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The durability of beneficial health effects associated with expressive writing

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Abstract

This study examined the durability of benefits associated with expressive writing. Sixty-eight college undergraduates completed measures of physical and psychological health at the beginning of their first year and were then randomized to either an expressive writing or a control writing condition. Changes in physical health, psychological health (i.e., depression, stress, and anxiety), and academic performance were assessed two, four, and six months later. Findings indicated that participants assigned to the expressive writing condition reported less depression symptom severity at the two-month follow-up assessment relative to participants assigned to the control condition. However, these symptom reductions were not observed at any of the subsequent follow-up assessments. No significant changes were reported for physical health complaints, stress symptoms, anxiety symptoms, or academic performance. These findings suggest that, among first-year college students, expressive writing may provide some short-term relief for certain symptoms.

Keywords

expressive writing; written disclosure; stress; anxiety; depression; physical health

Over the past 20 years, a great deal of research has been conducted examining the beneficial effects associated with expressive writing (also referred to as written emotional disclosure). The expressive writing procedure typically requires participants to write for at least 20 minutes about a traumatic or stressful event that they experienced, incorporating both descriptive and emotional information, on 3–5 consecutive days. The initial beneficial health findings associated with expressive writing reported by Pennebaker and Beall (1986) have been subsequently replicated using a variety of populations, with college students representing the sample most frequently examined (e.g., Greenberg, Wortman, & Stone, 1996; King, 2001; King & Miner, 2000; Klein & Boals, 2001; Lumley & Provenzano, 2003; Pennebaker & Francis, 1996; Pennebaker, Kiecolt-Glaser, & Glaser, 1988; Sheese, Brown,

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& Granziano, 2004; Sloan & Marx, 2004a; Sloan, Marx, Epstein, & Lexington, 2007; Ullrich & Lutgendorf, 2002). Although several studies have not found expressive writing to be associated with health benefits (e.g., Kloss & Lisman, 2002; see also meta-analysis by Meads & Nouwen, 2005), results from several meta-analyses have reported that, overall, expressive writing is associated with psychological and physical health benefits (Frattaroli, 2006; Frisina, Borod, & Lepore, 2004; Smyth, 1998), with weighted mean overall effect sizes (d) ranging from .13 to .47.

Although there has been a great deal of research investigating the benefits of expressive writing, the durability of these benefits remains unclear. Expressive writing studies have most often included only one follow-up assessment (e.g., Epstein, Sloan, & Marx, 2005; King, 2001; Park & Blumberg, 2002; Pennebaker & Francis, 1996; Sloan & Marx, 2004a; Sloan et al., 2007; Ullrich & Lutgendorf, 2002) and the handful of studies that have assessed participants repeatedly over time have typically collapsed the data into a single composite follow-up score (e.g., Greenberg et al., 1996; Sheese et al., 2004). For instance, Sheese and colleagues (2004) conducted follow-up assessments once a week over a five-week period. These investigators then averaged the weekly assessments to produce composite scores that were used in their outcome analyses. Similarly, Greenberg et al. (1996) conducted follow-up assessments once a week over a four-week period and then used an average score (average of the four assessments) in the outcome analyses. Other studies have included multiple assessment points but have focused their outcome analysis on just one of the follow-up assessments (e.g., Broderick, Junghaenel, & Schwartz, 2005; Smyth, Stone, Hurewitz, & Kaell, 1999). In using both approaches it is not possible to determine whether beneficial outcome associated with expressive writing is sustained. Alternatively, some outcome effects may require a longer duration of time to be observed. If a study only includes one, relatively short follow-up assessment, the beneficial outcome may be missed. An example of such a scenario was reported by Smyth and colleagues (1999). These investigators examined the effects of expressive writing on rheumatoid arthritis symptoms. Although these investigators assessed differences in outcome at two weeks, two months, and four months, results showed a significant difference only at the four-month follow-up interval.

