Narratives of 9/11: Relations Among Personal Involvement, Narrative Content and Memory of the Emotional Impact Over Time

ROBYN FIVUSH1*, VALERIE J. EDWARDS2 and JEAN MENNUTI-WASHBURN1

1Department of Psychology, Emory University, Atlanta, Georgia
2Centers for Disease Control and Prevention, Atlanta, Georgia

SUMMARY

Previous research has documented the beneficial effects of expressive narrative writing, and especially the inclusion of cognitive processing and emotion words, for alleviating stress. In this study, 65 mostly white Emory University undergraduates of Judeo-Christian backgrounds recalled their emotional reaction upon hearing the news of 9/11 within 2 months of the event, and again one month and 6 months later. Between the initial and one month assessment, participants engaged in expressive writing for 20 minutes a day for 5 consecutive days. Individuals who had higher personal involvement in the events of 9/11, through knowing someone who was killed or having lived in the affected areas, recalled being more shocked and upset upon hearing the news across time, and used fewer cognitive processing and positive emotion words in their narratives, than those with no direct involvement. Individuals who used more cognitive processing and emotion words in their narratives subsequently recalled being less shocked and upset upon hearing the news. Implications of these finding for emotional memory and emotional regulation are discussed. Copyright © 2003 John Wiley & Sons, Ltd.

The way in which we remember stressful events may be an important factor in coping and outcome. Whereas a great deal of research has examined the effects of stress on the accuracy of recall (see Christianson, 1992; Christianson & Lindholm, 1998; Pezdek & Taylor, 2001, for reviews), substantially less research has emphasized the content of recall and how and why content may change over time. More specifically, after experiencing a particularly stressful event, how might memory of the emotional reactions experienced at the time of the event change over time and with subsequent recall experiences? There are several reasons to predict that with time and disclosure, memory of the emotional impact of an event will diminish. Indeed, with the simple passage of time, individuals tend to recall negative experiences as being less unpleasant than when originally experienced (see Walker, Skowrons, & Thompson, 2003, for a review). However, most of this research focuses on ratings of current affect, rather than memory of affect at the time of experience. With the passage of time would individuals recall being

*Correspondence to: Robyn Fivush, Department of Psychology, Emory University, Atlanta, GA 30030.
E-mail: psyrf@emory.edu

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less upset when the event actually occurred? Further, almost all of this research focuses on everyday events, some of which may be emotionally negative, but few of which are highly stressful. How might individuals recall affect experienced at the time a highly stressful event occurred?

More important, little is known about the mechanism by which affect fades over time. One possibility is Taylor’s (1991) mobilization-minimization hypothesis, which proposes that, initially, people deal with stressful events through mobilizing cognitive, emotional and social resources, but over time, in order to return to homeostasis, people try to minimize the impact of the event. One way in which minimization may occur is through disclosure. As individuals talk about stressful events with others, the emotional intensity may lessen (Stiles, 1995). But again, it is not clear what it is about disclosure that alleviates negative affect.

Recent work by Pennebaker and his colleagues on expressive writing (Francis & Pennebaker, 1992; Pennebaker & Beall, 1986; Pennebaker & Francis, 1996; see Pennebaker, 1997; Smyth, 1998, for reviews) provides one possible answer. In this research, individuals are asked to write for 10 to 20 minutes a day on several consecutive days about stressful events in their lives, focusing on their deepest thoughts and feelings. Compared to non-writing control groups, individuals who engage in expressive writing show subsequent decreases in anxiety, depression and stress, and increases in physical health and effective behaviors. For example, college students who write about stressful experiences subsequently have fewer doctor visits, improved immune system functioning, and higher GPAs. These kinds of findings indicate that the act of disclosure through expressive writing aids in resolving aversive affect that may negatively affect health and behavior.

