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Stress Management Through Written Emotional Disclosure Improves Academic Performance Among College Students With Physical Symptoms

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This study tested whether writing about stressful events improves grade point averages (GPAs) and whether decreases in writing-induced negative mood from the first to last day of writing predicts GPA improvements. College students ($n = 74$) reporting elevated physical symptoms were randomized to write for 4 days about either stressful experiences (disclosure group) or time management (control group). Students rated their mood before and after writing each day, and transcripts provided GPAs for the baseline and subsequent semesters. Compared with the control condition, disclosure led to significantly better GPAs the next semester. Among disclosure students, but not control students, improved mood from the first to last writing days predicted improved GPA. Writing about general life stress leads to improved academic functioning, particularly among those who become less distressed over writing days.

Stress and Academic Performance Among College Students

College students' academic performance is influenced by numerous factors (Dill & Henley, 1998; Mouw & Khanna, 1993; Musgrave-Marquart, Bromley, & Dalley, 1997; Novak & Thacker, 1991; Trockel, Barnes, & Egget, 2000). One such factor is psychological or emotional stress, which is related to poorer performance (Haines, Norris, & Kashy, 1996; Klein & Boals, 2001; Meilman, Manley, Gaylor, & Turco, 1992; Misra, McKean, West, & Russo, 2000; Orpen, 1996; Roehl & Okun, 1984). Stress may impair academic functioning either by interfering with adaptive behaviors, such as studying or class attendance, or by impeding vital cognitive processes, such as attention and concentration.

Stress among college students can be conceptualized as having two origins. First, adjustment to college is a well-recognized stressful experience, as students decide about careers, develop and negotiate new relationships, face novel ideas that challenge previous views, and possibly move away from home. Yet stress can also derive from issues not directly related to college. For example, conflicts with family, relationship problems, legal difficulties, deaths of loved ones, and identity problems all are found among college students.

Most studies of stress and academic performance are descriptive and correlational. There has been much less empirical effort to develop stress reduction or management techniques and test their effects on academic functioning. A few studies have been conducted on interventions to help students manage college-related stress (e.g., Godbey & Courage, 1994; Kiselica, Baker, Thomas, & Reedy, 1994). These studies have usually used multiple techniques, including relaxation training, time management, nutrition and exercise, assertiveness training, and problem solving. Yet, these studies have their limitations, including small samples, failure to use randomized designs, or the use of multicomponent interventions that preclude specifying effective ingredients. Moreover, these comprehensive stress-management interventions may be more appropriate for college-related stressors (e.g., managing one's time, resolving conflicts with faculty or fellow students), but they may be of less assistance for students experiencing stressors unrelated to college. For example, stressors that are long standing, related to previous traumatic events, or that have substantially distorted one's views of self or others may need an alternative stress-management approach.

Written Emotional Expression as a Stress Management Technique

In recent years, theory and research have suggested that the consequences of a stressful experience hinge on how the event and attendant emotions are processed (Borkovec, Roemer, & Kinyon, 1995; Foa & Kozak, 1986; Horowitz, 1986). According to this view, adaptive resolution of a stressful experience is facilitated when people volitionally recall the event, access and experience the emotions stemming from it, explore how the event has changed their beliefs, and then integrate these new perspectives into their developing sense of self. A failure to resolve a stressful experience occurs when people attempt to inhibit or suppress negative emotional memories, when they allow themselves to experience only a limited subset of emotions associated with a stressful event, or when they fail to cognitively understand and integrate the experience. For example, correlational studies have demonstrated that there are maladaptive consequences of suppressing certain

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thoughts or failing to disclose stressful experiences or express negative emotions (King & Emmons, 1990; Lane & Wegner, 1995; Larson & Chastain, 1990; Pennebaker, Barger, & Tiebout, 1989; Pennebaker & O'Heeron, 1984).

Correlations between emotional inhibition and poorer functioning, however, cannot be taken as definitive evidence that the failure to disclose and process stressful memories causes worse health and functioning. To address the issue of causality, Pennebaker and Beall (1986) developed an experimental research paradigm that uses purposeful disclosure and processing as a method to counter inhibition. In this paradigm, participants are randomly assigned to write about personal stressful experiences (experimental group) or neutral topics (control group) for 3 to 5 days, and their functioning is assessed at baseline and then again some months later. Researchers have tested this paradigm in a number of studies and have found that writing about stress leads to an immediate increase in negative mood but subsequently leads to a wide range of health benefits (Cameron & Nicholls, 1998; Esterling, Antoni, Fletcher, Margulies, & Schniederman, 1994; Francis & Pennebaker, 1992; Greenberg & Stone, 1992; Greenberg, Wortman, & Stone, 1996; Kelley, Lumley, & Leisen, 1997; Pennebaker & Beall, 1986; Pennebaker, Colder, & Sharp, 1990; Pennebaker & Francis, 1996; Pennebaker, Kiecolt-Glaser, & Glaser, 1988; Petrie, Booth, Pennebaker, Davison, & Thomas, 1995; Smyth, Stone, Hurewitz, & Kaell, 1999; Spera, Buhrfeind, & Pennebaker, 1994). A meta-analysis of this literature indicated that expressive written emotional disclosure generates a mean effect size of .47 standard deviations across all outcome measures (Smyth, 1998).

