

## **MENDING BROKEN HEARTS: EFFECTS OF EXPRESSIVE WRITING ON MOOD, COGNITIVE PROCESSING, SOCIAL ADJUSTMENT AND HEALTH FOLLOWING A RELATIONSHIP BREAKUP**

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Seventy-two male and 73 female undergraduates were randomly assigned to an experimental group, in which they wrote expressively about a relationship breakup, or to a control group, in which they wrote in a non-emotional manner about impersonal relationship topics. Control participants reported short-term increases in upper respiratory illness (URI) symptoms, tension and fatigue, whereas experimental participants did not. Further, higher levels of intrusive thoughts and avoidance were associated with short-term increases in URI symptoms in the control group, but were unrelated to URI symptoms in the experimental group. Finally, there was a trend ( $p < 0.06$ ) suggesting that experimental participants were more likely to reunite with their ex-partner than were control participants. These findings indicate that expressive writing has a wide range of social, emotional, and physical health benefits for individuals coping with stressful events, particularly if they are experiencing ongoing intrusive thoughts and avoidance responses related to the stressor.

*Keywords:* Expressive writing; Emotional expression; Intrusive thoughts; Avoidance; Social adjustment; Upper respiratory illness

The ability to freely express stress-related thoughts and feelings appears to reduce the negative mental and physical health effects of stressful life events (Smyth, 1998). While individuals often choose to disclose to significant others (Rimé, 1995), for various reasons this is not always feasible or advised (Lepore *et al.*, 1996). Non-social modes of expression, such as expressive writing, may be particularly useful for individuals who feel constrained in disclosing to members of their social network. Expressive writing also provides a convenient method for individuals to confront and work through unresolved feelings and thoughts related to stressful events. In this article,

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we examine the mental and physical health benefits of expressive writing, and we attempt to identify some mechanisms of action to advance theorizing and research in this field.

Pennebaker and Beall (1986) have developed a brief written emotional expression intervention that appears to help individuals to cognitively confront and process their reactions to stressful life events. Participants write about their deepest thoughts and feelings associated with a specified or self-selected stressful event for 20 min per day, typically for a 3-day period. Over a decade of research suggests the efficacy of this intervention in improving physical health and psychosocial adjustment. For instance, written expression interventions have reduced physician visits for illness (Pennebaker and Beall, 1986; Pennebaker *et al.*, 1990; Greenberg *et al.*, 1996; King 2000), reduced self-reports of illness symptoms (Pennebaker and Beall, 1986; Greenberg and Stone, 1992), reduced levels of negative mood and post-traumatic stress symptoms (Donnelly and Murray, 1991; Lepore, 1997; Lange *et al.*, 2000), enhanced immune functioning (Pennebaker *et al.*, 1988; Petrie *et al.*, 1995), and enhanced role and physical functioning (Spera *et al.*, 1994; Cameron and Nicholls, 1998; Smyth *et al.*, 1999).

Early theoretical work suggested that expressive writing produced physiological release, thus reducing health risks and physiological strain associated with prolonged inhibition of the desire to disclose (Pennebaker, 1989). According to this approach, past traumas, especially those involving shame or social stigma, are the most appropriate subject for disclosure because they are most likely to be inhibited. More recently, cognitive interpretations of the effects of disclosure have gained theoretical prominence (Tait and Silver, 1989; Clark, 1993; Pennebaker, 1995; Greenberg *et al.*, 1996; Lepore *et al.*, 1996; Lepore, 1997; Kliwer *et al.*, 1998; Lepore and Helgeson, 1998; Kennedy-Moore and Watson, 1999; Lutgendorf and Antoni, 1999; Major and Gramzow, 1999; Lepore *et al.*, 2000).

According to cognitive models of disclosure, stressful events contain novel information that is difficult to reconcile with prior assumptions about the self and the world. Thus, these events are initially stored in active, short-term memory as cognitively disparate fragments. Because active memory has a tendency to repeat its contents, distressing trauma-related thoughts, images, dreams, or feelings intrude on awareness (Horowitz, 1986). Intrusions result from the uncomfortable discrepancy between the trauma and existing schemas, leading individuals to deny, avoid, or suppress these responses. Cognitive processing of the event involves alternating between intrusive and avoidant reactions, gradually reappraising the event or modifying extant schemas to reduce the discrepancy. Some individuals, however, are unable to make this cognitive transformation. Their continued awareness of cognitive discrepancy leads to prolonged, intense intrusive states and/or rigid dysfunctional avoidance. These intrusive thoughts can be an ongoing source of internal stress (Baum *et al.*, 1993), which may be implicated in mental and physical health problems. Investigators also have suggested that avoidance can contribute to unfavorable health consequences (e.g., Lepore and Helgeson, 1998).