But what specifically about expressive writing is beneficial? Analyses of the narratives indicate that those individuals who use more cognitive processing words, such as ‘know’, ‘comprehend’ and ‘realize’, and more emotion words, show better subsequent improvement. Through the use of these kinds of words, individuals are creating a more causal explanatory framework and greater emotional integration for understanding the event, and this greater understanding allows the individual to work through the aversive event. Even for highly traumatic events, such as rape, individuals who are better able to construct a coherent, causally connected and emotionally integrated narrative subsequently show fewer post-traumatic stress symptoms (Foa, Molnar, & Cashman, 1995).

The relation between the use of cognitive processing and emotion words in alleviating aversive affect is particularly intriguing in light of current conceptions of coping. Lazarus and Folkman (1984) define coping as, ‘constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the individual’ (p. 41). Coping is further conceptualized as problem-focused coping, emphasizing creating an explanatory framework for understanding a stressful event, and emotion-focused coping, emphasizing seeking social support and self-soothing to regulate aversive affect. Thus it seems quite possible that expressive writing that emphasizes cognitive processing and emotion words is effective in helping individuals to engage in problem-solving and emotional regulation as a means of coping. In essence, cognitive processing and emotion words can be considered the ‘language of coping’.

Several studies have documented that both children and adults use more cognitive processing and emotions words when narrating negative events compared with positive events (Bauer, 2003; Bohanek, Fivush, & Walker, 2003; Fivush, Hazzard, Sales, Sarfati, &
Brown, 2002; Porter & Birt, 2001), supporting the supposition that the increased use of these kinds of words are used in the service of making sense of difficult experiences. Yet, it is also the case that more highly stressed individuals have more difficulty confronting their experiences and regulating their emotional reactions (Schwartz & Kline, 1995), and therefore may be less likely to use the language of coping in their narratives (e.g., Sales, Fivush, Parker, & Bahrick, 2003). Parenthetically, the use of cognitive processing and emotion words is unrelated to overall length of the narrative, and previous research has provided mixed findings on whether length varies as a function of either emotional valence (positive versus negative) or level of stress experienced (Bohanek, Fivush, & Walker, 2003).

The tragic events of 11 September, 2001, in which terrorists flew planes into the World Trade Center buildings and the Pentagon, killing thousands of people, compelled a response on the part of the mental health community. Simultaneously, it provided a unique opportunity to examine the effects of expressive writing on a large group of individuals who had all experienced the same stressful event. In this study, we asked undergraduates to engage in an expressive writing intervention between one and 2 months following 9/11. We also assessed their memory of the initial emotional impact of the event immediately before the expressive writing intervention, after one month, and again after 6 months. Note that we did not include a non-writing control group as used in much of the previous research. Because a substantial body of research indicates that expressive writing alleviates stress and improves well-being, we believed it would be unethical to randomly assign some individuals to a non-writing group. Therefore, we took an individual differences approach in this research, examining relations among naturally occurring differences in level of personal involvement and narrative content.

In terms of personal involvement, we assumed that individuals who lived in the New York or Washington, DC areas most likely experienced higher levels of stress than those who did not. And, most obvious, those who knew someone killed or injured in the attacks would experience the highest levels of stress. Thus the first question addressed in this research was how level of personal involvement effects memory of the emotional impact of the event. We predicted that higher levels of personal involvement would result in remembering being more shocked and upset upon hearing the news, and that this would remain consistent over time.

Further, based on previous research on expressive writing, we assumed that there would be individual differences in the content of the narratives. Although all participants were asked to write about their deepest thoughts and feelings, we assumed that some individuals would engage in more of this kind of writing than others. More specifically, we predicted that those individuals who had higher personal involvement and were more emotionally impacted by the event, would use fewer cognitive processing and emotion words in their narratives. This prediction stems from findings that higher levels of stress may disrupt the ability to effectively process personal experiences. We further predicted that those individuals who did use more cognitive processing and emotion words in their narratives would subsequently recall being less stressed upon hearing the news of 9/11. This prediction follows from the body of research indicating that using the language of coping in expressive writing facilitates emotional regulation, and this, in turn, would lead to memories of being less stressed at the time of experience. Given mixed findings in the literature, we made no specific predictions regarding overall length of the narratives as a function of personal involvement or narrative content.

