausible alternative explanations for our findings (see below).

Transformations. The following variables were highly positively skewed, so inverse or natural logarithmic transformations were performed: length of written response to the open-ended prompt (number of characters), acute stress response, generalized distress, PTSD symptoms, and pre-9/11 physical health diagnoses.

Coefficient reporting. To make coefficients reported in tables and the text more interpretable, all continuous predictors (e.g., response length) were standardized and all continuous outcome variables except for diagnosed physical disorders (see below) were divided by the standard deviation of all observations across all waves of data collection. Coefficients thus reflect effect sizes in units of standard deviations. Because GEE utilizes maximum likelihood estimation, traditional measures of effect size such as variance accounted for cannot be calculated. For categorical predictors (e.g., choosing to respond to the prompt vs. choosing not to respond), B coefficients represent the difference between the com-

pared groups in standard deviations of the outcome variable. For continuous predictors (e.g., length of response to the prompt), β coefficients represent the number of standard deviations of change in the outcome variable predicted for each standard deviation change in the predictor. For dichotomous outcomes, odds ratios represent the relative likelihood of the outcomes as a function of category membership (categorical predictor) or, for continuous predictors, each standard deviation change in the predictor (e.g., the degree of increase in the likelihood of choosing to respond to the prompt vs. choosing not to respond for each standard deviation increase in age). Because physical diagnoses are count data, incidence-rate ratios (IRRs)—analogous to odds ratios—are reported for that outcome variable.

Power analysis. According to Twisk (2003), with three waves of data collection and within-subject correlations of 0.5 between waves, 1,178 total respondents are required to achieve power of 0.8 when alpha is 0.05 and the expected effect is 0.1 standard deviations in magnitude. This estimate suggests that the current design and sample provide ample power to detect small-to-medium effects.

Results

Sample Characteristics

At the start of the study, the sample ranged in age from 18 to 91 years old, with a median of 48 years, and was 50.6% women and 49.4% men. Almost 73% of the sample self-identified as White (non-Hispanic), 10.6% as Hispanic, 9.4% as African American (non-Hispanic), and 7.2% as Other, which included Asian. Median household income was \$40,000–\$49,999. Approximately 61% of the sample was married, 15% was divorced or separated, 16.2% was single, and 7.7% was widowed. Just over 9% of the sample attained less than a high school degree, 35.7% held a high school degree, 29.7% attended some college, and 25.3% held a college or advanced degree. The number of pre-9/11 physician-diagnosed physical health ailments ranged from 0 to 26, with a median of 3. Prior to September 11, 2001, 14.7% of the sample reported that a physician had diagnosed depression, anxiety, or both. Just over 6% of the sample lived within 25 miles of the WTC, 5.2% lived between 25 and 100 miles, 20.4% between 100 and 500 miles, 23.9% between 500 and 1,000 miles, and 44.3% lived over 1,000 miles. More than 4% of the sample reported having been directly exposed to the attacks, 63.4% reported having been exposed by watching the attacks live on TV, and 32.4% reported no live exposure.

Predictors of Reading the Open-Ended Prompt

A subsample of 2,138 respondents reported longitudinal data in the 2 years post-September 11, 2001, and read the open-ended prompt immediately after the attacks. An additional 1,041 reported longitudinal data but did not read the open-ended prompt because they did not open the survey e-mail within the time limit. Differences between these two groups were assessed with a logistic regression analysis, using the variables included in the standard group of covariates (gender, ethnicity, age, income, marital status, education, degree of exposure to and distance from the attacks, and pre-9/11 mental and physical health history) to predict reading the

open-ended prompt versus not reading it. Results revealed that the following were significantly ($ps < .05$) more likely to read the prompt: older respondents (odds ratio [OR] = 1.317; 95% confidence interval [CI] = 1.187, 1.462), widowed respondents compared with married respondents (OR = 1.466; 95% CI = 1.012, 2.125), respondents who lived 100–500 miles away from the WTC (OR = 1.881; 95% CI = 1.255, 2.819) or 500–1,000 miles away from the WTC (OR = 1.481; 95% CI = 1.004, 2.184), compared with those who lived within 25 miles, and respondents with a higher number of pre-9/11 physical health difficulties (OR = 1.122; 95% CI = 1.019, 1.237). The following were less likely to read the prompt: women (OR = 0.827; 95% CI = 0.693, 0.988), and higher-income respondents (OR = 0.868; 95% CI = 0.786, 0.958). No other predictors reached significance. Because lifetime trauma history was assessed after September 11, 2001, it was added to the standard covariate model in a separate analysis; it did not significantly predict reading the prompt.