Pennebaker and colleagues (Pennebaker, 1989; Pennebaker *et al.*, 1990) argue that expressive writing can facilitate cognitive processing by changing the meaning or significance of the trauma to make it more consistent with existing self- and world-views. Consistent with this perspective, Pennebaker *et al.* (1997) found that an increase in the use of causal and insight words over writing sessions predicted subsequent health benefits. Writing also might facilitate organizing the event into a coherent narrative

or story, which allows new perspectives, problem definitions, or coping strategies to emerge (Smyth and Greenberg, 2000).

Adopting a cognitive processing perspective naturally leads to a focus on recent events for which adjustment is ongoing. If one can intervene early in the cycle and help individuals to cognitively process events as they are unfolding, this should prevent further emotional or physiological damage later on. This can help to prevent a potential negative cycle in which intrusions both provoke and are triggered by chronic physiological arousal and emotional distress (McFarlane, 1992). Memories and emotional reactions relating to recent events should be particularly salient and easily accessible, thus lending themselves to cognitive modification. Furthermore, reappraisals of the stressor may lead to new coping strategies or adaptive behaviors. With ongoing events, there is an opportunity to initiate actions that resolve the problem. Thus, expressive writing may be especially powerful for these types of events.

The goal of this study is to evaluate the impact of expressive writing on adjustment to a recent event, the breakup of a romantic relationship. For young adults, such relationships can be an important aspect of identity and a source of intimacy, social status, and emotional security. The breakup of a relationship may involve dealing with rejection, loneliness, or guilt, and can result in emotional distress and grief responses (Kaczmarek *et al.*, 1990). Loss of romantic relationships may be a good arena for exploring the cognitive effects of expressive writing because research shows a relationship between cognitive variables (e.g., attachment styles, cognitive self-complexity, mood regulation expectancies) and distress reactions to these events (Smith and Cohen, 1993; Sprecher *et al.*, 1998).

The major focus of this study was on how expressive writing affects cognitive processing. Pennebaker (1989) argues that expressive writing brings about cognitive assimilation, organization, and new perspectives, thus reducing the *frequency* of intrusions and avoidance. Lepore (1997), on the other hand, suggests that expressive writing reduces the negative emotional and physiological *impact* of intrusive thoughts. This argument is based on evidence that stressor-related intrusive thoughts lose their emotional sting when individuals are able to express themselves in a supportive and non-constraining social context (Lepore *et al.*, 1996; Lepore, 1997; Kliwer *et al.*, 1998; Lepore and Helgeson, 1998; Major and Gramzow, 1999; Manne, 1999; Lepore, 2001). In a similar vein, Greenberg and colleagues (1996) suggest that expressive writing may promote affective regulation by increasing individuals' tolerance for negative affect, enhancing their perceptions of control and self-efficacy over negative affect, and promoting self-empathy and acceptance of their own emotional reactions. Others, too, have argued that expressive writing might promote habituation to stress-related stimuli (Bootzin, 1997).

Whether writing actually reduces the quantity of intrusions and avoidance in individuals experiencing ongoing stressors is still at issue. In one expressive writing study, Greenberg *et al.* (1996) found increased avoidance in a trauma group, relative to controls, but interpretation is complicated because traumas were diverse and only one writing session was used. In Lepore's (1997) study, expressive writing did not reduce the frequency of intrusions over time. However, writing condition moderated the effects of intrusions, such that high intrusions predicted increases in depressive symptoms in the control group, but not in the expressive writing group. This is consistent with the desensitizing or blunting effect of writing on intrusive thoughts. Participants in Lepore's study wrote about their anticipatory reactions to an upcoming examination.