Five studies have used this paradigm with college students and have examined students' academic performance as indexed by their grade point averages (GPAs) either later that semester or during the subsequent semester. In two studies, Pennebaker et al. (1990) and Pennebaker and Francis (1996) found that new college students who were randomly assigned to write about the stress of adjusting to college for 3 days showed marginally better GPAs than did control students assigned to write about trivial topics ($p = .11$ and $p = .07$, respectively). Cameron and Nicholls (1998) found that incoming students writing about adjusting to college had significantly higher GPAs than students writing about trivial topics. In contrast, Pennebaker and Beall (1986) found that students assigned to write about general life stress rather than adjustment to college did not differ in subsequent GPA from controls. Also, in two samples, Klein and Boals (2001) found no effect of writing about either adjusting to college or general life stress on subsequent GPAs.

Limitations of Available Research and Goals of This Study

There are a number of limitations of this research that need to be addressed. First, only one study (Cameron & Nicholls, 1998) of the five available has shown a statistically significant effect of written disclosure on improving grades; two others were marginally supportive, and two were not, so clearly further study is needed. Second, although the three supportive studies do not indicate the ethnic or social background of the student participants, the studies come from only two universities, both of which are private and academically competitive and enroll primarily economically advantaged Caucasian students. Thus, research on ethnically heterogeneous students who are less advantaged is needed. Third, only psychologically and physically healthy students have been studied, not students thought to be at risk in some way. Thus, it is important to determine whether written emotional disclosure leads to academic improvement among students who are at social, academic, or behavioral risk.

In addition to addressing the replicability and generalizability of the findings, we need to make several theoretical advances. First, a review of four of these studies led Pennebaker and Keough (1999) to suggest a topic–outcome specificity hypothesis—that academic improvement follows writing about only adjusting to college but does not follow writing about life stress more generally. It is important to test this hypothesis to determine whether the benefits of written disclosure are specific to the topic written about and limited only to those students whose stress is college related. Second, the control condition used in all of the previous studies may not be ideal. In these studies, control students wrote about topics that the authors described as "trivial," such as the contents of their room, or a recent social event, or their activities of the day. Such control conditions, although equating the groups for the time spent writing, may not lead to equal levels of credibility as a method of managing stress if the control condition is perceived as too trivial or meaningless. We think that it is important to use a control writing task that has more face validity as being a useful method to reduce stress and to test the credibility of both writing conditions, which has not yet been done in any studies of written emotional disclosure. Because the management of time is typically viewed as an important technique for reducing stress and improving academic functioning, we had our control group write about how they will use their time and plan their activities in the future, including both the short and long term. We also tested whether these two stress management writing tasks were comparable in credibility.

Finally, there is much debate but little consensus over the mechanism by which written emotional disclosure leads to better health and functioning. One of the leading hypotheses is that writing for a series of days leads to changes in emotional and cognitive processing of the stressful experiences, such that these experiences are no longer emotionally disruptive, cognitively distracting, and physiologically arousing (Lepore, Greenberg, Bruno, & Smyth, 2002; Pennebaker, Mayne, & Francis, 1997). Many of the studies of expressive writing have tracked how writing affects the participants' moods immediately after writing and how this mood effect changes over the series of writing days. The studies have shown that there is an immediate increase in negative mood as a consequence of writing about stress, and some studies have shown that each writing episode evokes less negative mood over subsequent days (Pennebaker & Beall, 1986). This suggests that the stressful experiences are being resolved and/or the participant is habituating to the experience, such that the events are no longer stressful. Lepore et al. (2002) have suggested that participants who show a decrease in negative mood induced by writing about stress across the writing days may manifest the greatest benefits. The relationship of mood changes induced by writing to subsequent academic functioning has not been tested, however.

