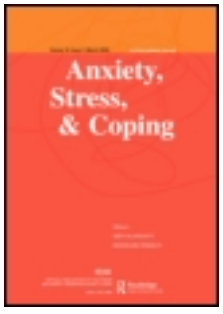

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Randomized controlled trial of expressive writing for psychological and physical health: the moderating role of emotional expressivity

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The current study assessed main effects and moderators (including emotional expressiveness, emotional processing, and ambivalence over emotional expression) of the effects of expressive writing in a sample of healthy adults. Young adult participants ($N = 116$) were randomly assigned to write for 20 minutes on four occasions about deepest thoughts and feelings regarding their most stressful/traumatic event in the past five years (expressive writing) or about a control topic (control). Dependent variables were indicators of anxiety, depression, and physical symptoms. No significant effects of writing condition were evident on anxiety, depressive symptoms, or physical symptoms. Emotional expressiveness emerged as a significant moderator of anxiety outcomes, however. Within the expressive writing group, participants high in expressiveness evidenced a significant reduction in anxiety at three-month follow-up, and participants low in expressiveness showed a significant increase in anxiety. Expressiveness did not predict change in anxiety in the control group. These findings on anxiety are consistent with the matching hypothesis, which suggests that matching a person's naturally elected coping approach with an assigned intervention is beneficial. These findings also suggest that expressive writing about a stressful event may be contraindicated for individuals who do not typically express emotions.

Keywords: expressive writing; anxiety; emotional approach coping; coping processes; moderators of expressive writing

Since Pennebaker and Beall's (1986) seminal study demonstrating that expressive writing about a stressful experience improves indicators of physical health, more than 400 studies have tested the effects of expressive writing in different populations, on various outcomes, and under a variety of circumstances. A meta-analysis (Frattaroli, 2006) identified an overall effect size of .075 for physical, psychological, and overall functioning outcomes. This effect size is modest but statistically significant, and it reflects the wide variability in effect sizes across studies. Such variability indicates that expressive writing works better in some contexts than others. Identifying the conditions under which and for whom expressive writing is most effective is important for illuminating the boundary conditions of expressive disclosure and for productively targeting interventions involving expressive disclosure to those who will benefit from them. Given that the expressive writing paradigm requires emotional disclosure,

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facets of dispositional emotional expressiveness have garnered particular interest among researchers as potential factors predicting response to the intervention. The current study assessed the main effect of expressive writing on psychological and physical outcomes, and whether individuals' dispositional tendency toward emotional expressiveness and ambivalence over expressiveness moderates the effect.

A number of studies have assessed moderators of expressive writing including, but not limited to, dispositional expressiveness (Stanton, Kirk, Cameron, & Danoff-Burg, 2000), emotional approach coping (EAC) (Austenfeld, Paolo, & Stanton, 2006), alexithymia (Lumley, 2004), and ambivalence over emotional expression (Lu & Stanton, 2009). All of these moderators relate to an individual's tendency to express emotion or, alternatively, difficulty with or uncertainty about expressing emotions. Various measures of emotional expressiveness predict differential responding to the expressive writing paradigm; however, findings are not consistently in the same direction.

Studies that assess emotional expressivity, either as a dispositional variable (e.g., King & Emmons, 1990) or as a situation-specific construct (e.g., EAC; Stanton et al., 2000), have demonstrated that higher levels of expressivity at baseline predict more favorable responses to experimentally induced emotional disclosure. In a study of 64 medical students (Austenfeld et al., 2006), expressive writing about stressful medical clerkship events was compared to writing about goals. For participants high in situational emotional expression regarding clerkship stressors, those in the expressive writing condition had improved depressive symptoms compared to those who wrote about goals. In another study, Stanton et al. (2000, Study 4) randomly assigned 76 college students to describe their emotional reactions to or facts regarding a parent's serious psychological or physical disorder and assessed physiological arousal and negative affect. Within the emotion group at the second session, higher baseline expressive coping about the parent's disorder was significantly associated with lower heart rate, skin conductance, and hostility during emotional expression. In a related line of research, 80 undergraduate women with migraine headaches (Kraft, Lumley, D'Souza, & Dooley, 2008) were assigned to expressive writing or relaxation technique exercises. Higher dispositional EAC predicted improvement in headache frequency and disability for the expressive writing group, but not for the control group.