It is not clear if the same processes would occur in relation to a recent stressor involving loss, rather than challenge. In the present study, using relationship breakup as the stressor, we assessed intrusive thoughts and avoidance at 3 weeks and 15 weeks following expressive writing and examined intrusions and avoidance as both dependent variables and moderators to obtain a comprehensive assessment of this issue.

An implication of the cognitive processing perspective is that expressive writing should change people's views of the breakup to be more consistent with prior positive schemas of self and world. For example, people may reevaluate a breakup as providing opportunities for growth and meaning making (Greenberg, 1995). The relatively few studies that have assessed the impact of expressive writing on appraisals of a stressor have demonstrated beneficial cognitive and emotional changes, such as new perspectives on the stressor, increases in positive feelings about the stressor, and increases in self-esteem and adaptive behavior (Donnelly and Murray, 1991; Murray *et al.*, 1989). In these studies, cognitive and affective appraisals were assessed short-term either via content analysis of the essays or immediate post-experimental questionnaires. Thus, it is unclear if expressive writing has more enduring effects on stressor-related cognitions and emotions. Further, participants in these studies wrote about diverse events, which precluded a more detailed examination of the specific types of cognitive changes.

The current study adds to the research on cognitive and emotional effects of written disclosure by assessing participants' moods and their feelings and attitudes towards their ex-partner. We examined several specific moods, including negative moods (e.g., anger, depression) and physiological arousal/activation (e.g., tension, fatigue). We predicted that expressive writing would improve negative mood and reduce tension and fatigue. Based on previous work (e.g., Lepore, 1997), we expected that individuals evidencing incomplete cognitive processing (i.e., high intrusions and avoidance) would experience the greatest mood benefits through expressive writing. We also examined perceptions of resent toward the ex-partner, positive feelings toward the ex-partner, and guilt over the breakup. We predicted that expressive writing would lead to positive reappraisal of one's role in the breakup (i.e., less guilt), its impact on one's life (i.e., reduced resent) and feelings toward the ex-partner (e.g., restoration of positive regard).

We also predicted that expressive writing would facilitate social adjustment. Once individuals express and deal with their emotional reactions, this should free up cognitive resources and emotional energy, which they could devote to planning and implementing restoration activities (e.g., finding other relationships, getting the ex-partner back). In Spera *et al.*'s (1994) study, unemployed professionals who were able to process their anger about the layoff through writing were more likely to be reemployed at follow-up, relative to non-writing controls. Freshmen who processed their feelings about adjusting to college via written disclosure had higher grade point averages than controls at the end of the semester (Pennebaker *et al.*, 1990, Cameron and Nicholls, 1998). In addition, writing may help some individuals to see more clearly their own contribution to relationship problems or to have more empathy for their ex-partner's perspective, which could lead to a change of heart and a resumption of the relationship.

The current randomized, prospective study sought to replicate the beneficial health effects of written disclosure found in previous studies by comparing the effects of writing about relationship breakups to writing about non-emotional relationship topics. We assessed physical health effects using a reliable, validated measure of upper respiratory symptoms. Based on previous research (e.g., Pennebaker *et al.*, 1990), we predicted that

expressive writing would reduce individuals' risk for developing upper respiratory symptoms. As with the mood outcomes, we expected that individuals evidencing incomplete cognitive processing would experience the greatest health benefits from expressive writing.

## METHOD

### Participants

We identified eligible participants via a questionnaire administered in introductory-level psychology courses. We recruited all students who indicated that they had a breakup in the prior year. Of the 152 eligible participants enrolled, 145 (72 males; 73 females) completed all phases of the study. Six recruits could not be contacted at follow-up and one was dropped because of language problems. Attrition was not related to condition or the dependent variables.

### Procedures

We used a two-group, repeated measures design. Female interviewers collected data during three structured, telephone interviews with participants. The baseline interview was conducted approximately 7 months (mean days = 192.23,  $SD = 111.59$ ) after the breakup. Participants received and completed their writing assignments (see below) within the next week. The second interview was conducted approximately 2 weeks (mean days = 18.07,  $SD = 6.40$ ) after participants completed their writing assignments. The final interview was conducted approximately 15 weeks (mean days = 102.57,  $SD = 13.65$ ) after participants completed their writing assignments. Demographic and background variables were measured once; the remaining variables (see below) were measured in all three interviews. After the first interview, we randomly assigned participants to an experimental or control writing condition.