Frattaroli (2006) examined whether time to follow-up moderated the effects of expressive writing outcome in her meta-analysis of disclosure studies. Results revealed that time to follow-up significantly moderated psychological health outcomes, with studies including a shorter follow-up assessment period having larger effect sizes than studies that included a longer follow-up assessment period. In contrast, a significant moderation effect was not observed for self-reported physical health outcomes or academic performance outcomes. These findings suggest the possibility that, although the psychological health benefits derived from expressive writing may be short lived, the physical health benefits and improvements in academic performance may be longer lasting.

Although Frattaroli's results are informative, they may not provide an adequate understanding of the durability of the expressive writing effects simply because a direct examination of the durability of outcomes associated with expressive writing using multiple follow-up assessments and outcome measures has not been conducted. Frattaroli's meta-analytic findings were obtained by comparing studies with varying methodologies (e.g.,

participant sample, outcome measures, time to follow-up assessment). In order to adequately examine durability of benefits associated with expressive writing, direct investigation of this question is needed.

Specific aims of the present study

The current study directly examined the durability of benefits derived from expressive writing by including two, four, and six-month follow-up assessments. As prior research has suggested that durability of health benefits associated with expressive writing may differ by the type of health outcome measure, we also investigated whether durability differed across various domains of functioning (i.e., psychological health, physical health, and academic performance).

Participants in this study were individuals who were beginning college. We elected to investigate this group of individuals because transition to college is generally regarded as a stressful period for young adults (e.g., Dyson & Renk, 2006), and other studies have suggested that expressive writing might be helpful under such circumstances (e.g., Cameron & Nicholls, 1998; Lumley & Provenzano, 2003; Pennebaker & Francis, 1996). As noted earlier, there is limited information in the literature with regard to durability of benefits associated with expressive writing given that the majority of studies have examined only one follow-up assessment. Thus, we based our predictions for this study largely on Frattaroli's (2006) meta-analysis. We predicted that participants assigned to the expressive writing condition would show benefits in psychological health, physical health, and academic performance at the first (two months, first semester grade point average (GPA)) follow-up assessment compared with participants assigned to the control writing condition. Given that we expected psychological health benefits associated with expressive writing would be short lived, we did not expect to observe psychological health benefits for expressive writing participants at the four and six-month follow-up assessments. However, improvements in health and academic performance at later follow-up assessments were expected.

Method

Participants

During a summer student orientation fair, incoming first-year students enrolled at a university in the northeast region of the USA were asked to provide their names and contact information, if they were interested in potentially volunteering for “a research study examining the effects of writing on academic performance.” Individuals who provided their contact information were informed that they would be contacted at the beginning of the fall semester to see if they were still interested in participating and, if so, arrangements for participation would be made at that time.

Potential participants were contacted during the first two weeks of the fall semester and asked to volunteer for the study in exchange for financial compensation (\$5 per session). The only inclusion criterion for this study was that participants needed to be first-year university students. Among first-year university students, there were no exclusion criteria. Participants entered the study between the third and sixth weeks of the fall (i.e., beginning)

semester. These participants were randomly assigned to either an expressive writing condition or a control writing condition using a computerized random number generator. A stratified randomization procedure was used so that the two conditions would be balanced for gender. Experimenters were aware (i.e., not blind) to condition assignment, but participants were blind to condition assignment. That is, participants were unaware that there was more than one condition in the study. The study was approved by the university Institutional Review Board.

Of the 69 students (45 females) who entered the study, one dropped out after the first writing session (expressive writing condition), three failed to return for the two-month follow-up assessment (two from the expressive writing condition), three failed to return for the four-month follow-up assessment (two from the expressive writing condition), and five participants failed to return for the six-month follow-up assessment (two from the expressive writing condition). In total, 12 students dropped out of the study before the final follow-up assessment with seven (four females) participants assigned to the expressive writing condition and five (four females) assigned to the control condition, resulting in an 83% retention rate. Chi-square (racial background, gender) and *t*-test (age, baseline outcome measures) analyses indicated that participants who dropped out of the study did not significantly differ from participants who completed the study (largest $p > .40$). The data for the 68 students who completed all of the writing sessions are used for the analyses reported here. Demographic and academic characteristics of the sample as a function of condition are shown in Table 1.