We sought to redress these limitations by testing whether written emotional disclosure about general life stress leads to better grades among college students. We studied an ethnically diverse group of students from a wide range of academic and social

backgrounds, all of whom reported some health concerns. We studied students with elevated physical symptoms because such students are likely to have increased life stress (Watson & Pennebaker, 1989) and may be at increased academic risk. (Also, we studied people with physical symptoms because we are examining the effects of writing on health, which will be reported elsewhere.) In addition, (a) students wrote about stressful life events in general rather than about adjusting to college to test the topic-specificity hypothesis, (b) the control condition was modified to make it more relevant to managing stress among college students, and (c) the credibility of the two experimental conditions was compared. Finally, the change in writing-induced negative mood from the first to the last day of writing was examined as a predictor of subsequent grades.

Method

Participants

Participants in this study were 74 college students taking Introductory Psychology. All participants reported experiencing high levels of physical symptoms, scoring in the top 20% (above the 80th percentile) on a somatic symptom scale (described following). The sample of 74 participants included 52 women (70.3%) and 22 men (29.7%) with a mean age of 19.5 years (range = 17 to 49). Participants were ethnically diverse: 37.8% were Caucasians, 36.5% were African Americans, 12.2% were Arab American, 6.8% were Asians, and 6.8% were from other ethnic groups. Students at this university typically are from the working class, have parents who lack college degrees, live at home and commute to the campus, and work part time. One additional student who participated in writing did not enroll in the university during a subsequent semester and was excluded from this study.

Procedure

At the start of several consecutive semesters, we administered a somatic symptom checklist to large classes of Introductory Psychology students, and we telephoned and recruited for participation those students who scored above the 80th percentile on this scale. Students presented individually to the laboratory, were fully informed about the study, and provided written consent to the protocol, which was approved by the institutional review board, including accessing their university transcripts. The study was described to all students (both verbally and using the informed consent form) only as a study of the effects of "managing stress by writing about life events or life plans." Recruitment and the conduct of the writing task occurred throughout the semester, from 2 weeks to 2 months following the screening.

After completing questionnaires related to the larger study, students were stratified by gender and randomly assigned to a writing group, so that there would be equal numbers of men and women in each group. In a private room, the experimenter provided each student with a writing packet appropriate to his or her group assignment and read to the student the instructions for that group (see following). The student also had the instructions written on a sheet that he or she kept with the writing packet. Students were instructed to write for 4 consecutive days for 15 to 20 min daily. After receiving their instructions but before starting the writing, participants completed a scale to assess the perceived credibility of the writing task for managing stress. The first day's writing was conducted in the laboratory, but writing for Days 2 to 4 was conducted in a private place of the participant's choosing, such as a library or their home. Participants completed a mood rating scale immediately before and after each day's writing regarding how they were feeling "right then." Students returned their writing packets to the laboratory after the Day 4 writing. Packets were marked with unique code numbers, but otherwise there was no identifying information on them. Several semesters after the student's participation, the experimenter accessed all participants' transcripts from the university registrar and determined the GPA for the semester in which the students conducted the writing and the next semester that the student was enrolled in the university.

Experimental Groups

Written emotional disclosure (n = 37). Participants assigned to this condition were given the following instructions:

> The writing exercise that you will do for the next 4 days comes out of research on stress management. Writing about stressful or traumatic experiences can help you manage stress. During each of the 4 writing days, I want you to write about the most traumatic and upsetting experience of your whole life. In your writing, I want you to describe what happened and discuss your deepest thoughts and feelings about the experience. You can write about anything you want, but whatever you choose, it should be something that has affected you very deeply. Ideally, whatever you write about should deal with an event or experience that you have not talked about with others in much detail; that is, an experience that you have kept rather private. It is critical, however, that you let yourself go and touch the deepest emotions and thoughts that you have about the experience. You can write about a different stressful experience each day or about the same experience for all 4 days. When you write, don't worry about grammar, spelling, or sentence structure; these things are not important.

Control writing (n = 37). Participants assigned to this condition were given a writing task thought to be relevant to the experience of stress among students—a consideration of future time management and future plans. The specific instructions were as follows:

> The writing exercise that you will do for the next 4 days comes out of research on stress management. Learning how to plan the use of your time to reach your goals can help you manage stress. During each of the 4 writing days, I want you to write about your plans for the immediate and long-range future: On Day 1, you should write about your plans for the next 24 hours. On Day 2, you should write about your plans for the next week. On Day 3, you should write about your plans for the next year. On Day 4, you should write about your plans for the next 10 years. Before writing each day, think about what you would like to accomplish during the time period assigned to that day. Then, when you write, please be as objective as possible, writing only about your plans. Try to avoid writing about your feelings, concerns, worries, or problems. Try not to add opinions or attitudes. Your task is only to make concrete plans about your goals. When you write, don't worry about grammar, spelling, or sentence structure; these things are not important.