### Writing Manipulation

We mailed participants a packet that included instructions for writing in either the experimental or control condition. As recommended by Pennebaker (1989), participants were instructed to write one 20-min essay on each of three consecutive days, and to write in a private, quiet, and comfortable spot.

Participants in the *experimental group* received the following daily instructions: "We want you to let go and write about your deepest thoughts and feelings about the relationship. You can write about your thoughts and feelings regarding the relationship, how the relationship affected your life when you were in it, or the effect of the relationship on your life in the present. The important thing is that you dig down into your deepest emotions and explore them in your writing. Do not worry about grammar and spelling." To help individuals to form a coherent story about the breakup, we provided additional directions for writing on each day. On day one, they were instructed to: "Write as much as you can remember about what your relationship was like before you broke-up with your romantic partner." On day two, they were instructed to: "Write down the events and factors that you think lead up to your breakup and

about the actual breakup.” On day three, they were instructed to: “Write about the aftermath of the breakup.”

Participants in the control group wrote about impersonal relationship topics. They received the following daily instructions: “Try to develop rational, or logical, arguments and do not express your feelings or emotional reactions to this issue. Do not worry about grammar and spelling.” Participants also received additional instructions for each day. On day one, they wrote about the following problem: “Should universities promote ‘safe sex’ materials, even though this may offend some students’ religious views?” On day two, they wrote about this problem: “Should men and women be allowed to cohabitate in the same dormitory or dormitory room?” On day three, they wrote about this problem: “Should college students and professors be allowed to date?”

## Measures

*Manipulation Check* In the second interview, participants answered several questions about their essays. Using a 9-point scale (1 = not at all, 9 = very much), they indicated the extent to which their essay was “meaningful,” “personal,” and “revealing of your emotions.”

*Upper Respiratory Symptoms* We assessed physical symptoms of illness using the Upper Respiratory Symptoms Scale (URSS; Vickers and Hervig, 1988). Respondents indicated on a 5-point scale (1 = not at all/absent, 5 = extremely) how severe each symptom (e.g., sore throat, sneezing) was for them in the prior seven days. The scale had good reliability ( $\alpha = 0.86$ ).

*Mood* We used the shortened version of the Profile of Mood States (POMS-SF; Shacham, 1983) to assess five dimensions of mood. Respondents indicated on a 5-point scale (1 = not at all, 5 = extremely) how much they felt each mood in the prior seven days. The total summary mood scale had good reliability ( $\alpha = 0.90$ ), as did the subscales: depression ( $\alpha = 0.92$ ), tension ( $\alpha = 0.88$ ), anger ( $\alpha = 0.82$ ), vigor ( $\alpha = 0.87$ ), and fatigue ( $\alpha = 0.90$ ). These subscales tap both negative mood (depression, anger) and physiological arousal/activation (tension, vigor, fatigue). The intercorrelations between the subscales ranged from 0.27 to 0.69 (average  $r = 0.49$ ). These results justified separate analyses of each of the mood subscales. Principal components analysis confirmed the existence of the five underlying mood factors.

*Cognitive Processing* We adapted the Impact of Events Scale (IES; Horowitz *et al.*, 1979) to assess intrusive thoughts and avoidance related to the breakup. High intrusion and avoidance reactions are indicative of incomplete or unsuccessful cognitive processing. The IES can apply to any stressful event, referred to in the items as “it.” We substituted the term “breakup” for “it.” A sample intrusion item is: “had thoughts about the breakup when you didn’t meant to.” A sample avoidance item is: “tried not to think about the breakup”. In the present study, the intrusion and avoidance subscales were very highly correlated ( $r = 0.77$ ) and preliminary analyses revealed that the subscales were indistinguishable in terms of their association with other variables. Therefore, we just used the total score in subsequent analyses. Respondents indicated

on a 5-point scale (1 = never, 5 = very often) how true each statement was for them in the prior 7 days. The scale had good reliability ( $\alpha = 0.90$ ).