There is some evidence that expressive writing may be contraindicated for individuals who are unable to express emotions. In a review paper, Lumley (2004) discussed marginally significant results (left out of the published manuscripts) from two studies. One study assessed the effect of writing about stressful events on grade point average (GPA) in college students with elevated physical symptoms (Lumley & Provenzano, 2003). A marginally significant moderating effect of alexithymia (i.e., deficit in understanding, describing, or expressing emotions) indicated that expressive writing participants who were high in alexithymia reported a marginally significant increase in respiratory infection symptoms at follow-up, but those low in alexithymia reported a (non-significant) decrease in symptoms. In addition, high externally oriented thinking, a facet of alexithymia, predicted a significant increase in symptoms of anxiety and depression in the expressive writing group at follow-up, but no change in symptoms in the control group. The second study (Norman, Lumley, Dooley, & Diamond, 2004) assessed effects of expressive writing in women with pelvic pain. Highly alexithymic women in the expressive writing group reported marginally significant increases in pain, prescription medication use, and health care

utilization at follow-up, whereas participants high in alexithymia in the control group reported decreased pain, medication use, and health care utilization.

Other researchers have found the opposite pattern of results that writing is more effective for those who have difficulty identifying or expressing emotion. Lu and Stanton (2009) assessed ambivalence over emotional expression as a moderator of expressive writing effects on negative affect in 130 undergraduates. Expressive writing produced greater reductions in negative affect for highly ambivalent participants than for those low in ambivalence. In a study of 73 college students (Páez, Velasco, & González, 1999), participants were assigned to write briefly (one 3-minute writing session) or more intensively (4 days, 20 minutes each day) about a stressful event. Within the intensive writing group, those with a high level of difficulty describing their feelings (a facet of alexithymia) showed greater reduction in negative affect after intensive writing than those with low difficulty. Another study examining the effect of expressive writing on 40 patients recovering from bladder papilloma resection found that for those high in alexithymia, writing reduced the length of hospital stay and number of physical and psychological symptoms, but this effect was not found for patients low in alexithymia (Solano, Donati, Pecci, Persichetti, & Colaci, 2003).

Studies demonstrating that emotional expressiveness predicts better outcomes from expressive writing, or that the inability to express emotions predicts worse outcomes, are consistent with the matching hypothesis, which suggests that matching a person's naturally elected coping approach with contextual parameters (e.g., assigned intervention) is particularly beneficial (Engebretson, Matthews, & Scheier, 1989; Stanton et al., 2000). This hypothesis proposes that expressive disclosure is not a universally beneficial strategy and that it may in fact be unhelpful or detrimental to individuals who are not normally expressive. However, the studies finding that the inability or reluctance to express emotions predicts better outcomes from expressive writing support the hypothesis that those who do not normally express emotions will benefit more from expressive writing, perhaps because it provides a safe and structured context for expression. This hypothesis suggests that expressive writing can be beneficial for all, and prompting those who do not normally express emotions to do so is therapeutic. Determining which of these hypotheses is more useful is of particular importance given that the first proposes that expressive writing may be contraindicated for some, whereas the second proposes that anyone can engage in this activity without detriment.

Although a number of studies have demonstrated that emotional expressiveness moderates the effect of expressive writing, the current body of work does not yet provide a consistent portrait of the direction of this relationship. The goal of this study was to examine components of emotional expressiveness as moderators of the effects of expressive writing on psychological and physical health in a sample of healthy adults. Due to the inconsistency of findings, we did not have a priori hypotheses about whether high expressiveness would augment or diminish the effects of expressive writing.

Method

Participants

In response to course announcements and flyers, UCLA students and adults from the community ($n = 537$) called research staff to learn about the study and undergo

eligibility screening. Eligibility criteria were: (1) between 18 and 40 years of age; (2) fluent in English; (3) no psychiatric disorder as indicated by participants' self-report of a doctor's diagnosis, hospitalization, or current treatment; (4) no serious physical illness as indicated by self-report of a doctor's diagnosis; and (5) having experienced a stressful event within the past five years that they rated as 5 or greater in stressfulness on a 7-point Likert scale (1 = not at all stressful; 7 = extremely stressful). Because participants also completed functional magnetic resonance imaging (fMRI),[1] they were required to be scanner eligible (i.e., metal-free, right-handed, not claustrophobic, and not pregnant).