Measures

Somatic symptoms. The 12-item Somatization subscale of the Symptom Checklist–90—Revised (Derogatis, 1983) was completed as a screening measure by over 1,000 students. Items include headaches, pains, soreness, hot–cold spells, and trouble getting breath, and the items are rated on a scale of 0 (*not at all*) to 4 (*extremely*) for how much the respondent has been bothered by them over the past 2 weeks. Ratings were averaged, the means were rank ordered, and potential participants were identified as those scoring at or above the 80th percentile (a mean score of 1.08 in this sample). This subscale has been used in other studies as a generic physical symptom measure.

Intervention credibility. The 5-item Credibility Scale (Borkovec & Nau, 1972) has been widely used to assess how much participants believe

an intervention is credible and potentially efficacious. As is typically done, we adapted the wording of the items to make it relevant to our particular situation (i.e., using the phrase *managing stress* and referring to *students* rather than to *patients*). Two example items were "How logical does this type of technique seem to you for helping people manage stress in their lives?" and "How confident would you be in recommending this technique to a friend?" The response option ranged from 0 to 9, and ratings were averaged. Higher scores indicate greater credibility. The internal consistency of the scale in this study was an alpha level of .93.

Immediate mood. Immediately before and immediately after writing each day, participants completed a mood rating scale that was on a sheet at the front and back of the day's writing packet. Participants rated on a scale of 1 (*not at all*) to 7 (*very high*) how much they felt sad, angry, afraid, and guilty. Because these four mood adjectives were highly correlated, we created a "negative mood" score by taking the mean of the four moods. We were interested in how writing affected mood each day, so we created and analyzed a mood-change index, subtracting the prewriting mood rating from the postwriting mood rating for each day separately. Thus, positive values of this index indicate that writing led to an increase in negative mood on that day, whereas negative values indicate a decrease in negative mood.

Grade point average (GPA). A research assistant who was blind to the student's assigned writing group reviewed university transcripts of all participants. The GPA was reported for each semester on a 0.0 to 4.0 scale. Two GPA values were obtained, one for the semester in which the student participated in the study and one for the next available semester in which the student enrolled in classes. In addition, the number of credit hours attempted and earned for each semester was recorded. For students who started the study and conducted their writing in the fall, the next available semester was typically the winter semester. For students who started the study during the winter semester, the subsequent fall semester's GPA and credit hours were used, or for those students who also took a few classes in the spring–summer, the cumulative spring–summer–fall GPA and credits were calculated. Note that 6 students (3 from the disclosure group and 3 from the control group) enrolled in a subsequent semester but withdrew or otherwise failed to complete classes; they were given a GPA of 0.0 for the subsequent semester.

Results

Comparison of Groups at Baseline

To determine the adequacy of the randomization, we compared the two groups using *t* tests and chi-squares on demographic and background academic factors. As shown in Table 1, the two experimental groups did not differ significantly on age, gender, ethnicity, ACT scores, high school GPA, or credit hours attempted or earned in the baseline semester. It is important to note that the two groups did not differ on the baseline semester GPA.

Credibility of the Writing Conditions

The two groups were compared on the perceived credibility of the writing exercise to manage stress. The credibility score for the disclosure group ($M = 5.57$, $SD = 1.56$) was nearly identical to that of the control group ($M = 5.64$, $SD = 1.91$), $t(72) = 0.17$, $p = .86$. Thus, as desired, the two writing conditions were comparably credible as stress management techniques.

Adherence to the Writing Assignment and Content of the Essays

The essays of all students were read to verify that students followed the assigned instructions. Of the 37 control students, 36 (97.3%) completed all 4 days of writing, whereas 1 student turned in only 1 day of writing. All but 6 of the 37 students were judged to have completely followed directions. The other 6 were judged to have included some mention of a stressful event or negative emotion in at least one ($n = 4$) or two ($n = 2$) of their four essays.