Consistent with other studies that have allowed expressive writing participants to select the writing topic (Epstein et al., 2005; Park & Blumberg, 2002; Sloan & Marx, 2004a), there was considerable range in the types of events that participants elected to write about. Most participants wrote about either an assault (24%) or an illness or injury to themselves or a family member (24%). Others wrote about the end of a close relationship (16%), a family conflict (12%), the death of a close friend or family member (12%), or another stressful life event (10%). Although all of the participants were starting their first-year in college, only 2% of the expressive writing participants wrote about their transition to college.

Measures

Depression, Anxiety, and Stress Scale – 21 item (DASS₂₁; Lovibond & Lovibond, 1995)—The Depression, Anxiety, and Stress Scale (DASS) is a 21-item questionnaire consisting of items relating to depression, hyperarousal, and stress. A Likert-type scale is used to rate items according to symptoms experienced in the past week, ranging from zero (not at all) to three (most of the time). Factor analytic studies with both clinical and non-clinical samples have shown that the DASS₂₁ items can be reliably grouped into three scales: depression, anxiety, and stress (Antony, Bieling, Cox, Enns, & Swinson, 1998) and that the measure differentiates between symptoms of anxiety and depression, as well as between symptoms of physical arousal and symptoms of generalized anxiety (e.g., tension; Antony et al., 1998). The depression subscale is composed of items that measure symptoms associated with depressed mood (e.g., sadness, worthlessness), and the anxiety subscale includes items that are related to symptoms of physical arousal, panic attacks, and fear (e.g.,

trembling, faintness). Items that measure symptoms, such as tension, irritability, and tendency to overreact to stressful events comprise the stress subscale. Examples of items from the depression subscale include, “I felt I had nothing to look forward to” and “I felt down-hearted and blue.” Examples of items from the anxiety subscale include, “I experience trembling” and “I felt scared without any good reason.” Examples of items from the stress subscale include, “I found it hard to relax” and “I felt that I was using a lot of nervous energy.”

The DASS₂₁ depression subscale has been shown to provide a better separation of the features of anxiety and depression than other existing measures of depression and anxiety (Antony et al., 1998; Brown, Chorpita, Korotitsch, & Barlow, 1997; Lovibond & Lovibond, 1995). Two-week retest reliabilities for the DASS₂₁ subscales were found to be relatively high at .71, .78, and .81, for the depression, anxiety, and stress scales, respectively (Antony et al., 1998). In this study, Cronbach's alphas for the baseline administration of the depression, anxiety, and stress subscales were .94, .89, and .93, respectively. These internal consistency values are similar to those reported by Antony and colleagues (1998).

The DASS₂₁ was included in this study because of its strong psychometric properties and ability to assess several areas of psychological functioning. The DASS₂₁ has also been used in other expressive writing studies to examine outcome in psychological functioning (e.g., Epstein et al., 2005).

Pennebaker inventory of limbic languidness (PILL; Pennebaker, 1982)—The Pennebaker inventory of limbic languidness (PILL) is a 54-item self-report measure that indexes the frequency of a group of common physical symptoms and sensations. Examples of items from the PILL include, “sore throat,” “congested nose,” “upset stomach,” “heartburn or gas,” and “chills.” Cronbach's alphas range from .88 to .91 and two-month test-retest reliability ranges from .79 to .83. Cronbach's alpha in this study was .86 for the baseline administration of the PILL.

Research indicates that high scores on the PILL are significantly associated with a greater frequency of health center visits and a greater number of days sick and/or work related absences (Pennebaker, 1982). The PILL is scored by summing the total number of items on which the frequency occurs at least every month. The mean score on the PILL is 17.9 (SD = 4.5) based on a college sample (Pennebaker, 1982). The PILL was included in this study because we were interested in examining the effect of expressive writing on physical health outcomes and the PILL is a measure that has been frequently used in other expressive writing studies (e.g., Epstein et al., 2005; Sheese et al., 2004; Sloan et al., 2007).