Predictors of Attrition

In a GEE analysis, using the standard covariates to predict failures to participate in longitudinal assessments over the combined five waves of post-9/11 surveys (each wave coded dichotomously as participated [1] vs. did not participate [0]) revealed that the following people were significantly ($ps < .05$) less likely to miss assessments (i.e., more likely to have provided data): older respondents (OR = 0.830; 95% CI = 0.782, 0.881), and respondents with a high school degree (OR = 0.734; 95% CI = 0.611, 0.881), some college (OR = 0.815; 95% CI = 0.673, 0.988), and a college degree or higher (OR = 0.762; 95% CI = 0.625, 0.930), relative to those with less than a high school degree. No other standard covariates reached significance. When responding to the prompt and length of response were added individually to the standard covariate model, neither variable significantly predicted missing assessments. When lifetime trauma history was added to the standard covariates in a separate analysis, it also failed to predict attrition significantly. A substantial portion of the eligible adult sample continued to participate in follow-up assessments (ranging from a 74%–91% participation rate at each wave), and overall the sample remained representative of the United States adult population over time (see Silver et al., 2006).

Predictors of Expression

Responding to the prompt. Using the standard covariates to predict choosing to respond to the prompt, a logistic regression analysis revealed that older respondents were significantly ($ps < .05$) more likely to choose to respond than were younger respondents (OR = 1.226; 95% CI = 1.081, 1.391), and respondents who reported more pre-9/11 physical health diagnoses were more likely to respond to the prompt (OR = 1.196; 95% CI = 1.061, 1.348). No other standard covariates reached significance. In a separate analysis in which lifetime trauma history was added to the model containing the standard covariates, people who reported more lifetime traumatic events were more likely to choose to respond (OR = 1.199; 95% CI = 1.047, 1.374).

Length of response to prompt. Using the standard covariates to predict response length, a linear regression analysis revealed that women wrote significantly ($ps < .05$) longer responses than

did men ($B = 0.258$), and respondents who reported more pre-9/11 physical health diagnoses wrote longer responses ($\beta = 0.069$). No other standard covariates reached significance. In a separate analysis in which lifetime trauma history was added to the model containing the standard covariates, people who reported more lifetime traumatic events wrote longer responses ($\beta = 0.165$). The primary longitudinal analyses reported below included all standard covariates, regardless of significance in these preliminary models.

Expression and Adjustment Over Time

Compared with participants who elected not to respond to the open-ended prompt, participants who did respond exhibited worse mental health outcomes (see Table 1), and in particular those who responded reported higher PTS symptoms from 2 to 6 months and 12 to 24 months post-9/11, even after controlling for exposure to and distance from the attacks. Importantly, choosing to respond remained a significant predictor of PTS symptoms 12 to 24 months post-9/11, even after adjusting for 9/11-related acute stress response.

Among participants who responded to the open-ended prompt, longer responses were associated with worse mental and physical health (see Table 2), and in particular those who wrote more reported both higher generalized distress from 6 to 24 months posttrauma and more physician-diagnosed physical ailments 12 to 24 months posttrauma, independent of degree of exposure to and distance from the attacks. The effect for physical diagnoses remained significant after adjusting for 9/11-related acute stress response.