Of the 37 disclosure-group students, 34 (91.9%) completed all 4 days of writing, whereas 3 students turned in only 1 day of writing. The essays of all of the disclosure students were judged to relate to stressful experiences and generally reflect a high level of openness about their life experiences. On average, disclosure students wrote an average of 3.0 different topics or themes over the four essays, suggesting that they experienced and wrote about a number of different stressors. Table 2 shows the frequency of topics written about by the 37 disclosure students. Relationship problems followed by family conflicts were most commonly written about. Yet, these students also often wrote about loved ones dying (often violent deaths), and a number of students shared experiences of abuse (9 of whom experienced sexual abuse or rape and 6 others who experienced nonsexual physical abuse or violence). Concerns related to pregnancy or abortion or engaging in illegal behavior

Table 1
Comparison of Written Emotional Disclosure and Control Groups on Sociodemographic and Academic-Background Variables

	Emotional disclosure		Control			
Variable	*M*	*SD*	*M*	*SD*	*t*[a]	*p*
Age	20.08	5.34	18.84	1.42	1.37	.18
High school GPA[b]	3.16	0.47	3.10	0.39	0.55	.58
ACT score[c]	22.15	3.41	20.63	3.92	1.50	.14
GPA: Introductory Psychology	2.84	1.22	2.81	0.93	0.13	.90
Credits attempted Semester 1	12.57	2.83	12.22	2.52	0.56	.58
Credits earned Semester 1	11.38	3.90	11.46	3.20	−0.10	.92
GPA Semester 1	2.69	1.01	2.86	0.80	−0.77	.45

Note. In each group ($n = 37$), there were 11 (29.7%) men and 26 (70.3%) women. GPA = grade point average. [a] $df = 72$, except for high school GPA ($df = 65$) and ACT score ($df = 51$). [b] High school GPA was available for 67 students. [c] ACT scores were available for 53 students; this score is not required for admission.

Table 2
Frequency of Topics Written About by Students in the Written Emotional Disclosure Condition

Topic	*n*	% of total
Relationship problems (partners, friends)	26	70.2
Family discord–conflict	17	45.9
Death or near death of loved one	16	43.2
Abuse	15	40.5
College–career–future concerns	8	21.6
Engaging in illegal activities	8	21.6
Pregnancy–abortion	5	13.5
Own health or mental health problems	3	8.1
Being rejected for award or job	2	5.4
Other (house break-in, car accident)	2	5.4

Note. $n = 37$.

were not unusual. Note that only 8 students (21.6%) wrote about a topic that was related to college or career (e.g., sorority problems, wanting to go to another college, feeling "stressed" by school demands), but all 8 of these students wrote primarily about other noncollege topics as well.

Although all students wrote for Days 2 to 4 outside of the laboratory, students recorded the date and duration of each day's writing. An examination of this information indicated that writing occurred as instructed—on separate days for all students and lasting for at least 5 min but typically for 15–20 min every day. We retained all 74 students in the analyses, even those who wrote for only 1 day, as well as those control students who did not completely follow the assigned directions. This "intent to treat" analysis is considered to be more conservative than dropping participants, because retaining participants who are not fully adherent typically reduces the likelihood of obtaining significant group differences.

Effect of Written Emotional Disclosure on Academic Performance

Two types of statistical analyses were used to determine how the groups differed in their GPAs from the first to second semester. First, a between-groups and within-semester multivariate repeated measures analysis of variance (ANOVA) revealed a significant Group × Semester interaction, Wilks's λ $F(1, 72) = 6.96$, $p = .01$. As shown in Figure 1, the control-group mean GPA decreased from 2.86 ($SD = 0.80$) to 2.34 ($SD = 1.04$) over the two semesters, whereas the disclosure-group mean GPA increased slightly from 2.69 ($SD = 1.01$) to 2.72 ($SD = 1.02$) over the two semesters. Second, an analysis of covariance was conducted in which the baseline semester GPA was covaried and group differences in second semester GPA were analyzed. Consistent with the first analysis, this analysis also showed a significant group effect, $F(1, 71) = 6.25$, $p = .015$. Thus, writing about stressful life experiences prevented a drop in GPA over semesters.

We then conducted several analyses to test alternative explanations of the relatively improved GPA after disclosure writing. First, as noted previously, 6 students were assigned a GPA of 0.0 for the subsequent semester because they failed to complete the semester; however, the Group × Semester interaction on GPA as well as the group effect after covarying first semester GPA were even more significant ($p = .002$) when the data were reanalyzed after dropping these 6 students. Second, we sought to verify that the differential group effect on GPA was not due to attempting or earning fewer credit hours in the next semester. The disclosure group actually attempted slightly more credit hours ($M = 13.54$ vs. 12.97) and earned slightly more credit hours ($M = 11.57$ vs. 10.46) than the control students in the subsequent semester, although these values did not differ significantly ($p = .57$ and $p = .41$, respectively). Furthermore, statistically covarying either hours attempted or hours earned during the subsequent semester did not change the significance of the group effect ($p = .02$ and $p = .05$, respectively). Finally, we sought to verify that the grade improvement was not due to disclosure students taking "easier" courses the next semester, such as more psychology courses or fewer traditional science (e.g., biology, chemistry, physics) and math courses. We coded the types of courses taken the next semester and found that disclosure students took about the same number of science–math credits as controls ($M = 2.14$ vs. 2.11), and the number of disclosure students who took a psychology course the next semester ($n = 6$) was equal to the number of control students ($n = 6$) who did so.