Finally, we also examined possible gender differences. Because a great deal of research has indicated that females have longer, more detailed and more emotionally laden
autobiographical memories than males (see Fivush & Buckner, 2003, for a review), we predicted that females might write longer narratives and include more emotional language in their narratives than males.

METHOD

Participants

Eighty-eight undergraduates from Emory University, 25 males and 63 females were enrolled in a larger study of coping with the events of 9/11. Sixty-eight students received introductory psychology credit, and 20 participants received $20 for participating through the 1-month assessment, as described below. All participants who returned for the 6-month assessment received $20. Participants were mostly white and of Judeo-Christian backgrounds. All participants signed fully informed consent as approved by the university Institutional Review Board.

Procedure

Participants engaged in groups of 2 to 18 in a baseline assessment between 5 and 8 weeks after 9/11, a short-term follow-up at 1 month after baseline, and a long-term follow-up at 6 months after baseline. At each assessment point, participants completed a range of questionnaires about coping and psychological and physical well-being. In addition, participants completed a demographic information and personal involvement questionnaire. Specifically, participants were asked if they knew anyone injured or killed in the disaster, and, if so, who. Finally, participants completed the ‘Emotional Reaction Scale’ (Pfefferbaum, 2002). This scale was developed to examine responses to the Oklahoma City bombing, in which a federal building was car bombed resulting in hundreds of deaths. The scale has been shown to be a reliable and valid assessment of emotional reaction to a terrorist attack. Participants responded on a 5-point Likert scale from strongly agree to strongly disagree with whether they experienced 10 emotional reactions when they first heard the news of 9/11: (1) dazed and confused; (2) trembling or shaking; (3) heart beat fast; (4) nervous or afraid; (5) made me jump; (6) on automatic pilot, felt emotionally numb; (7) scared someone in my family would be hurt; (8) scared someone I knew would be hurt; (9) upset by how I acted; (10) helpless. Thus scores could range from 10 (not stressed at all) to 50 (highly stressed).

Immediately following the baseline assessment, participants were given a spiral bound notebook and asked to write for 20 minutes a day for 5 consecutive days about the events of 9/11. Following Pennebaker (1997), participants were asked to write continuously, without regard for spelling or grammar, and to focus on their deepest thoughts and feelings. All diaries were identified only with a 5 digit code number and participants were assured complete anonymity. Diaries were returned to a secure box in the main office of the Psychology Department.

Eighty-three participants returned the diaries and returned for the 1-month follow-up, but due to missing diary entries and/or missing questionnaire data, only 71 of these participants had complete data. Sixty-five of these participants completed the 6-month follow-up. Reasons for withdrawal are unknown, but there were no differences in responses to the baseline assessment measures between those who did and did not
complete the study. Of the participants included in analyses, 16 knew someone who was killed in the World Trade Centers; all of these were deaths of close family friends (e.g., a friend’s mother; a childhood Little League coach). None of the participants reported the death of an immediate family member, and no one reported knowing someone injured. An additional 11 participants did not know anyone directly who was killed, but they lived in the greater New York or Washington, DC area. Note that because the first part of the study took place during the fall semester, and the long-terms follow-up took place during the spring semester, students were not living in these areas either on 9/11 or at the time of the assessments. However, because these students had lived in these areas for most of their lives and had family and friends in the area on 9/11, we still assumed a higher level of personal involvement for these participants than for those who did not live in the affected areas. Finally, 38 participants did not know anyone killed and did not live in the affected areas, and thus were considered to have no direct personal involvement.