For a diagram of participant flow through the study, see Figure 1. A total of 116 participants were randomly assigned to the expressive writing ($n = 59$) and control ($n = 57$) conditions. As shown in the figure, three participants were not included in

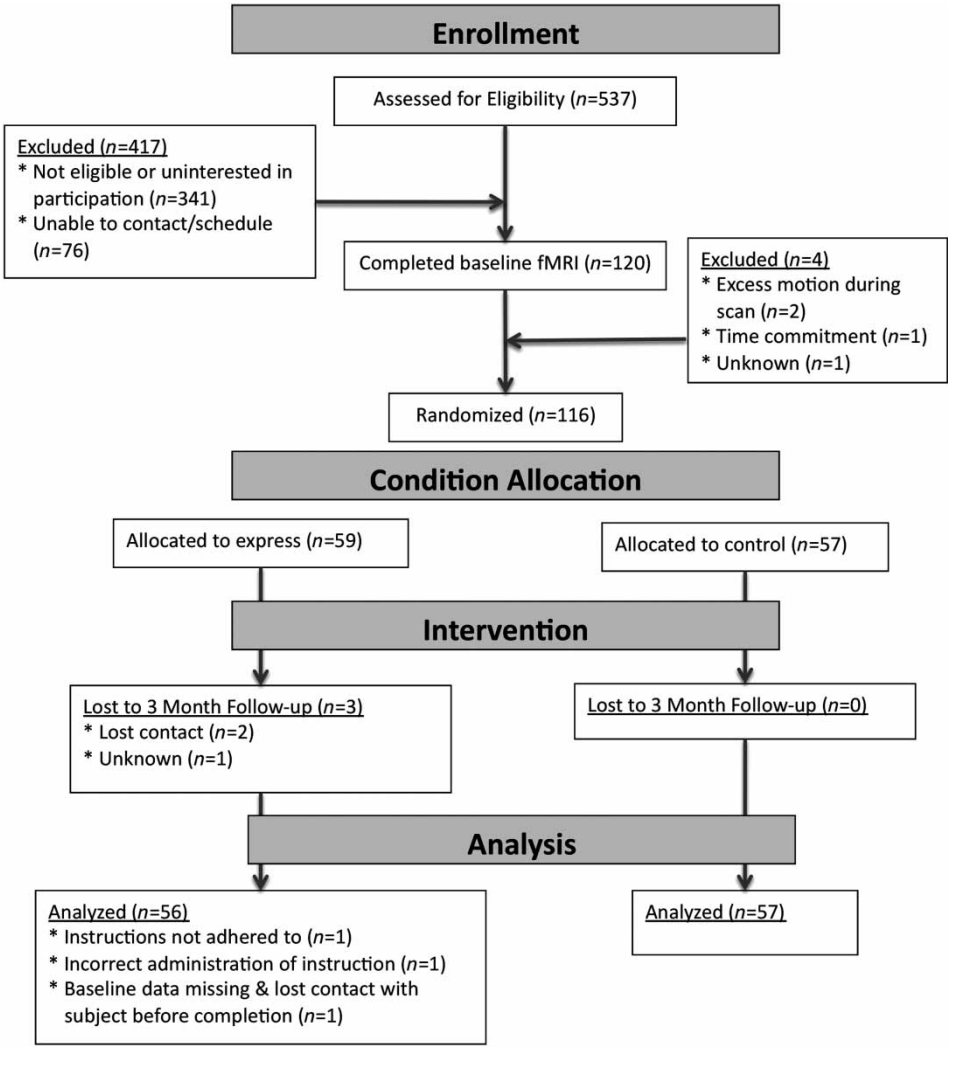

Figure 1. Participant flow chart.

data analyses. One participant did not follow instructions, and the additional two were removed due to experimenter error in data collection or instruction administration. Data from 113 participants were analyzed (56 women). Participants were an average of 21.2-years-old ($SD = 2.89$, range = 18–35) and were Asian (41.8%), White (37.3%), Black (10.9%), Latino (8.2%), and bi-racial (1.8%). Of those who were included in analyses, two participants did not complete the Time 2 assessment at three months (2 from expressive writing, 0 from control). Baseline data were included for these participants, and therefore, all analyses are intent to treat. Two participants' baseline data were inadvertently deleted (1 expressive writing and 1 control), and therefore only follow-up data for those participants are included in analyses.