Effect of Written Emotional Disclosure on Immediate Mood

Figure 2 presents the negative mood change scores for the two experimental groups across all 4 writing days. These data were analyzed using a 2 (groups) × 4 (days) between–within multivariate repeated measures ANOVA. Analyses were conducted on 70 participants, because the 4 students who wrote for only 1 day did not have mood data across days. There was a significant group effect, Wilks's λ $F(1, 68) = 41.38$, $p < .001$, but neither the day effect ($p = .56$) nor the Group × Day interaction ($p = .85$) neared significance. As can be seen in Figure 2, negative mood increased significantly more for disclosure than control participants on all 4 writing days, and the magnitude of this difference remained quite stable across all 4 days.

Relationship Between Immediate Mood Change and GPA Change

Although the mean level of writing-induced negative mood among disclosure students did not attenuate across the 4 writing

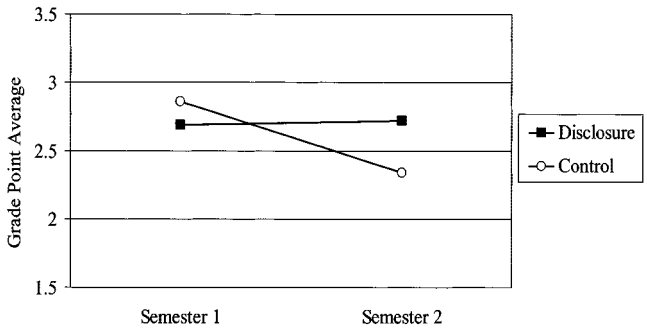

Figure 1. Comparison between the written emotional disclosure (disclosure) and control groups on grade point average for the semester of writing (Semester 1) and the subsequent semester (Semester 2).

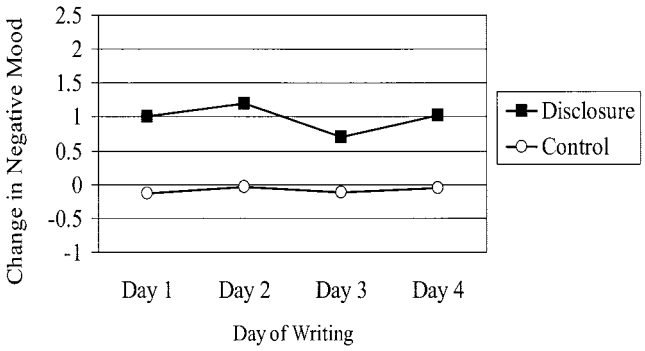

Figure 2. Comparison between the written emotional disclosure (disclosure) and control groups on the change in negative mood from immediately before to immediately after writing over the 4 writing days.

days, students varied widely in their negative mood change across days. For some students, the negative mood resulting from writing attenuated over days, for others, negative mood increased, and for still others, it remained steady. We created a negative-mood-change score across days by subtracting the Day 1 mood score from the Day 4 mood score; positive values indicate that negative mood increased from Day 1 to Day 4, whereas negative values indicate that negative mood change decreased. We also created a GPA change score by subtracting the first (writing) semester from the subsequent semester's GPA; positive values indicate an increase in GPA over semesters, and negative values indicate a decrease in GPA. We then correlated (Pearson product–moment correlation) this Day 1 to Day 4 negative-mood-change index with the GPA-change score.

Among disclosure-group students, this correlation was significant and inverse ($r = -.40$, $p = .02$), indicating that a decrease in negative mood over writing days (i.e., improved mood) predicted increased GPA over semesters. Among the controls, however, change in negative mood was unrelated to change in GPA ($r = -.02$).

Additional Exploratory Analyses

We conducted several additional exploratory analyses to further understand these findings. First, as noted previously, most students in the disclosure group wrote about various stressful topics over the 4 days rather than repeatedly on only one topic. This raises the question of whether the change in mood from Day 1 to Day 4 was influenced by the variability in topics, because one might hypothesize that staying with one topic across days would result in more complete emotional processing and better mood. As expected, writing about fewer topics was associated with an improvement rather than a worsening of mood, but this relationship was small and nonsignificant ($r = .10$). Further, writing about fewer topics predicted a higher GPA (less GPA reduction) the following semester, but again this relationship was small and nonsignificant ($r = -.14$).