These findings were generally not moderated by exposure to or distance from the 9/11 attacks, as most interaction terms were not significant. Significant or nearly significant interactions did emerge between distance (within 25 miles of the WTC [coded 0] vs. farther away [coded 1]) and choosing to respond for PTS symptoms from 2 to 6 months posttrauma ($B = -0.499$; 95% CI = $-1.023, 0.024$; $p = .062$) and 12 to 24 months posttrauma ($B = -0.570$; 95% CI = $-0.974, -0.165$; $p < .01$). Among respondents who lived in close proximity to the WTC, those who responded to the prompt exhibited poorer mental health over time than did those who chose not to respond (from 2 to 6 months: $B = 0.671$; 95% CI = $0.164, 1.177$; $p < .01$; and from 12 to 24 months: $B = 0.727$; 95% CI = $0.336, 1.118$; $p < .001$); this difference was also significant among more distant respondents, but of smaller magnitude (from 2 to 6 months: $B = 0.171$; 95% CI = $0.044, 0.298$; $p < .01$; and from 12 to 24 months: $B = 0.158$; 95% CI = $0.059, 0.256$; $p < .01$). Thus, the interactions showed that the effect for responding versus not responding was in fact stronger among participants who lived closest to the WTC, relative to those who lived farther away.

Secondary Analyses

We conducted several additional analyses to test alternative explanations that might account for the observed relationship between expression and subsequent outcomes, including how people who chose to express might differ from those who did not do so. These analyses included the standard covariates described previously.

Table 1
Choosing to Respond to the Open-Ended Prompt (Versus Not) as a Predictor of Longitudinal Mental and Physical Health Outcomes Over 2 Years Following 9/11

Outcome variable (months post-9/11 when assessed)	Coefficient		95% confidence interval	Z
	B	IRR		
Including standard covariates				
Generalized distress (6-12-18-24) ^a	0.059		-0.032, 0.151	1.27
PTS symptoms (2-6) ^b	0.202		0.078, 0.326	3.20**
PTS symptoms (12-18-24) ^c	0.187		0.091, 0.283	3.81***
Diagnosed physical disorders (12-24) ^d		1.009	0.925, 1.099	0.19
Adding acute stress response covariate				
Generalized distress (6-12-18-24) ^e	-0.024		-0.116, 0.068	-0.51
PTS symptoms (2-6) ^f	0.076		-0.050, 0.203	1.19
PTS symptoms (12-18-24) ^g	0.101		0.011, 0.191	2.20*
Diagnosed physical disorders (12-24) ^h		0.980	0.893, 1.074	-0.44

Note. Standard covariates included gender, ethnicity, age, income, marital status, education, degree of exposure to and distance from the attacks, and pre-9/11 mental and physical health history. Responding to the prompt was coded as 1 and choosing not to respond was coded as 0. Bs represent coefficients calculated by standardizing each outcome variable using the overall SD of all observations across all waves of data collection. Incidence-rate ratios (IRRs) are reported for all analyses of number of physical diagnoses because number of diagnoses represents count data. Because generalized estimating equations (GEE) utilizes maximum likelihood estimation, traditional measures of effect size (i.e., variance accounted for) cannot be calculated; the coefficients reported are interpretable alternatives in that they present the magnitude of effects in terms of standard deviation units.
^a Model $\chi^2(21, N = 1,711) = 238.36^{***}$. ^b Model $\chi^2(21, N = 877) = 157.70^{***}$. ^c Model $\chi^2(21, N = 1,622) = 172.79^{***}$. ^d Model $\chi^2(21, N = 1,568) = 1,186.29^{***}$. ^e Model $\chi^2(22, N = 1,485) = 508.67^{***}$. ^f Model $\chi^2(22, N = 631) = 458.87^{***}$. ^g Model $\chi^2(22, N = 1,422) = 696.02^{***}$. ^h Model $\chi^2(22, N = 1,373) = 1,097.26^{***}$.
 * $p < .05$. ** $p < .01$. *** $p < .001$.