Procedure

UCLA students and community members were recruited via flyers posted in several university locations and announcements made during introductory psychology classes. Interested parties contacted a study coordinator for telephone screening. Experimenters were graduate students, postdoctoral fellows, or full-time employed research coordinators who were unaware of participants' study condition assignments. Eligible and interested participants attended a baseline session during which they provided written informed consent, completed a set of questionnaires administered electronically (Time 1), and completed a fMRI scan. Participants then engaged in four 20-minute writing sessions, scheduled at the participants' convenience at least three days apart and occurring within eight weeks. Four writing sessions were chosen based on Frattaroli's (2006) meta-analysis, which revealed greater effect sizes for three or more writing sessions compared to fewer than three sessions. Participants completed baseline and writing sessions in an average of 24.83 days ($SD = 5.16$).

During the initial writing session, participants were assigned to one of the two writing conditions (expressive writing or control) using a random numbers generator by a biostatistician who was uninvolved in the study, and completed the first 20-minute writing task. Participants listened to an audio recording of the writing instructions, and completed the writing task in a private laboratory room in the psychology building using pen and paper. Following the completion of writing, participants placed their essays in an envelope and returned it to the experimenter. Essays were checked for suicidality content. The two writing tasks to which participants were randomized involved: (1) describing their deepest thoughts and feelings regarding the "most stressful or traumatic experience during the past five years" (expressive writing) or (2) describing how they spent their time without expressing emotions or opinions (control). Following Pennebaker and Beall (1986), instructions were as follows:

Expressive writing condition:

> What I would like you to write about for these next four sessions is your most stressful or traumatic experience during the past five years. In your writing, I want you to really let go and explore your very deepest feelings and thoughts about the stressful experience. Remember that you have four days to write. You might tie your experience to other parts of your life. How is the experience related to your childhood, your

> parents, people you love, who you are, or who you want to be? Please write continuously for the entire time, and don't worry about grammar, spelling, or sentence structure.

Control condition:

> What I would like you to write about over the next four sessions is how you use your time. Each day, I will give you different writing assignments on the way you spend your time. In your writing, I want you to be as objective as possible. I am not interested in your emotions or opinions. Rather I want you to try to be completely objective. Feel free to be as detailed as possible. In today's writing, I want you to describe what you did yesterday from the time you got up until the time you went to bed. For example, you might start when your alarm went off and you got out of bed. You could include the things you ate, where you went, which buildings or objects you passed by as you walked from place to place. Please write continuously for the entire time, and don't worry about grammar, spelling, or sentence structure.

In sessions 2 and 3, participants in the expressive writing group were prompted to continue writing about their stressful event with the same instructions as in the first session. In session 4, participants were reminded that this was the last session and were prompted to "wrap everything up" and to describe "how is this experience related to [their] current life and to [their] future." They were reminded to express their deepest emotions and thoughts. In session 2, the control group was asked to describe what they did since waking that day; in session 3, what they planned to do when the experiment was over until when they went to sleep; and in session 4, what they planned to do over the next week. Each time, instructions prompted them to be detailed and objective.

Three months after the final writing session, participants were emailed a link and completed follow-up questionnaires via the Internet (Time 2). They were compensated up to $130 ($30 for the fMRI session, $15 for each writing session, and $40 for completion of the follow-up questionnaires).

Dependent variables

Depressive symptoms

Three measures of depressive symptoms were administered, and a composite measure comprised of the three scales was created. Correlations between depression measures at Time 1 ranged from .62 to .78 and at Time 2, from .74 to .83. Scores on each of the three scales were standardized at baseline. To allow for detection of change from Time 1 to Time 2, *z*-scores for Time 2 were calculated using means and standard deviations from Time 1 with the equation (Time 2 raw score – Time 1 mean)/(Time 1 standard deviation). Standardized scores on the three measures were averaged at baseline and follow-up to create composite scores. The composite measure had a mean of zero and standard deviation of one.