Second, one might wonder about the duration of the positive effects of disclosure writing on GPA. We examined the transcripts for the semester of study following the subsequent semester analyzed previously. These analyses were more limited because an increasing number of students left the university (transferred, graduated, or dropped out) by this semester; however, the number of students who dropped did not differ across the two groups (disclosure = 4; control = 6). We examined group differences in the GPA change from the initial semester to this third semester. Control-group students continued to show a larger decline in GPA ($M = -0.52$, $SD = 1.03$) compared with disclosure-group students ($M = -0.13$, $SD = 1.04$), but this was no longer significant ($p = .14$).

Discussion

Although stress has long been recognized as related to poorer academic performance among college students, few studies have demonstrated that stress management techniques can lead to improvements in academic functioning. This study found that writing about general life stress for 4 days led to better grades during the immediately subsequent semester than an equally credible control writing task and that the improvement in grades was attenuated but not eliminated when examined for an additional semester after that. Moreover, the improvement in grades was not due to taking or earning fewer credit hours or to taking fewer difficult (e.g., math and science) courses. These findings extend the results of other studies that have found evidence for improved grades following writing about the stress of adjusting to college (Cameron & Nicholls, 1998; Pennebaker et al., 1990; Pennebaker & Francis, 1996). The present study, however, shows the generalizability of the findings, addresses a theoretical issue about the specificity of writing–outcome relationships, and illuminates a mechanism by which writing may operate.

Writing about stress appears beneficial not only for the upper middle-class Caucasian students studied previously but also for an ethnically diverse group of primarily working-class students. Furthermore, the present sample can be considered at risk, in that they reported elevated physical symptoms or health concerns. These findings increase our confidence that the academic benefits of writing about stress can be experienced by a broad spectrum of people, including those who are less socially, academically, or physically advantaged.

There has been some concern that the effects observed in prior controlled studies of writing may have been due, in part, to negative reactions from participants who were assigned to write about a trivial, meaningless topic. This study, however, used a control condition thought to be relevant to college students—managing their time to reach their goals—and more important, we assessed the perceived credibility of the two writing tasks for managing stress. We confirmed that this control condition was as credible as the disclosure condition. Furthermore, we retained in analyses those students who were less than fully adherent to the protocol, thereby being conservative with respect to testing the hypothesis. Thus, the group differences that we found in this study cannot be attributed to problems with differential motivation, credibility of the task, or attrition.

This study also sheds light on a theoretical issue relevant to writing as a stress management technique. Although it has been hypothesized that academic benefits accrue only after writing about the stress of coming to college (Pennebaker & Keough, 1999), this does not appear to be the case. In this study, students assigned to the disclosure condition wrote almost exclusively about general life stressors, and few wrote about college-related

topics, yet this group achieved academic benefits anyway. This suggests that the outcomes of writing are not specific to the topics chosen, which is consistent with a review of the literature that shows that there are wide-ranging benefits for various writing parameters (Smyth, 1998). Yet, differences between the participants in this study and previous studies may also have accounted for the fact that benefits were found after writing about noncollege topics. The present sample consisted largely of working-class students who lived at home, commuted to college, and worked part time. Thus, general life stressors may be more relevant to these students, whereas stressors related to adjustment to college may be more relevant to students in the prior studies, who typically had moved from home to a residential college.

This study also illuminates a potential mechanism for disclosure writing's effects. The results suggest that expressing and then resolving negative emotional experiences over the 4 days of writing predicts later academic benefits. As with other studies (Smyth, 1998), we found that writing about stressful experiences led to a more negative mood immediately after writing, compared with the controls. As suggested by research on anxiety disorders (Foa & Kozak, 1986), we believe that one's mood immediately following writing is an indication of the degree to which negative emotional memories have been accessed. Furthermore, the degree to which a participant's immediate negative mood attenuates over days indicates the degree to which a stressful emotional experience has been processed or resolved (Foa & Kozak, 1986; Lepore et al., 2002). In this study, among students who wrote about stress, some showed habituation or attenuation of the negative-mood effect over writing days, whereas others had unchanged moods or became increasingly distressed. It is important to note that we found that these changes across days predicted later GPA—students whose negative moods attenuated from the first to the last day of writing about stress demonstrated benefits in later GPA, whereas worsening of mood from the first to last day predicted poorer GPA. Thus, it appears that the academic benefits occurring after writing about stress derive from both accessing and resolving negative emotional experiences. In contrast, failing to resolve stressors predicts continued academic problems.