Coding

All diaries were transcribed verbatim and analyzed using the Linguistic Inquiry and Word Count Program (LIWC) developed by Pennebaker and Francis (1996). This is a computer based word count program that matches all written transcripts against an extensive dictionary, and provides the percentage of words in a large set of categories and sub-categories. For example, there is a general category of negative emotion that includes all references to negative feeling states (e.g., angry, sad, scared, hate, upset), which is further broken down into words expressing the emotion of sadness (e.g. sad, unhappy, depressed), anger (e.g., angry, mad) and anxiety (e.g., upset, anxious, fearful). For purposes of this study, we examined the percentage of words in each of three theoretically relevant categories: (1) cognitive processing words (e.g., comprehend, understand, realize,); (2) positive emotion words (e.g., happy, pleased, joyful); and (3) negative emotion words. Negative emotion words were further categorized as those words expressing anger, sadness, and anxiety.

RESULTS

Analyses focused on three major questions: how might level of personal involvement relate to memory of the emotional impact of the event; how might level of personal involvement relate to the content of the diary narratives and how might this change across the 5 days of writing; and how might personal involvement and the content of the diary narratives influence subsequent memory of the emotional impact? All significant multivariate ANOVA effects were followed up with analyses of simple main effects and Tukey’s post-hoc tests at the $p < 0.05$ level where appropriate.

Personal involvement and emotional impact

To answer the first question, a 3(level of involvement: knew someone killed; live in the area; no direct involvement) by 2(gender) by 3(time: baseline, 1-month follow-up; 6-month follow-up) mixed-model ANOVA was conducted on responses to the Emotional Reaction scale.
As can be seen in Table 1, participants remembered being highly emotionally stressed upon hearing the news of 9/11 at both baseline (M = 32.56, SD = 0.79) and 1-month (M = 32.24, SD = 0.86), but at 6-months, they recalled being significantly less stressed at hearing the news than they had previously (M = 23.85, SD = 2.02), F(2, 144) = 16.91, p < 0.001. Individuals who knew someone killed in the disaster remembered being more stressed at hearing the news (M = 32.52, SD = 1.63) than either people who lived in the area (M = 29.00, SD = 1.98) or had no direct involvement (M = 27.12, SD = 1.07), and this held across all three time points, F (2, 72) = 3.85, p < 0.05. Females also remembered being more stressed (M = 31.57, SD = 1.09) than males (M = 27.52, SD = 1.50), F (1, 72) = 4.80, p < 0.05. However, these main effects must be interpreted within an interaction among level of personal involvement, time of assessment, and gender, F (4, 72) = 4.23, p < 0.01 (see Table 1). More specifically, females showed a general decrease in remembering how stressed they were at hearing the news across the three time points, F (2, 108) = 23.36, p < 0.001, and this was particularly true for females who knew someone killed or lived in the area, F (4, 108) = 5.07, p < 0.001. Males did not show a significant decrease in remembering how stressed they were at hearing the news over time.

**Personal involvement and narrative content**

To answer the second question, 4 separate 3(level of involvement) by 2(gender) by 5(day of writing) ANOVAs were performed on total number of words, and percentage of cognitive processing words, negative emotion and positive emotion words used in the narratives. All means and standard deviations are shown on Table 2.

For word count, there were no main effects, but there was a significant interaction among level of connection, gender, and day of writing, F (2, 70) = 3.93, p < 0.05. Females wrote longer narratives on the first day (M = 469.48, SD = 32.07) than did males (M = 358.87, SD = 24.33). There were no differences in length on the second, third or fourth days of writing. On the last day of writing, females who knew someone killed wrote longer narratives (M = 353.30, SD = 43.33) than males who knew someone killed (M = 227.20, SD = 61.28), but males who lived in the area wrote longer narratives (M = 412.40, SD = 61.28) than females who lived in the area (M = 255.00, SD = 51.79). There were no gender differences for those with no direct involvement (M = 222.71, SD = 26.62 for males and M = 276.09, SD = 23.16 for females).