Relationship between initial and subsequent expression. We believe the prompt that respondents were exposed to represents a reasonable proxy for being approached (i.e., by a clinician) in the immediate aftermath of a collective trauma and given an opportunity to express. However, a potential criticism that would limit the applicability of our findings is that people who did not respond to the prompt may have simply expressed elsewhere, perhaps because they preferred a face-to-face interaction. If people who chose not

to express initially also expressed less according to different or subsequent measures, it would support the notion that our prompt represents a proxy for expressing in general, across situations. At 2 weeks posttrauma, respondents reported their use of coping strategies (Brief COPE), including items assessing their seeking of emotional support and venting (i.e., expressing negative feelings). In linear regressions, compared with participants who elected not to respond to the open-ended prompt, participants who did respond

Table 2
Length of Response to the Open-Ended Prompt as a Predictor of Longitudinal Mental and Physical Health Outcomes Over 2 Years Following 9/11

Outcome variable (months post-9/11 when assessed)	Coefficient		95% confidence interval	Z
	β	IRR		
Including standard covariates				
Generalized distress (6-12-18-24) ^a	0.048		0.001, 0.094	2.01*
PTS symptoms (2-6) ^b	0.046		-0.023, 0.114	1.31
PTS symptoms (12-18-24) ^c	0.030		-0.020, 0.079	1.18
Diagnosed physical disorders (12-24) ^d		1.084	1.041, 1.129	3.93***
Adding acute stress response covariate				
Generalized distress (6-12-18-24) ^e	0.004		-0.041, 0.049	0.16
PTS symptoms (2-6) ^f	0.020		-0.049, 0.088	0.56
PTS symptoms (12-18-24) ^g	-0.029		-0.074, 0.015	-1.29
Diagnosed physical disorders (12-24) ^h		1.074	1.030, 1.120	3.36***

Note. Standard covariates included gender, ethnicity, age, income, marital status, education, degree of exposure to and distance from the attacks, and pre-9/11 mental and physical health history. β s represent coefficients calculated by (a) standardizing the transformed values of response length and (b) standardizing each outcome variable by using the overall SD of all observations across all waves of data collection. Response length incidence-rate ratios (IRRs) were calculated by using standardized values of the predictor.
^a Model $\chi^2(21, N = 1,263) = 201.57^{***}$. ^b Model $\chi^2(21, N = 629) = 132.52^{***}$. ^c Model $\chi^2(21, N = 1,207) = 128.08^{***}$. ^d Model $\chi^2(21, N = 1,164) = 991.50^{***}$. ^e Model $\chi^2(22, N = 1,099) = 424.02^{***}$. ^f Model $\chi^2(22, N = 451) = 373.05^{***}$. ^g Model $\chi^2(22, N = 1,056) = 602.19^{***}$. ^h Model $\chi^2(22, N = 1,018) = 876.41^{***}$.
 * $p < .05$. *** $p < .001$.

reported both seeking more emotional support ($B = 0.169$; 95% CI = 0.062, 0.276; $p < .01$; $sr^2 = .0053$) and venting more ($B = 0.188$; 95% CI = 0.079, 0.298; $p < .001$; $sr^2 = .0066$). This pattern is consistent with these participants being more likely to express posttrauma in general, not just to our prompt. When these coping strategies were included as covariates in the aforementioned longitudinal analyses, results paralleled the pattern described when controlling for acute stress response.

Expression as a reflection of distress. If reluctance to express immediately posttrauma reflects resilience and true lack of distress, then choosing to express and expressing more versus less should be associated with relatively high levels of distress in the short term. Consistent with this logic, regression analyses revealed that responding to the open-ended prompt ($B = 0.154$; 95% CI = 0.042, 0.265; $p < .01$; $sr^2 = .0044$) and writing a longer response ($\beta = 0.094$; 95% CI = 0.034, 0.154; $p < .01$; $sr^2 = .0085$) were associated with significantly higher acute stress response at 2 weeks posttrauma. High levels of initial distress should also predict attempts to cope with that distress. Accordingly, responding to the prompt was associated with higher reported use of the following coping strategies at 2 weeks posttrauma (assessed via Brief COPE subscales): active coping ($B = 0.146$; 95% CI = 0.035, 0.258; $p < .01$; $sr^2 = .0040$), denial ($B = 0.155$; 95% CI = 0.049, 0.261; $p < .01$; $sr^2 = .0045$), seeking instrumental social support ($B = 0.116$; 95% CI = 0.005, 0.227; $p < .05$; $sr^2 = .0025$), behavioral disengagement ($B = 0.132$; 95% CI = 0.028, 0.237; $p < .05$; $sr^2 = .0033$), positive reframing ($B = 0.132$; 95% CI = 0.015, 0.249; $p < .05$; $sr^2 = .0032$), planning ($B = 0.191$; 95% CI = 0.078, 0.304; $p < .01$; $sr^2 = .0068$), and religion ($B = 0.322$; 95% CI = 0.214, 0.429; $p < .001$; $sr^2 = .0193$). Writing a longer response to the prompt was associated with higher reported use of planning ($\beta = 0.093$; 95% CI = 0.036, 0.150; $p < .01$; $sr^2 = .0083$) and religion ($\beta = 0.091$; 95% CI = 0.032, 0.149; $p < .01$; $sr^2 = .0079$). No other significant effects emerged. When these variables were included as covariates in longitudinal analyses of long-term adjustment, results paralleled the pattern described when controlling for acute stress response.