The 7-item Depression subscale of the Depression, Anxiety and Stress Scale (DASS-21; Antony, Bieling, Cox, Enns, & Swinson, 1998) assesses symptoms of dysphoric mood such as sadness and worthlessness. Subscale items were distinct from those on the Anxiety and Stress subscales and items have acceptable to excellent internal consistency and concurrent validity (Antony et al., 1998). In the current sample, αs were .84 (Time 1) and .88 (Time 2). The Beck Depression Inventory 1A (BDI; Beck & Steer, 1984) is a

21-item measure that assesses symptoms of depression such as hopelessness, feelings of guilt, and weight loss. For Institutional Review Board (IRB) purposes, the suicidality item was removed. Participants rated the severity of depressive symptoms from 0 to 4 in the past week. The BDI-1A has clinical utility and sound psychometric properties in psychiatric and non-clinical samples (Beck, Steer, & Carbin, 1988; Steer, Beck, Garrison, & Lester, 1988). The BDI-1A is strongly correlated with the BDI-2 both in terms of number of symptoms endorsed ($r = .93$) and total score ($r = .94$) (Beck, Steer, Ball, & Ranieri, 1996). In the current sample, αs were .83 (Time 1) and .90 (Time 2). On the 20-item Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), participants rate the frequency of symptoms associated with depression in the past week from rarely or none of the time (less than 1 day) to most or all of the time (5–7 days). The scale has high internal consistency and adequate test–retest reliability (Radloff, 1977), and is reliable in young adult populations (Radloff, 1991). In the current sample, αs were .88 (Time 1) and .90 (Time 2).

Physical symptoms

The 54-item Pennebaker Inventory of Limbic Languidness (PILL; Pennebaker, 1982) assesses a number of common physical symptoms. Participants indicate how often they have experienced each symptom on a five-point Likert scale (1 = never or almost never, 2 = less than 3 or 4 times per year, 3 = every month or so, 4 = every week or so, 5 = more than once every week). Scores are summed across all 54 items. Internal consistency and reliability are excellent ($\alpha = .91$ and two-month test–retest correlation = .83). In the current sample, αs were .94 (Time 1) and .95 (Time 2).

Anxiety symptoms

Three measures of anxiety symptoms were administered. Correlations between anxiety scales at Time 1 ranged from .65 to .73 and at Time 2, from .65 to .80. A composite measure comprised of the three scales was created using the same method as for the depression composite. The composite had a mean of zero and standard deviation of one.

The 7-item Anxiety subscale of DASS (Antony et al., 1998) assesses symptoms of physical arousal, panic attacks, and fear such as trembling or faintness. In the current sample, αs were .78 (Time 1) and .78 (Time 2). The Anxiety and Somatization subscales from the Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983), a global measure of psychological symptoms, were used to assess anxiety symptoms. Participants rate the extent to which they were distressed or bothered by each symptom in the past 30 days. Sample items from the Somatization subscale include "faintness or dizziness" and "pains in the heart or chest," and sample Anxiety items include "nervousness or shakiness inside," and "being suddenly scared for no reason." Although the Somatization subscale assesses physical symptoms, it has previously been used as a measure of anxiety (Roy-Byrne et al., 2010), and in our sample, correlated more strongly with the BSI Anxiety subscale ($r = .74$) and Depression, Anxiety, and Stress Anxiety subscale ($r = .68$) than with the PILL, our measure of physical symptoms ($r = .37$). The scales demonstrate good internal consistency and reliability (Derogatis, 1993). In the current sample, αs for the

Anxiety subscale were .80 (Time 1) and .81 (Time 2) and for the Somatization subscale were .82 (Time 1) and .88 (Time 2).

Moderator measures

Emotional Approach Coping

We administered the 4-item Emotional Expression (EE) and 4-item Emotional Processing (EP) subscales of the EAC scale (Stanton et al., 2000). The EE scale assesses frequency of coping with emotions about a stressful event through expression (e.g., "I take time to express my emotions"), and the EP scale measures frequency of active attempts to acknowledge and understand emotions (e.g., "I delve into my feelings to get a thorough understanding of them"). At baseline, participants briefly described their most stressful experience in the past five years (which in nearly all cases was the same as the stressor they wrote about in their essays). Participants indicated the frequency of using each strategy to cope with the specific stressful experience on a 4-point Likert scale. The scales have sound internal consistency, test–retest reliability, and convergent and discriminant validity (Stanton et al., 2000). Items were embedded within the COPE (Carver, Scheier, & Weintraub, 1989). In the current sample, α for the EE subscale was .89 and for the EP subscale was .80.

Emotional Expressiveness Questionnaire (EEQ)

The 16-item EEQ measures dispositional emotional expressiveness (King & Emmons, 1990). Participants rate the extent to which they agree with each item (e.g., "People can tell from my facial expressions how I am feeling") on a 1–7 scale with higher numbers representing higher expressiveness. The scale is comprised of three subscales: expression of positive emotion, expression of negative emotion, and expression of intimacy. For the current study, the overall scale was used. The EEQ has adequate internal consistency ($\alpha = .78$) (King & Emmons, 1990). In the current sample, α was .74.