Turning to content, males used more cognitive processing words (M = 8.97, SD = 0.35) than females (M = 8.05, SD = 0.27), F (1, 70) = 4.30, p < 0.04. Fewer cognitive processing words were used by individuals who knew someone killed in the disaster (M = 8.01, SD = 0.42), and those who lived in the area (M = 8.34, SD = 0.45) than those with no direct involvement (M = 9.18, SD = 0.24), F (2, 70) = 3.53, p < 0.05. Those who knew someone killed also used fewer positive emotion words (M = 1.74, SD = 0.20) than those who lived in the area (M = 2.17, SD = 0.22) or had no direct involvement (M = 2.48, SD = 0.17), F (2, 70) = 5.31, p < 0.05. Across level of personal involvement, individuals used fewer positive emotions on the first day (M = 1.64, SD = 0.13) than on subsequent days (M = 2.28, SD = 0.20 for Day 2, M = 2.09, SD = 0.17 for Day 3, M = 2.009, SD = 18 for Day 4 and M = 2.54, SD = 0.22 for Day 5), F (4, 280) = 3.92, p < 0.01. The use of negative emotion words interacted with personal involvement and gender, F (2, 70) = 3.09, p < 0.05. There were no gender differences for those who knew someone killed (M = 3.18, SD = 0.43 for males and M = 3.16, SD = 0.30 for females), but males who lived in the area used fewer negative emotion words (M = 2.43, SD = 3.46) than
Table 1. Mean recalled emotional reaction (and standard deviations) by personal involvement, time and gender (scores can range from 10 = minimal stress to 50 = high stress)

<table>
<thead>
<tr>
<th></th>
<th>Knew someone killed</th>
<th>Lived in area</th>
<th>No connection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male M (SD)</td>
<td>Female M (SD)</td>
<td>Total M (SD)</td>
</tr>
<tr>
<td>Baseline</td>
<td>29.67 (2.18)</td>
<td>38.20 (1.69)</td>
<td>33.93 (1.38)</td>
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<td></td>
<td>31.25 (2.67)</td>
<td>36.71 (2.02)</td>
<td>33.98 (1.68)</td>
</tr>
<tr>
<td></td>
<td>27.09 (1.61)</td>
<td>32.43 (0.85)</td>
<td>29.76 (0.91)</td>
</tr>
<tr>
<td>1 month</td>
<td>31.50 (2.39)</td>
<td>37.70 (1.85)</td>
<td>34.60 (1.51)</td>
</tr>
<tr>
<td></td>
<td>30.25 (2.93)</td>
<td>35.57 (2.22)</td>
<td>32.98 (1.84)</td>
</tr>
<tr>
<td></td>
<td>25.73 (1.77)</td>
<td>32.68 (0.93)</td>
<td>29.20 (1.00)</td>
</tr>
<tr>
<td>6 months</td>
<td>32.17 (5.63)</td>
<td>25.90 (4.36)</td>
<td>29.03 (3.56)</td>
</tr>
<tr>
<td></td>
<td>24.50 (6.90)</td>
<td>15.71 (5.21)</td>
<td>20.11 (4.32)</td>
</tr>
<tr>
<td></td>
<td>15.55 (4.16)</td>
<td>29.25 (2.18)</td>
<td>22.40 (2.35)</td>
</tr>
</tbody>
</table>

Table 2. Mean number of words and mean percentages (and standard deviations) for cognitive processing, negative emotion and positive emotion words by level of personal involvement