Grade point average (GPA)—University transcripts for participants enrolled in the study were obtained and GPA for the fall semester (the semester in which the student participated) and the subsequent spring semester were calculated on a .0–4.0 scale. In addition, the number of credit hours attempted and earned for the fall and spring semesters were recorded. Of the 68 participants in the study, only one student (expressive writing condition) withdrew from the university. This student withdrew in the fall semester due to medical reasons, did

not return to college in the spring semester, and did not complete any of the follow-up assessments. The GPA for this student was recorded as .0.

Manipulation check—Using a five-point scale (1 = not at all, 5 = a great deal), immediately after each writing session participants provided ratings regarding the extent to which their narrative was “meaningful,” “personal,” and “revealing of their emotions.” These ratings were used as a manipulation check of whether or not participants in the two writing conditions followed the writing instructions that they were given.

Procedure

Participants were informed that the purpose of the study was to examine the effect of writing on academic performance. As noted earlier, participants were not aware that there was more than one condition in the study. Thus, all participants had similar expectations for the study regardless of their condition assignment. Upon arrival for the first session, participants provided written informed consent and consent to access their academic records (for purpose of obtaining information on GPA and Scholastic Assessment Test (SAT) score). Although consent to access their academic record was optional, all participants provided this consent. Participants were then asked to complete an assessment packet containing a demographics questionnaire, the DASS₂₁, and the PILL. Following completion of the questionnaires, participants were given an envelope that contained the general instructions for writing and specific instructions for the first writing session, as well as a booklet in which they were instructed to write. Writing instructions for each writing condition and session were replicated from the standard instructions developed by Pennebaker (1997). Briefly, participants assigned to the expressive writing condition were asked to write about the most stressful or traumatic experience of their lives with as much emotion and feeling as possible. Consistent with the standard protocol, they were instructed that they could write about the same or different events during each writing session. Participants assigned to the control writing condition were asked to write about how they spent their time each day without any emotion or opinions. Participants in both conditions wrote continuously for 20 minutes each session on three consecutive days. Participants wrote alone in a private location within the laboratory. After the participant had read their instructions, they were left alone in the room to write. After 20 minutes, the experimenter entered the room and instructed the participant to stop writing. Although participants were given the option of keeping their narratives, all participants submitted their narratives by placing them back in the envelope and dropping the envelope into a secured box located within the laboratory.

With the exception of the questionnaires, the same procedure was followed for the writing sessions completed on the following two days. Participants returned two, four, and six months later to complete the DASS₂₁ and PILL. Participants were fully debriefed at the six-month follow-up assessment. Participants who dropped out of the study prior to the last follow-up assessment were asked to return for a debriefing. If they did not return for an in-person debriefing, a letter was sent to them that provided the debriefing information.

Data analysis plan

To investigate the adequacy of randomization, participants assigned to the two writing conditions were compared on demographic and academic characteristics using chi-squares (racial background, gender) and *t* tests (age, SAT total score, credit hours earned in fall and spring semesters).

An intent-to-treat analysis approach was used to examine outcome. Participants who did not attend one follow-up assessment session continued to be contacted for subsequent follow-up assessment sessions. In many cases, we were successful in participants who had missed one follow-up assessment returning for subsequent follow-up assessments. In cases in which participants did not return, we used the last observation carried forward approach. Hence, all 68 participants who completed the writing sessions were included in the outcome analyses. To examine writing condition differences on the outcome measures, a 2 (writing condition) $\times$ 3 (assessment period) repeated measures of analysis of covariance (ANCOVA) was conducted, with writing condition as the between subjects variable, assessment period (two month, four month, and six-month follow-up) as the within subject variable, and baseline score used as the covariate variable, separately for each self-report outcome measure (DASS₂₁ – depression, DASS₂₁ – anxiety, DASS₂₁ – stress, PILL). Effect sizes were calculated using Cohen's *d* (1988).