Pretrauma social networks. Members of the KN panel provided additional information before September 11, 2001, including their memberships in a number of organizations. Specifically, they reported memberships from a list of 18 categories of social, political, and religious groups. Using a count of total memberships as a proxy for breadth of pretrauma social network allowed us to test if smaller and potentially impoverished networks predicted greater expression. If participants with impoverished networks, or those who were lonely, had few other outlets for expression, it could have motivated greater expression in response to our Web-based prompt and accounted for poorer mental and physical health over time. However, counter to this explanation, pretrauma organization membership predicted only response length, such that having more memberships was associated with longer responses ($\beta = 0.073$; 95% CI = 0.015, 0.130; $p < .05$; $sr^2 = .0043$). Including organization membership as a covariate in longitudinal analyses did not affect the longitudinal long-term adjustment results.

Lifetime trauma. Exposure to lifetime trauma and negative events is a risk factor for subsequent vulnerability (e.g., Turner & Lloyd, 2004). If a higher number of lifetime traumas are associated with greater distress post-9/11, and greater immediate distress is associated with higher likelihood of expression, lifetime trauma

history could account for the observed relationship between expression and differences in mental and physical health over time. When controlling for lifetime trauma in longitudinal analyses, the PTS symptom and physical health results remained significant and only the effect of response length predicting generalized distress from 6 to 24 months posttrauma dropped from significance ($p = .34$).

World assumptions. Differences in beliefs about the benevolence and meaningfulness of the world may be associated with the likelihood of expression after a trauma and subsequent health outcomes—especially to the extent that a collective trauma conflicts with these beliefs. However, in GEE analyses, responding to the prompt and length of response did not predict respondents' beliefs as reported over 2 to 24 months post-9/11. Similarly, controlling for World Assumptions Scale subscales did not change the pattern of results.

Big Five personality domains. Regression analyses revealed that participants who responded to the prompt reported significantly higher extraversion ($B = 0.240$; 95% CI = 0.108, 0.373; $p < .001$; $sr^2 = .0104$), agreeableness ($B = 0.197$; 95% CI = 0.066, 0.328; $p < .01$; $sr^2 = .0070$), and openness to experience ($B = 0.211$; 95% CI = 0.078, 0.345; $p < .01$; $sr^2 = .0080$) than did participants who chose not to respond. In addition, longer responses were associated with higher conscientiousness ($\beta = 0.091$; 95% CI = 0.026, 0.156; $p < .01$; $sr^2 = .0080$), emotional stability ($\beta = 0.067$; 95% CI = 0.004, 0.130; $p < .05$; $sr^2 = .0043$), and openness to experience ($\beta = 0.100$; 95% CI = 0.034, 0.167; $p < .01$; $sr^2 = .0097$). Importantly, however, controlling for the five dimensions did not affect the longitudinal long-term adjustment results reported above.

Discussion

Our results did not support the common assumption that choosing *not* to express one's thoughts and feelings in the immediate aftermath of a collective trauma—or expressing them only minimally—is harmful and indicative of vulnerability to future negative consequences. Instead, the opposite pattern emerged. Respondents who elected not to express when given the opportunity to do so exhibited lower PTS symptoms over the following 2 years, compared with respondents who chose to express. In addition, less expression in the form of shorter responses predicted lower generalized distress and better physical health over time.