<table>
<thead>
<tr>
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<th>Knew someone killed</th>
<th>Lived in area</th>
<th>No connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word count</td>
<td>Male M (SD)</td>
<td>Female M (SD)</td>
<td>Total M (SD)</td>
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<tr>
<td>Cognitive</td>
<td>255.96 (47.50)</td>
<td>336.28 (33.59)</td>
<td>296.12 (29.09)</td>
</tr>
<tr>
<td>processing</td>
<td>325.28 (33.59)</td>
<td>295.89 (40.14)</td>
<td>310.58 (31.09)</td>
</tr>
<tr>
<td></td>
<td>232.96 (28.39)</td>
<td>309.10 (17.95)</td>
<td>271.03 (16.79)</td>
</tr>
<tr>
<td>Negative</td>
<td>8.78 (0.68)</td>
<td>7.24 (0.48)</td>
<td>8.01 (0.42)</td>
</tr>
<tr>
<td>emotion</td>
<td>8.41 (0.68)</td>
<td>8.27 (0.58)</td>
<td>8.34 (0.45)</td>
</tr>
<tr>
<td></td>
<td>9.70 (0.41)</td>
<td>8.66 (0.26)</td>
<td>9.18 (0.24)</td>
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<tr>
<td>Positive</td>
<td>3.11 (0.42)</td>
<td>3.16 (0.30)</td>
<td>3.13 (0.26)</td>
</tr>
<tr>
<td>emotion</td>
<td>2.43 (0.43)</td>
<td>3.46 (0.36)</td>
<td>2.95 (0.28)</td>
</tr>
<tr>
<td></td>
<td>3.73 (0.26)</td>
<td>3.20 (0.16)</td>
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<td>1.69 (0.33)</td>
<td>1.79 (0.23)</td>
<td>1.74 (0.20)</td>
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<td></td>
<td>2.06 (0.33)</td>
<td>2.27 (0.28)</td>
<td>2.17 (0.22)</td>
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<tr>
<td></td>
<td>2.50 (0.20)</td>
<td>2.47 (0.12)</td>
<td>2.48 (0.12)</td>
</tr>
</tbody>
</table>
females who lived in the area ($M = 3.46$, $SD = 0.36$), whereas males who had no direct involvement used more negative emotion words ($M = 3.73$, $SD = 0.26$) than females with no direct involvement ($M = 3.20$, $SD = 0.16$) (see Figure 1).

Analyses on use of the specific emotions of anger, sadness and anxiety revealed several significant changes over days of writing, as displayed on Figure 2. Anger words increased from the first to the second day of writing and then decreased across the remaining days, $F(4, 280) = 2.60$, $p < 0.05$. Anxiety tended to decrease from the second to the third day of writing, $F(4, 280) = 2.13$, $p < 0.08$. Only the use of words expressing sadness showed an effect of personal involvement and this interacted with gender, $F(2, 70) = 3.43$, $p < 0.05$. As with negative emotion words more generally, there were no gender differences in use of sadness for those who knew someone killed ($M = 0.46$, $SD = 0.19$ for males and $M = 0.71$, $SD = 0.14$ for females), but for those who lived in the area, males expressed less sadness ($M = 0.42$, $SD = 0.19$) than females ($M = 0.80$, $SD = 0.06$), and for those with no direct involvement, males expressed more sadness ($M = 0.91$, $SD = 0.11$) than females ($M = 0.64$, $SD = 0.07$) (see Figure 3).

In summary, those with higher personal involvement used fewer cognitive processing and positive emotion words than those with less personal involvement. Across the 5 days of writing, participants used more positive emotion words, fewer anxiety words and increased and then decreased in the use of anger words. Males used more cognitive
processing words overall than did females; males who lived in the affected areas used fewer negative emotion words, especially sadness, than did females who lived in these areas, whereas males with no personal involvement used more negative emotion words, especially sadness, than females with no personal involvement. Females wrote longer narratives than males initially. However, on the last day of writing, females who knew someone killed wrote longer narratives than males who knew someone killed, whereas males who lived in the area wrote longer narratives than females who lived in the area.