Results

The analyses examining adequacy of randomization revealed no significant condition differences in demographic or academic characteristics. Demographic and academic characteristics as a function of condition are shown in Table 1.

Manipulation check

To examine the effectiveness of writing instructions for the two conditions, ratings of the extent to which the writing was meaningful, personal, and revealing of emotions following each of the three writing sessions were averaged. Average ratings were then compared for the writing groups using a *t*-test. As shown in Table 2, participants assigned to the expressive writing condition rated their narratives as significantly more meaningful, personal, and revealing of emotions relative to average ratings of the participants assigned to the control writing condition. These results indicate that expressive writing participants complied with the expressive writing instructions and were engaged in the writing assignment.

In addition to examining participant ratings of their essays, the first and third authors read each essay to investigate whether the participant complied with the writing instructions. This review indicated 100% compliance with the writing instructions.

Outcome assessment

Descriptive information for the outcome measures at baseline and at follow-up assessments, as a function of condition, is shown in Table 3. An exploratory analysis of each of the dependent variables was first conducted to examine whether the assumptions of ANCOVA were met. The exploratory analyses indicated that the depression, anxiety and stress subscale

scores at each assessment period were significantly skewed. Square root transformations corrected the skew for each of these variables. The square root transformed variables were used in our outcome analyses. Exploratory analyses of the PILL and GPA variables indicated that these variables were normally distributed and therefore no transformations were conducted.

No significant main effects (largest $F(2, 65) = .72, p > .45, d = .21$) or writing condition $\times$ assessment period interaction ($F(2, 65) = .30, p > .70, d = .14$) were found for self-reported physical health. The main effects and interaction for the stress subscale (largest main effect $F(2, 65) = .21, p > .80, d = .11$; interaction $F(2, 65) = .21, p > .75, d = .11$) and anxiety subscale of the DASS₂₁ (largest main effect $F(2, 65) = .05, p > .90, d = .06$; interaction $F(2, 65) = .23, p > .75, d = .12$) were also not significant. The main effects for writing condition for the depression subscale of the DASS₂₁ were not significant (largest $F(2, 65) = 2.54, p = .08, d = .40$), however, a significant writing condition $\times$ assessment period interaction was observed, $F(2, 65) = 3.60, p < .05, d = .47$. An ANCOVA, in which baseline depression score was used as a covariate and Writing condition as the between subject variable, was conducted for each assessment period to further explore the significant interaction. As shown in Figure 1, the significant interaction was the result of writing condition differences at the two-month follow-up assessment ($F(2, 65) = 3.05, p < .05, d = .43$). Specifically, participants assigned to the expressive writing condition reported significantly fewer depression symptoms compared with participants assigned to the control writing condition. This significant decrease in depression symptom severity for the expressive writing participants was not sustained, however, as indicated by the non-significant writing condition difference in depression scores at the four-month ($F(2, 65) = 2.10, p > .15, d = .36$) and six-month ($F(2, 65) = .98, p > .30, d = .24$) follow-up assessments.

To investigate whether the participants assigned to the two writing conditions differed in GPA, a 2 (writing condition) $\times$ 2 (fall semester, spring semester) repeated measures ANCOVA was conducted, using GPA as the dependent variable and SAT total score as a covariate. In contrast to the findings of Lumley and Provenzano (2003) and Pennebaker and Francis (1996), the main effect and the interaction for GPA were not significant for either the fall ($F(1, 66) = .64, p > .20, d = .19$) or spring semesters (largest $F(1, 66) = .41, p > .30, d = .15$). The findings remained unchanged when the one student who dropped out of college was removed and the data were reanalyzed.