*Relationship Status, Feelings and Attitudes about the Ex-partner* At each wave, respondents described their current relationship status (e.g., in a new relationship, reunited with ex-partner). We also assessed their views about their ex-partner and the breakup using the Feelings and Attitudes Toward Ex (FATE; Ahrons, 1997) measure. We used five of the FATE subscales: regret over the breakup, distance from ex-partner, anger toward ex-partner, positive feelings toward ex-partner, and blame ex-partner for breakup. Respondents indicated on a 5-point scale (1 = strongly disagree, 5 = strongly agree) how much they agreed or disagreed with each statement about their ex-partner and their personal role in the breakup. Preliminary analyses revealed that some of the subscales had very low reliability ( $\alpha < 0.60$ ), so we conducted a principal components analysis on all of the items. This analysis revealed three reliable underlying factors, which we have labeled caring/positive regard for ex-partner ( $\alpha = 0.85$ ), resent/anger toward ex-partner ( $\alpha = 0.83$ ), and guilt over the breakup ( $\alpha = 0.81$ ). A sample caring item is: "I care about my ex's welfare." A sample resent item is: "I feel angry for the hurt I have gone through." A sample guilt item is: "I feel guilty about the breakup."

## RESULTS

### Manipulation Check

As shown in Table I, participants in the expressive writing condition rated their essays as significantly more meaningful, personal, and revealing of their emotions than did participants in the control condition.

### Effects of Expressive Writing on Upper-Respiratory Symptoms and Mood

Figure 1 shows participants' mean levels of upper respiratory symptoms as a function of writing condition at Time 1 ( $T1$ ), Time 2 ( $T2$ ) and Time 3 ( $T3$ ). This figure suggests that the control group experienced a short-term ( $T1$  to  $T2$ ) increase in symptoms followed by a return to baseline, whereas the expressive writing group experienced no change in symptoms over time. Change scores ( $T2 - T1$  and  $T3 - T1$ ) were calculated to analyze the change in symptoms over time as a function of writing condition.

Table I. Manipulation Check on Essay Contents ( $n = 145$ )

Variable	Control group		Experimental group		$t$ (143)
	$M$	$SE$	$M$	$SE$	
Rating of essay as revealing of emotions	5.28	0.22	6.99	0.14	6.70***
Rating of essay as personal	5.04	0.24	7.77	0.14	9.79***
Rating of essay as meaningful	5.81	0.19	7.04	0.18	4.75***

Note: All rating scales range from 1 (not at all) to 9 (very much). \*\*\* $p < 0.001$ .

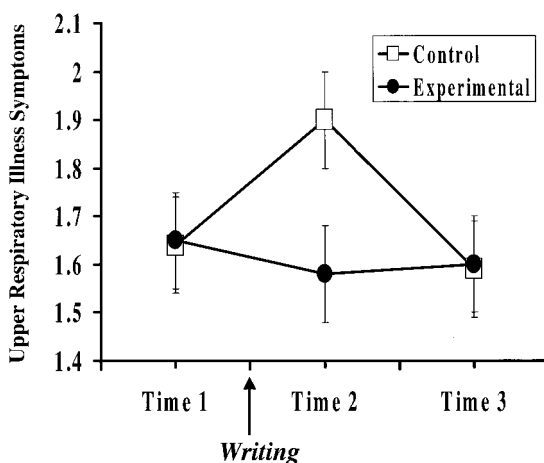


FIGURE 1 Mean upper respiratory illness symptoms as a function of writing condition and epoch. The experimental group expressed their deepest thoughts and feelings about the breakup in their writing, whereas the control group wrote dispassionately about impersonal relationship topics. Bars represent the standard error of the mean. Time 1, 2 and 3 refer, respectively, to approximately 7-, 8- and 11-months after the breakup. The writing manipulation was administered in the week following the Time 1 measurement period.

The change scores were subjected to a 2 (condition)  $\times$  2 (period) repeated measures analysis of variance (ANOVA). There was no significant main effect of time or condition, but there was a significant Condition  $\times$  Period interaction,  $F(1, 143) = 4.69$ ,  $p < 0.05$ . Simple effect analyses confirmed that the locus of this interaction was the increase in symptoms in the control group from  $T1$  to  $T2$  ( $p < 0.05$ ). There were no differences between groups in level of symptoms at  $T1$  and  $T3$ .