Rather than indicating pathology (see McNally et al., 2003), reluctance to express appeared to reflect resilience (i.e., better long-term adjustment). This resilience persisted over 2 years, showing no signs of the delayed onset of symptoms that would be expected if a lack of immediate post-9/11 expression reflected underlying pathology. This is consistent with the explanation that individuals who experienced more trauma-related distress were more likely both to choose to express and express more once they did so. Expression as a proxy for initial distress thus predicted subsequent mental and physical health symptoms over time. Moreover, it does not appear that this is simply true among only those distant from or relatively unexposed to the trauma, as these results were either (a) not moderated by exposure to or distance from the 9/11 attacks or (b) in some cases actually strongest among people geographically closest to the attacks.

The predictive value of expression choices was further established by analyses that controlled for acute stress response symptoms assessed at 2 weeks posttrauma. Results for both mental and physical health remained significant when accounting for this indicator of early distress, which itself is a risk factor for subsequent symptoms. Secondary analyses provided additional supporting evidence. First, participants who responded to the prompt had larger pre-9/11 social networks and vented more about the attacks to their social networks shortly afterwards, consistent with our argument that our methodology represents a proxy of expression across situations. This suggests that the observed findings are applicable beyond the context of responding to a Web-based prompt. Second, choosing to respond to the prompt and longer responses predicted greater use of a variety of coping strategies, consistent with expression reflecting greater distress, which should have motivated attempts to cope. Third, further establishing the value of assessing expression in the immediate aftermath of a collective trauma, other individual differences measured both pre- and posttrauma—including demographic characteristics, mental and physical health history, social network breadth, lifetime trauma history, world views, and Big Five personality domains—failed to account for the results we observed.

Offering individuals the opportunity to express therefore presents an immediate measure of vulnerability to trauma that may predict variance in future outcomes not accounted for by other methods. Three additional aspects of our study bolster this conclusion. First, a large and diverse national sample that provided pretrauma assessments of mental and physical health history, as well as 2 years of posttrauma assessments, addressed limitations typical in trauma research (see Silver et al., 2006). This suggests that the current findings should be applicable to real-world contexts. Second, the results did not depend on the content of respondents' expression. Chu et al. (2006) analyzed this content and found only a few significant predictors of distress and PTSD symptoms. Third, expression was not confounded with negative social feedback. When people express after a trauma, they often do not receive the support they desire and expect from their social network, which can have negative consequences for adjustment over time (Tait & Silver, 1989). Here, respondents expressed in a "social vacuum," without any expectation of personal contact or response, thus creating a conservative test of expression uncontaminated by negative concomitants.

The Role of Expression in Coping With Trauma

The current findings support the "myths of coping" described by Wortman and Silver (1989, 2001) and the work of Rimé and colleagues (Pennebaker et al., 2001; Rimé et al., 1998) in the domain of coping with a collective trauma. The notion that expressing one's thoughts and feelings in the immediate aftermath of a collective trauma is a necessary step in successful long-term adjustment was not supported. Instead, people who choose not to express appear able to cope very effectively.

Reconciling these results with previous research may further elucidate the role of expression in coping. Frattaroli (2006) concluded that experimentally induced expression can be beneficial, but this appears to be limited to expression that occurs long after the trauma. Similarly, reviews of psychological debriefing (e.g., CISD) as early posttrauma intervention have not supported the

technique's efficacy (McNally et al., 2003; van Emmerik et al., 2002). If the process of coping begins immediately after trauma, assessments made at that time rather than months later should provide an optimal test of the role of expression in that process. However, it seems plausible that different mechanisms are at work when initially warding off effects of trauma than when reflecting on a distant event. For example, expression that occurs simultaneously with a biological stress response (e.g., in the immediate aftermath of an event) may have a more powerful impact on long-term adjustment by solidifying or strengthening the stress-related physiological responses. However, expression at a time when one is mentally reflecting (long after initial physiological changes have subsided) is likely to have very different consequences over time. If true, assuming that expression functions identically across situations obscures important differences. Even rigorous research can create a "myth of coping" if its conclusions are applied too broadly.