Discussion

We predicted that psychological health benefits associated with expressive writing would be short lived, whereas physical health benefits and improvements in academic performance associated with expressive writing would be sustained for a longer period of time. Consistent with our first prediction, expressive writing participants displayed decreased depression symptom severity relative to control participants at the first (two months) assessment, but this benefit was not sustained at the subsequent follow-up assessments. However, in contrast to our predictions, no other group differences were found any of the follow-up assessments for self-reported physical health, academic performance, and other areas of psychological health (i.e., stress and anxiety). These findings were somewhat surprising given that prior

studies have reported psychological and physical health benefits associated with expressive writing, and Frattaroli's meta-analysis indicated significant effect sizes for self-reported physical health, psychological health, and academic outcomes.

There are a number of explanations that might account for the results obtained in this study. First, when psychological health has been used as an outcome measure in other expressive writing studies, investigators have typically examined depression (e.g., Batten, Follette, Hall, & Palm, 2002; Lepore, 1997; Sloan & Marx, 2004a). In Frattaroli's (2006) meta-analysis, depression was one of three psychological health subcategories (among a total of 13 subcategories) that had a significant effect size ($r = .07$, $p = .04$), with distress and psychological functioning representing the other two subcategories. Consequently, it may be the case that psychological benefits derived from expressive writing are limited to a handful of psychological health variables, which include depression.

Our null findings for self-reported physical health were somewhat surprising given that numerous studies have reported self-reported physical health benefits associated with expressive writing (e.g., Greenberg et al., 1996; Norman, Lumley, Dooley, & Diamond, 2004; Pennebaker, Colder, & Sharp, 1990; Pennebaker & Francis, 1996; Radcliffe, Lumley, Kendall, Stevenson, & Beltran, 2007; Sheese et al., 2004), and Frattaroli's (2006) meta-analysis indicated a significant effect size for self-reported physical health ($r = .056$). Several possible factors might account for the null findings observed for physical health. First, our first follow-up session occurred two months following the writing sessions. Expressive writing studies have substantially varied in the time to follow-up assessment (see Sloan & Marx, 2004b, for a review), and it is possible that the self-reported physical health benefit derived from expressive writing may have dissipated prior to our first follow-up assessment.

Another possible explanation for our null physical health findings is that our sample was comprised of healthy young adults. Frattaroli's meta-analysis findings suggest that individuals in poorer physical health reap greater physical health benefits from expressive writing. If someone is already in good physical health, such as the sample examined in this study, there is little room for improvement and therefore it is more difficult to observe beneficial outcome. This ceiling effect explanation would also apply to the null findings observed for stress and anxiety outcomes. That is, Frattaroli found that individuals with greater stress levels were more likely to experience improvements in psychological health. Although our sample consisted of individuals who were transitioning to college, a period of elevated stress (Dyson & Renk, 2006), their stress levels may not have been sufficiently high enough to glean any of the previously noted psychological health benefits associated with expressive writing, and we did not specifically pre-select individuals for high levels of stress. In some ways, the fact that we observed a significant between condition difference for depression symptom severity at the two-month follow-up assessment is remarkable given that the mean score for depression symptom severity at baseline was 7.2 for all participants and the range of scores for both conditions at the two-month follow-up assessment was restricted with the mean score within normal range (7.9).

Although, some expressive writing studies have found improved GPA to be associated with expressive writing (Cameron & Nicholls, 1998; Lumley & Provenzano, 2003; Pennebaker &

Francis, 1996; Pennebaker et al., 1990), other studies have found no improvement in GPA (Klein & Boals, 2001; Pennebaker & Beall, 1986). Moreover, two of the studies that showed improved GPA associated with expressive writing reported a marginal effect only (Pennebaker & Francis, 1996; Pennebaker et al., 1990). Frattaroli's (2006) meta-analysis revealed a significant but small effect size for academic outcomes ($r = .038$). Thus, a large sample size may be needed in order to observe improvements in GPA associated with expressive writing. Although, the sample size included in our study is consistent with the sample size of other expressive writing studies (see Frattaroli, 2006), we may not have been sufficiently powered to find a significant group effect for GPA outcome.