Change scores ( $T2 - T1$  and  $T3 - T1$ ) were calculated to analyze changes in mood states over time as a function of writing condition. We first analyzed changes in the overall POMS summary scores using a 2 (condition)  $\times$  2 (period) ANOVA. We found no significant main or interactive effects. Next, we looked for effects on specific moods by analyzing changes in participants' scores on the five mood subscales. The multivariate tests revealed no significant main effects of condition or time, but there was a significant Condition  $\times$  Period interaction,  $F(6, 138) = 2.55$ ,  $p < 0.05$ . The univariate tests revealed significant Condition  $\times$  Period interactions on tension scores,  $F(1, 143) = 5.56$ ,  $p < 0.05$ , and fatigue scores,  $F(1, 143) = 7.76$ ,  $p < 0.05$ , both of which reflect physiological arousal/activation. Simple effect analyses on the tension and fatigue scores showed that the locus of the interaction was the increase in tension and fatigue in the control group from  $T1$  to  $T2$  ( $p < 0.05$ ). There were no differences between groups in level of tension and fatigue at  $T1$  and  $T3$ . As shown in Fig. 2, these effects parallel the effect on upper respiratory symptoms.

### Effects of Expressive Writing on Relationship Status, Feelings and Attitudes Toward Ex-Partner and Cognitive Processing

Over the course of the study, six (8.2%) of the participants in the expressive writing condition were reunited with their ex-partner, while only one (1.4%) of the



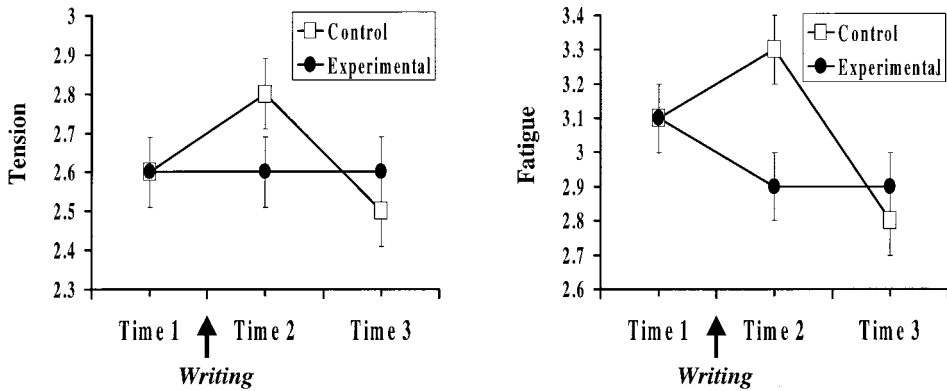


FIGURE 2 Mean tension (left) and fatigue (right) as a function of writing condition and epoch. Bars represent the standard error of the mean. See the caption accompanying Fig. 1 for details on the manipulation and timing of measurements.

participants in the control condition was reunited. This association between writing and reuniting was marginally significant [ $\chi^2(1, 145) = 3.68, p < 0.06$ ]. Writing condition did not influence whether participants engaged in a relationship with a new partner.

Change scores ( $T2 - T1$  and  $T3 - T1$ ) were calculated to analyze changes in feelings and attitudes toward the ex-partner and level of cognitive processing. We analyzed the change scores using 2 (condition)  $\times$  2 (period) ANOVAs and found that expressive writing had no influence on participants' feelings and attitudes toward their ex-partner or their level of intrusive thoughts and avoidance. However, mean scores on these variables did change over time, revealing a pattern of increased emotional detachment from the ex-partner and the breakup. Specifically, participants reported significant decreases in resentment toward their ex-partner, caring for their ex-partner, guilt over the breakup, and symptoms of intrusions and avoidance (all  $p$ 's  $< 0.05$ ; see Table II).