Narratives and memory of the emotional impact over time

The final question concerned relations among narrative content and memory of the emotional impact of the event. Whereas the previous analyses used personal involvement as a grouping variable, these analyses focused on individual differences across level of personal involvement in emotional impact and narrative content. Table 3 displays correlations among these variables. Not surprisingly, there was extremely high consistency in individuals’ memories of how stressed they were; those who recalled being highly stressed when hearing about 9/11 continued to recall being highly stressed over time. The most intriguing findings concerned relations between narrative content and subsequent memory of one’s emotional reaction. Whereas memory of emotional reaction at baseline was unrelated to the subsequent narrative content, those individuals who used more cognitive processing words and more negative emotion words in their narratives subsequently recalled being less stressed when they initially heard about 9/11 both 1-month and

Table 3. Correlations among variables

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<tr>
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<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
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<tbody>
<tr>
<td>1. Emo reaction: Baseline</td>
<td>0.75***</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2. Emo reaction: 1-month</td>
<td></td>
<td>0.76***</td>
<td>0.76***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Emo reaction: 6-month</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Cog words</td>
<td>0.20</td>
<td>-0.34**</td>
<td>-0.33**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Neg words</td>
<td>-0.17</td>
<td>-0.30**</td>
<td>-0.30**</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>6. Pos words</td>
<td>-0.10</td>
<td>-0.21*</td>
<td>-0.04</td>
<td>0.24*</td>
<td>0.21</td>
</tr>
</tbody>
</table>

***p < 0.001; **p < 0.01; *p < 0.05.
6 months later. Those who used more positive emotion words recalled being less stressed at hearing the news at the 1-month assessment but not 6 months later.

To examine these relations in more detail, a regression analysis was performed with memory of emotional reaction at 6-months as the outcome variable and memory of emotional reaction at baseline, at 1-month, cognitive processing words, negative emotion words and positive emotion words entered simultaneously as predictor variables. Based on the ANOVA results, we also included level of personal involvement and gender as predictor variables. Given the relatively low N and the large number of predictor variables, this analysis must be viewed as suggestive, but the overall model was highly significant, $F(7, 49) = 16.44, p < 0.001$, accounting for 70% of the variance in memory of emotional reaction at the 6-month time point. Significant predictors were memory of emotional reaction at baseline ($t = 3.78, p < 0.001$), and memory of emotional reaction at 1-month ($t = 2.80, p < 0.01$). All three narrative content variables approached significance: cognitive processing words ($t = 1.75, p < 0.08$), negative emotion words ($t = 1.71, p < 0.09$) and positive emotion words ($t = 1.87, p < 0.07$). Neither personal involvement ($t = 0.23, p = 0.82$) or gender ($t = 0.41, p = 0.69$) were significant predictors. Thus, overall, the correlations and the regression analyses indicate that those individuals who were able to write about 9/11 using more cognitive processing and emotion words subsequently recalled being less stressed when first hearing the news.

**DISCUSSION**

In this study, we examined the effects of personal involvement and expressive narrative writing on individuals’ memories of their emotional reaction to the highly stressful events of 9/11. Not surprisingly, individuals who were more personally involved in the disaster, either though personal knowledge of someone who was killed or because they lived in the area, remembered being more shocked and upset when they heard the news, and these individuals continued to recall higher levels of emotion upon hearing the news even after the passage of 6 months. In writing about their deepest thoughts and feelings about the disaster, those with higher levels of personal involvement used fewer cognitive processing words and fewer positive emotion words, as predicted, suggesting that they were having more difficulty constructing a causal-explanatory framework for the event, and more difficulty creating a more positive interpretation of events surrounding the tragedy of 9/11, than those with less personal involvement.

However, the use of negative emotion words in the narratives was not related to level of personal involvement; rather, regardless of level of personal involvement, individuals generally used fewer words indicative of anxiety between the second and third day of writing, and more and then less anger words across the five days of writing. There was also an overall increase in the use of positive emotion words. This pattern suggests that expressive writing alleviates negative affect. The increase in positive emotion is particularly striking, as several theorists have suggested that the ability to place a more positive interpretation on negative experiences increases both psychological and physical well-being (Salovey, Rothman, Detweiler, & Steward, 2000; Tedeschi, Park, & Calhoun, 1998). Inspection of the diaries suggests that the positive spin placed on the events of 9/11 included re-evaluating the positive role of family and friends in one’s life and expressing positive emotion over changing professional goals to include more humanistic endeavors. Thus, similar to what was presented in the media following 9/11, many of the
undergraduates in our study tried to find some positive consequences of this devastating event, although this did seem to be more difficult for those with higher personal involvement.