Clinical Application

The current findings have implications for posttrauma interventions. The prompt utilized here represents a useful analog to being approached by a clinician. The results suggest the importance of allowing individuals to choose for themselves whether to express their thoughts and feelings after a collective trauma and, more broadly, to choose to participate in interventions rather than being compelled to do so. If individuals who experience the greatest distress are more likely to express when given an opportunity, they may also be more willing to seek help actively. Assessing people's willingness to express thoughts and feelings may identify who is at risk for later problems and could thus benefit from effective intervention. Such time-efficient screening should be particularly valuable in the context of collective trauma, in which large numbers of people receive ostensibly equivalent exposure, yet only some will go on to experience lasting negative effects. While support for the efficacy of CISD is lacking (McNally et al., 2003; van Emmerik et al., 2002), other interventions that begin later in the process may be more successful, such as those based on cognitive behavior theory (e.g., Foa & Rothbaum, 1998).

Limitations

While the present design is an improvement over a great deal of prior trauma research, we acknowledge several limitations of the current investigation. First, our pre-September 11, 2001, mental health measure was dichotomous (physician diagnosis vs. no diagnosis) and was thus not optimally sensitive. Among the outcome measures, only the physical health measure was administered both before and after September 11, 2001; ideally, all of the outcome measures would have been. This would provide an even stronger basis for inference. It is important to note, however, that assessing any pre-measure at all is highly unusual in trauma research, given the inherently unpredictable nature of such events, particularly those on the scale of collective traumas.

Second, both measures of physical and mental health asked respondents for self-reports of physician diagnoses. Ideally, these reports would be corroborated by medical records. We note, however, that we used a health measure that has been benchmarked against the Centers for Disease Control and Prevention's National

Center for Health Statistics annual National Health Interview Survey (National Center for Health Statistics, U.S. Department of Health and Human Services, 2000), which itself has been validated against medical records.

Third, the current investigation does not resolve if the respondents who chose to express actually could have benefited from that or subsequent expression. For such respondents, it is possible that having the opportunity to express—perhaps over time, to their social networks—protected them from suffering even worse outcomes. Because our research question focused on respondents' choice of expression and was hence correlational in nature, our data do not speak to what effect a manipulation of expression (e.g., Pennebaker & Beall, 1986) might have had.

Fourth, our findings may not generalize to other social contexts of expression. As described above, we believe the prompt from this study serves as a useful analog to important real-world contexts. However, it may be the case that expressing in a socially rewarding environment (e.g., to a supportive spouse) may engender additional benefits not well captured in our data.

Conclusion

Contrary to common assumption, this study demonstrates that individuals who choose not to express their thoughts and feelings in the immediate aftermath of collective trauma are capable of coping successfully and in fact are more likely to do so than individuals who do express. This has important implications for understanding the role of expression in the coping process and for early posttrauma intervention. On a broader level, this also highlights the dangers of relying on hunches, common sense, and other "myths of coping" when attempting to provide intervention after a collective trauma. Doing so can result in wasted time, money, and effort, as well as misappropriation of resources away from those truly at risk and active interference with some individuals' natural coping processes. Despite the best of intentions, uninformed efforts to help may do more harm than good.

Finally, by virtue of their scale alone, collective traumas become the center of media attention. This not only contributes to the collective nature of the event but also has the effect of putting the field of psychology itself in the spotlight. Psychologists are called on to contribute to the public's understanding of the trauma through the media, dispersing the apparent word of science to a wide audience. The damage caused by misstatements and faulty conclusions drawn from intuition rather than empirical data can thus multiply beyond an individual client. Such statements may be the only contact many people have with psychology, especially if they experienced the trauma through media coverage. Even brief sound bites could guide the public's expectations for how they and those around them *should* be responding, including expressing thoughts and feelings. Collective traumas thus represent an important opportunity for psychology not only to make a positive impact on society but also to make a case for its own relevance in the eyes of the public and funding agencies. This raises the stakes for understanding collective trauma and ensuring that psychologists' conclusions accurately reflect the data.

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