Table II. Changes in Feelings and Attitudes Toward Ex-Partner, Coping, and Cognitive Processing Over Time ( $n = 145$ )

Variable	Time 1		Time 2		Time 3		$F(2,141)$
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	
Feeling & attitudes toward ex-partner <sup>a</sup>							
Resent toward ex-partner	1.66	0.05	1.58	0.05	1.54	0.05	4.02*
Caring for ex-partner	3.38	0.07	3.27	0.07	3.13	0.08	8.87***
Guilt about break-up	2.69	0.08	2.46	0.09	2.41	0.08	8.63***
Cognitive processing <sup>b</sup>							
Intrusions/avoidance	2.11	0.06	1.79	0.05	1.53	0.05	49.78***

<sup>a</sup> Scales ranged from 1 (strongly disagree) to 5 (strongly agree). <sup>b</sup> Scale ranged from 1 (never) to 5 (very often). \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

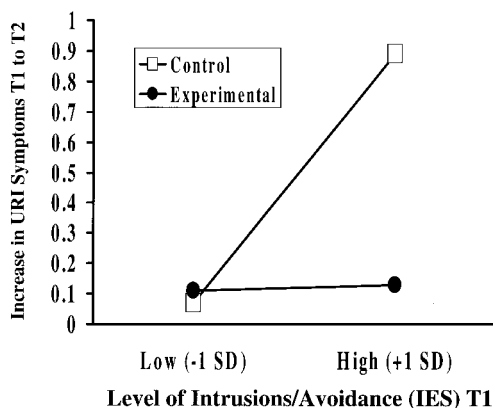


FIGURE 3 Slope of the relation between level of intrusions/avoidance at Time 1 and changes in upper respiratory illness (URI) symptoms from Time 1 to Time 2 ( $T2 - T1$ ) as a function of writing condition. IES = Impact of Event Scale score. See the caption accompanying Fig. 1 for details on the manipulation and timing of measurements.

### Interactive Effects of Expressive Writing and Cognitive Processing Variables on Upper Respiratory Symptoms and Mood

While expressive writing did not have a main effect on cognitive processing over time, we were interested in whether it interacted with cognitive processing to influence upper respiratory symptoms and mood. We limited analyses to the outcomes that were affected by expressive writing: changes from  $T1$  to  $T2$  in upper respiratory symptoms, tension and fatigue. Moderated regression analyses revealed a significant interaction of Condition  $\times$  Cognitive Processing (Intrusions/Avoidance), *Unstandardized B* =  $-0.55$ ,  $p < 0.01$ , on changes in upper respiratory symptoms. As shown in the plot in Fig. 3, higher levels of intrusive thoughts and avoidance were associated with increases in upper respiratory symptoms among participants in the control group but not among participants in the expressive writing group. There were no significant interactive effects of condition and cognitive processing on the mood outcomes.

## DISCUSSION

The present findings suggest that expressive writing has beneficial effects on a wide range of outcomes, including mood, physical health, and social functioning. In the aftermath of a relationship breakup, experimental participants, who wrote expressive essays about their breakup, reported no increases in upper respiratory symptoms, tension, or fatigue. In contrast, control participants, who wrote about impersonal topics, reported short-term increases in upper respiratory symptoms, tension and fatigue over time. There also was a trend ( $p < 0.06$ ) suggesting that participants in the experimental group were more likely to reunite with their ex-partner than were participants in the control group. Expressive writing did not affect participants' probability of starting a new relationship, their level of intrusions and avoidance, or their feelings and attitudes toward their ex-partner.

By analyzing the interaction between writing condition and cognitive processing, we had hoped to learn more about the mechanisms linking expressive writing to mood and

health outcomes. These analyses partially supported our predictions. Expressive writing appeared to attenuate the effects of incomplete cognitive processing on upper respiratory symptoms but not on mood. As shown in Fig. 3, individuals with incomplete cognitive processing, as represented by high levels of intrusions and avoidance, had short-term increases in upper respiratory symptoms only if they did not engage in expressive writing. If they did engage in expressive writing, incomplete cognitive processing was not associated with changes in upper respiratory symptoms. Our data do not allow us to identify the precise reason for this buffering effect, but several explanations seem plausible.