Related to the sample examined in this study, investigators have suggested that sample characteristics (e.g., college students versus clinical samples) may influence expressive writing outcome. Smyth's (1998) meta-analysis found that expressive writing studies that used college students had significantly larger psychological health effect sizes than studies that used non-student populations. In contrast, a more recent meta-analysis (Frattaroli, 2006) found that studies that used non-student populations had marginally larger psychological health effect sizes than studies that used student populations. Frattaroli (2006) noted that this discrepancy might be due to another, third variable, location of the writing sessions. That is, studies that examined student samples were more likely to be conducted in a controlled setting, such as a laboratory. When location of writing session was used as a covariate, sample no longer served as a significant moderator of outcome. Taken together, there is not convincing evidence that the expressive writing procedure is more or less effective for student versus non-student populations. However, a more critical issue may relate to individual differences serving as a moderator of expressive writing outcome (e.g., Norman et al., 2004; Sloan, Marx, Epstein, & Dobbs, 2008). Future studies examining expressive writing outcome should include an examination of moderators of expressive writing. Although the findings from Frattaroli's meta-analysis provide some important information on this topic, it is best to directly examine moderators of expressive writing outcome so that the influence of third variables can be controlled. There is also some evidence that altering the instructional set may lead to greater expressive writing benefits (e.g., Sloan et al., 2007).

As noted earlier, our study may not have been able to detect between group differences at follow-up assessments due to low power. Although, Frattaroli (2006) reported significant effect sizes across a variety of outcome measures, the $r_{\text{effect size}}$ for each outcome category was relatively small (e.g., .056, .054, and .036 for psychological health, self-reported physical health, and general functioning, respectively). These relatively small weighted mean effect sizes suggest the need to include larger sample sizes to detect between group differences in outcome effects. To investigate whether our study was underpowered to detect between group effects, we conducted a post hoc power analysis using G*power software (Faul, Erdfelder, Lang, & Buchner, 2007). Findings indicated that power for the between group difference of GPA for the fall semester was .26. Thus, we were underpowered to detect between group effects on GPA. However, post hoc power analyses of our other outcome variables indicated power was at least .80 (e.g., .86 for the PILL and .92 for anxiety), which is sufficient to detect between group differences.

Although, there is not clear evidence as to the underlying mechanism for the health benefits associated with expressive writing, there is growing evidence that the expressive writing intervention allows individuals the opportunity to express emotions and feelings surrounding current stressful experiences that they might not otherwise express (for a review see, Sloan & Marx, 2004b). Therefore, the intervention should primarily be associated with psychological health benefits. However, as the mind affects the body (e.g., Irwin, 2008; Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002; Lutgendorf & Costanzo, 2003), it is reasonable to assume that other benefits would also be observed. For example, reductions in psychological stress levels may lead to improvements in physical health (Lovallo, 2005). Thus, if expressive writing is associated with decreased stress then one would expect to find decreased physical health problems to follow. Given that we did not find any improvements in stress levels associated with expressive writing in this study, it is not surprising that physical health benefits were also not observed. Similarly, if a person is in good physical and psychological health they will be better able to focus on their school work as they will not be distracted by physical and psychological health problems. Consequently, we would expect improvement in academic performance to follow improvements in psychological and physical health. As we found no benefits in anxiety, stress or physical health associated with expressive writing, it is not surprising that we did not observe improvements in academic performance (as indexed by GPA). In addition, the short-lived reductions in depression symptoms would not promote longer term additional benefits, such as improved scholastic performance.

One of the main findings of this study is the short duration of the derived benefits associated with expressive writing. This finding raises questions regarding whether expressive writing can be useful as an intervention. On the other hand, it may be necessary to conduct writing sessions on a periodic basis (e.g., every few weeks) in order to reap the greatest benefit from the expressive writing procedure. As Pennebaker (1997) has noted, because new stressors occur over time, the expressive writing intervention might be best implemented by individuals who complete writing sessions at regular intervals, similar to booster sessions that are commonly used in psychotherapy (e.g., Baggs & Spence, 1990; Braukhaus, Hahlweg, Kroeger, Groth, & Fehm-Wolfsdorf, 2003; Clarke, Rohde, Lewinsohn, Hops, & Seeley, 1999; Connors & Walitzer, 2001), and booster sessions might be particularly useful for relatively healthy individuals. Gortner, Rude, and Pennebaker (2006) investigated whether a booster writing session enhanced expressive writing outcome with a college student sample. No benefit was observed by adding a booster session. It should be noted that these investigators used only a single booster writing session that occurred five weeks after the initial expressive writing sessions. Given that follow-up was assessed six months following the initial writing sessions, the single booster writing session may have been insufficient to enhance lasting benefits derived from the expressive writing procedure. Overall, it will be important for investigators to continue to examine whether booster writing sessions enhance the efficacy of expressive writing.