One possible problem with this explanation, however, is that most of the students in the disclosure group wrote about multiple, seemingly different stressful events over the 4 days, rather than about one event repeatedly. This appears to challenge the ideas that one has to resolve a specific stressor by writing about it repeatedly and that mood improvements between first and last days reflect resolution of the stressor. Although we found that writing about fewer (rather than more) stressful events was weakly associated with mood improvement and better GPA, these correlations were not significant. Our findings, therefore, call for alternative explanations. We propose two possibilities.

First, there may be a generalized stress-resolution process, whereby disclosing and writing about any given stressor has effects that generalize to other stressors. We suspect that superficially different stressors (e.g., relationship problems, family discord, and abuse) have common elements (e.g., appraisals, attributions, specific emotions, physiological consequences) and that these events are stored as connected or shared emotion networks or schemas. Activation of any one stressful event by writing automatically triggers or activates the others (Lang, 1985). Thus, resolution of multiple, overlapping stressors may occur when any one of the events is processed. A second possibility is that there may be general improvements in self-efficacy that follow from the behavior of confronting or exposing oneself to previously avoided stressful memories, regardless of whether one "resolves" a particular stressor. Thus, confronting stress using writing may lead to greater self-efficacy over days, which then leads to better mood and subsequent functioning.

How does writing about stress influence subsequent grades? The present study cannot directly address this issue, but recent data from two samples by Klein and Boals (2001) suggest a plausible mechanism. In one study of college students, these authors found that students who wrote about stress had subsequent improvements in their working-memory capacity, which is the ability to simultaneously store and process information, a skill that is needed for sustained attention and learning such as occurs in academic settings. Furthermore, these authors found that improvements in working-memory capacity predicted better grades. In a second study, they found that writing about stress led to a decrease in thought intrusions and avoidant thinking about the stressor, and this decrease in intrusive–avoidant thinking mediated the relationship between writing about stress and improved working memory. Thus, in combination with the present study, we might hypothesize that writing about and resolving life stress over several days (as indexed by attenuation in negative mood) leads to reductions in the cognitive consequences of stress (thought intrusion and avoidance), which leads to improved working memory, which leads to better academic performance.

Several limitations of the study should be noted. First, writing about stress did not actually raise GPA but only prevented it from declining. The findings for the control group suggest that the natural trajectory for grades among this population was downward and that writing about stress buffered against this decline. We suspect that this was, in fact, the natural trajectory among this sample of higher risk students. However, the inclusion of a randomly assigned no-writing group would be needed to determine conclusively whether grades normally drop in this population. We also do not know how similar or different this sample was from the larger pool of students taking Introductory Psychology, as we did not have permission to access the transcripts of students who were only screened but did not participate in the writing study. In addition, one might posit that writing about stress actually depressed academic functioning during the first semester and that the significant interaction between group and semester was due to temporarily lower grades among disclosure students in the first semester, rather than to a buffer against falling grades in the second semester. We doubt this possibility, in part because the GPA of the groups was not different in the first semester and also because the largest influence on the interaction was the group difference in the second semester. Nonetheless, we have no definitive proof of this, and directly testing it requires a no-writing control group.

Second, this study examined students who had elevated physical symptoms, and we have speculated that they are actually at higher risk for academic problems. Although this may be true, we do not have proof of this increased academic risk. Having elevated physical symptoms is not typically thought of as a risk factor for academic problems. Moreover, high scores on a somatization checklist partially reflect negative affectivity or neuroticism, which is the general disposition to report aversive self-states

(Watson & Pennebaker, 1989), and elevated scores may also reflect chronic physical illnesses. Thus, it is likely that many of the students who we recruited actually had elevations in anxiety and depression and related psychiatric conditions or specific diseases or chronic illnesses. Unfortunately, we did not obtain a more differentiated understanding of the types of problems that generated the elevated somatization scores. Future studies should more clearly specify the risk factor and should also consider testing students who are selected because they have more traditional risk failures for poor academic performance, such as weak academic backgrounds, family or other adjustment problems, or increased life stress.

Finally, other than immediate changes in mood, this study did not include an examination of potential mechanisms linking writing about stress with subsequently improved grades. Although other studies suggest that cognitive processes, such as reduced thought intrusions and improved working memory, may be the mediating processes (e.g., Klein & Boals, 2001), it is also possible that writing-induced interpersonal and behavioral changes, such as reducing interpersonal conflicts and distractions or structuring one's time better, led to improved academic performance. Future studies should examine these potential pathways.

This study contributes to a growing literature that indicates that writing about stressful experiences can lead to better academic functioning among college students. Students appear to be quite responsive and adherent to the protocol, disclosing and processing very emotionally difficult experiences. Future research should identify ways to help more students gain the benefits of stress reduction, especially those students who are not able to resolve stress by writing for several days on their own.

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