One explanation is that expressive writing allowed individuals to become habituated to stressful stimuli (cf. Bootzin, 1997; Lepore, 1997), such as intrusive thoughts. From this perspective, expressive writing is a form of exposure therapy, in which negative responses to stressful stimuli become extinguished through repeated exposure to the stimuli in a safe context. Another explanation for the buffering effect is that expressive writing enhanced individuals' control, or perceived control, over their responses to stressful stimuli (see Greenberg *et al.*, 1996). Alternatively, expressive writing could have enhanced self-regulation by altering how individuals coped with stress-related thoughts. For instance, in contemplating their breakup in the expressive writing task, individuals might have learned to deal with confusing and uncomfortable thoughts and memories by using distraction, problem solving, or relaxation. Yet another explanation of the buffering effects is that the quality of participants' intrusive thoughts and avoidant behaviors in the experimental group changed over time, even though the frequency of these responses was unaffected by expressive writing. For instance, in the experimental group, intrusions might have become less stressful because they now fit into a coherent, organized story of the failed relationship, and were not diffuse and unprocessed thoughts, memories, and images. It is also possible that expressive writing changed the quality of individuals' responses to intrusive thoughts through reappraisal processes. That is, confronting stress-related thoughts and feelings through writing might have enabled participants to form benign appraisals about previously threatening stimuli, such as intrusive thoughts.

In order to account for the pattern of risk for infectious illness among participants in the current study, the above processes must be linked to biological processes of pathology. We believe that the stress of incomplete cognitive processing could have increased risk for infectious illness in the control group by directly activating neuroendocrine and physiological stress responses that suppress immune system functioning. In this compromised state, individuals in the control group who came into contact with viruses in the university environment would have a heightened risk for developing an illness. In the experimental group, the various mechanisms noted above (e.g., habituation, reappraisal, self-regulation), could have directly dampened neuroendocrine responding to the stress of incomplete cognitive processing, thus short-circuiting physiological stress response and concomitant changes in immune functioning that influence risk for infectious illnesses. While these speculations are not implausible, they await further empirical evidence. Several investigators have found beneficial effects of expressive writing on immune system functioning, but the clinical significance of these effects is unknown (see review by Petrie *et al.*, 1995). Further, there is a lack of data on the underlying neural, physiological, and hormonal mechanisms accounting for the effects of expressive writing on immune functioning.

The lack of interactive effects of expressive writing and cognitive processing on mood in the present study is inconsistent with Lepore's (1997) study, as is the lack of main effects of expressive writing on several mood outcomes (see Smyth, 1998). Prior work, however, suggests that such findings are not unprecedented. Several investigators have reported that the effects of expressive writing are more robust with physical outcomes than with emotional outcomes (see reviews by Pennebaker, 1989; Smyth, 1998). Even in the current study, the few main effects of expressive writing on mood were limited to those measures that tapped physiological arousal (tension, fatigue). These findings reinforce the notion that stress, and stress-reduction techniques, have somewhat independent effects on emotional and physical outcomes (see Lepore *et al.*, 2002). These results also parallel findings in the broader literature on stress, which show that while stress increases both negative emotions and physiological activation (e.g., increased autonomic arousal, increased cortisol production), the association between negative emotions and physiological stress responses is quite small (Feldman *et al.*, 1999).

In addition to the interaction hypotheses, we predicted that expressive writing would facilitate adjustment to the breakup by altering participants' feelings and attitudes toward their ex-partner. However, the null effects of expressive writing on feelings of guilt, positive regard for the ex, and resent toward the ex are inconsistent with this prediction. Thus, we have no evidence of expressive writing resulting in schema revision. It is possible that our measures were not sensitive enough or did not tap the appropriate schemas. For instance, expressive writing might have influenced individuals' future expectations for relationships rather than their beliefs about the failed relationship. A related possibility is that expressive writing altered global beliefs about relationships (e.g., whether to trust others), but not beliefs about the failed relationship. It is also possible that expressive writing influenced beliefs about the failed relationship that we did not assess. For instance, expressive writing might have influenced feelings of control over the breakup. The fact that experimental participants were more likely to reunite with the ex-partner is consistent with this latter hypothesis.

In summary, in the aftermath of a failed relationship, expressive writing reduced individuals' risk for developing symptoms of upper respiratory illness, tension and fatigue. Incomplete cognitive processing, which was indicated by high levels of intrusive thoughts and avoidance, was associated with an increased risk of developing symptoms of upper respiratory illness in the control group, but this association was absent in the expressive writing group. Thus, it appears that expressive writing buffers individuals from the inimical health effects of intrusion and avoidance reactions to stressors. Further, we found that expressive writing influenced social adjustment, as individuals in the experimental group were more likely to re-unite with their ex-partner. Future research is needed to identify the precise mechanisms through which expressive writing enhances social adjustment and mitigates the negative health effects of incomplete cognitive processing.

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