Taken together, the results of this study add to the large body of research indicating that expressive writing can be associated with beneficial outcome, at least in the short term. However, it appears that beneficial outcome may be observed for some areas of functioning but not others. It is likely that the benefits derived from the expressive writing task may vary

by the sample that is being studied. Durability of any observed benefit might also vary as a function of domain of assessment. In order to continue to further our knowledge on how expressive writing is best used, it will be important for investigators to include multiple assessments over time and to investigate a variety of health outcomes with different populations. Investigation of the potential benefit of booster writing sessions should also be pursued.

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Figure 1. Mean depression symptom severity as a function of time of assessment and condition assignment.

Table 1

Demographic and academic characteristics as a function of condition.

Variable	Expressive writing condition (<i>n</i> = 35)	Control writing condition (<i>n</i> = 33)
Age (in years)	18.8 (.6)	19.0 (.4)
Female (<i>n</i>)	20	17
Ethnicity (<i>n</i>)		
White	20	19
African American	10	9
Other	5	5
Overall SAT score	1034.7 (101.4)	1051.8 (110.8)
Credits completed in fall	13.2 (3.2)	12.8 (3.1)
Credits earned in spring	13.6 (3.6)	13.8 (3.6)

Note: Standard deviations are in parentheses.

Table 2

Manipulation check on ratings of the essays.

Rating	Expressive writing condition	Control writing condition		
	<i>M</i> (SD)	<i>M</i> (SD)	<i>t</i>(66)	<i>p</i>
Meaningful ^a	3.97 (1.21)	1.28 (.44)	5.24	.001
Personal	4.25 (.78)	2.56 (1.17)	7.06	.001
Revealing	4.08 (.89)	2.28 (.97)	8.00	.001

^aRating scale for all three ratings ranged from one (*not at all*) to five (*a great deal*).

Table 3

Means (and SD) at baseline and follow-up assessments as a function of condition.

Outcome measure	Disclosure	Control
GPA fall semester	2.77 (.71)	2.93 (.74)
GPA spring semester	2.79 (.65)	3.03 (.64)
DASS ₂₁ – depression		
Baseline	9.50 (8.3)	8.43 (7.9)
Two months	4.24 (9.2)	8.76 (6.4)
Four months	8.60 (9.8)	8.20 (8.1)
Six months	9.35 (8.6)	8.07 (8.3)
DASS ₂₁ – anxiety		
Baseline	3.78 (3.9)	4.38 (5.1)
Two months	4.00 (5.7)	4.9 (4.8)
Four months	5.46 (6.8)	6.27 (7.4)
Six months	6.72 (5.7)	5.70 (7.1)
DASS ₂₁ – stress		
Baseline	9.42 (7.8)	9.62 (7.4)
Two months	8.18 (8.7)	9.41 (8.2)
Four months	8.32 (8.5)	8.45 (7.4)
Six months	8.78 (8.7)	9.62 (9.3)
PILL		
Baseline	15.77 (8.3)	16.62 (8.8)
Two months	15.14 (9.9)	16.19 (8.9)
Four months	14.77 (9.7)	15.74 (10.3)
Six months	14.14 (9.8)	16.14 (10.4)

Note: GPA=grade point average; DASS₂₁=Depression, Anxiety, and Stress Scale; PILL=Pennebaker inventory of limbic languidness.