Most impressive, those individuals who were better able to express cognitive processing, negative emotion and positive emotion subsequently recalled being less upset at hearing the news of 9/11 than individuals who did not use as many of these words in their narratives. These findings confirm and extend findings on the benefits of expressive writing (e.g., Pennebaker, 1997). Whereas that research has demonstrated significant increases in concurrent psychological and physical well-being, our findings further indicate that expressive writing may actually change one’s memory of a previous emotional reaction. This is important both for theories of emotional memory and for emotional regulation.

A great deal of research has demonstrated that memories are generally evaluated less negatively over time (Walker et al., 2003). More clinically oriented research has further indicated that the ability to regulate negative affect associated with stressful experiences is beneficial (Salovey et al., 2000). Our findings contribute to both of these literatures by suggesting that at least one mechanism by which the regulation of negative affect occurs is through expressing that affect. Writing for as little as 5 consecutive days for 20 minutes per day allowed individuals to express both negative and positive affect, as well as to construct a coherent narrative of what happened, and individuals who were better able to do this were also better able to regulate negative affect associated with memory of the event across several months. As discussed in the introduction, cognitive processing and emotion words may reflect the language of coping; our results indicate that coping with stressful events through the use of this type of language may actually change one’s memory of the emotional impact of the event when it occurred. Not only is current stress associated with the event lessened, our results indicate that the retrospective memory of how one felt at the time is changed as well. Thus decreased levels of stress as a result of expressive writing may change perceptions of both current and previous stress.

We also found several gender differences. Females recalled being more shocked and upset upon hearing about 9/11 than did males, and females, especially those with higher personal involvement, showed a greater decline in how stressed they recalled being over time than did males, suggesting that expressive writing may have been particularly beneficial for females with the highest emotional stress. Perhaps this is due to differences in how females and males expressed themselves in their narratives. Although gender differences in the narratives were somewhat complicated, the overall picture that emerges is that females who were personally involved wrote longer narratives (at least on the first day of writing) and included more negative emotion, especially sadness, than males who were personally involved. In contrast, females with no direct involvement wrote shorter narratives (at least on the last day of writing) and included less negative emotion, especially sadness, than males with no direct involvement. Thus, females who were closer to the events of 9/11 were more emotionally expressive, whereas males who were closer to the events of 9/11 were less emotionally expressive.

Because of stereotypes and socialization experiences, females may feel more comfortable expressing negative emotions, particularly being upset and sad than do males (Fisher, 2000; Fivush & Buckner, 2000). Our findings further suggest that this may be particularly true when the emotion is deep and difficult, as would be the case here for those with high personal involvement. When there is no direct involvement, the emotion may be more abstract; males may feel more comfortable expressing more abstract emotion, whereas females may not feel as emotional in this situation. Moreover, the ability to express more
negative emotions about deeply personal experiences may be especially beneficial, as indicated by the steeper decrease in memory of initial emotional reaction for females than males.

Clearly, there are limitations to this study. Only undergraduates were studied, and given their age and the fact that most of them came from relatively privileged backgrounds, the events of 9/11 may have been differently processed and interpreted than in other populations. In addition, the narratives were only coded for the presence of specific word types; the context within which these words were embedded was not considered. Further analyses needs to examine both context and structural dimensions, such as chronology, completeness, and overall coherence of the narratives. Finally, we did not include a non-writing control, as has been used in previous research. However, the efficacy of expressive writing has been amply demonstrated (Smyth, 1998), and we found individual differences in the extent to which expressive writing was effective based specifically on the variables theoretically and empirically shown to be related to stress reduction. Thus, our results provide strong support for the role of expressive writing, and specifically, the role of the language of coping, in emotional regulation. Being able to express cognitions and feelings about a highly stressful event changes the way in which one remembers their initial emotional reaction.

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