Ambivalence over Emotional Expressiveness Questionnaire (AEQ)

The 28-item AEQ assesses one's feelings of ambivalence about expressing emotions (King & Emmons, 1990). Participants rate the frequency with which they experience each item (e.g., "I want to express my emotions honestly but I am afraid that it may cause me embarrassment or hurt") on a 1–5 Likert scale, with 5 being frequent experiences of ambivalence. The scale has adequate reliability ($\alpha = .89$; 6-week test–retest correlation = .78) and validity (King & Emmons, 1990). In the current sample, α was .95.

Manipulation check

At the three-month follow-up, participants rated on a 1–7 Likert scale, the extent to which they disclosed personal information, revealed emotion, increased understanding of their stressful event, found the writing valuable, believed writing had a positive effect, and how much they expected their participation to have lasting positive and negative effects.

Statistical analyses

Data were examined for outliers (>3 SD from the mean) on dependent measures (anxiety, depression, PILL) as well as continuous moderators (EAC scales, EEQ, AEQ). Four outliers were identified for anxiety and two for the PILL. Outliers were replaced with the next highest value based on the Winsor method (Guttman, 1973). When results differed between corrected and uncorrected data, it is reported in a footnote. Repeated measures data were analyzed with multi-level modeling in Stata 12.0 using the xtmixed command. Multi-level modeling accounts for the nesting of time-points within participants, allowing for examination of within- and between-participant change across time (baseline and three month follow-up) and by group (expressive writing and control). Multi-level modeling includes participants with missing data and uses all available data to estimate the model (Hedeker & Gibbons, 2006). Therefore, analyses include all participants with data for at least one time point.

Models including only random effects for the intercept were compared to those with random effects for intercept and slope using likelihood ratio tests. When the inclusion of a random slope was significant, final models included both random intercepts and slopes. When a random slope was included, models with unstructured covariance structures (allowing slopes and intercepts to covary) were compared to homogeneous covariance structures (constraining covariance to 0) using likelihood ratio tests. Allowing intercepts and slopes to covary did not significantly improve any of the models, and therefore final models with random slopes used independent covariance structures. Table 1 in the online supplemental materials includes a summary of random effects in each model and variance components.

In the multi-level model, Time was modeled at level 1, and Group at level 2. For analyses of the effects of writing group, between-group differences were assessed by examining the Time × Group interaction. Effect sizes were calculated based on the method described by Feingold (2009) that produces estimates analogous to Cohen's *d* for growth curve models in randomized clinical trials. Small, medium, and large effects for *d* are .2, .5, and .8, respectively (Cohen, 1988). When significant, tests of simple effects comparing change from baseline to follow-up by Group were conducted. When moderators were included in the model, the three-way Time × Group × moderator interaction was examined for significance. Given that three moderators were tested for three dependent variables (total of nine tests), a Bonferroni correction was used and α was set to .05/9 or .006. When significant, for continuous moderators, tests of simple effects were performed comparing change from baseline to follow-up by Group at 1 standard deviation above and below the mean on the moderator. For categorical moderators, tests of simple effects were performed comparing change from baseline to follow-up by Group at each level of the moderator. Cohen's f^2 effect sizes are reported for significant moderated effects and were calculated using the approach described by Selya, Rose, Dierker, Hedeker, and Mermelstein (2012) for multi-level models. Small, medium, and large effects for f^2 are .02, .15, and .35, respectively (Cohen, 1988).

Due to significant positive skew of the data, residual plots were examined for normality. For plots that indicated non-normally distributed residuals, models were retested using the vce (robust) command, which corrects for bias in standard errors.

Table 1. Descriptive statistics for dependent variables at Time 1 and Time 2 and moderators at Time 1.

	Control		Expressive writing	
	Time 1 mean (SD)	Time 2 mean (SD)	Time 1 mean (SD)	Time 2 mean (SD)
Dependent variables				
Depression				
DAAS depression	7.78 (7.2)	3.61 (4.0)	6.07 (6.5)	3.76 (4.0)
BDI	8.36 (6.3)	8.38 (8.5)	7.59 (5.2)	7.91 (6.6)
CES-D	12.16 (8.7)	14.55 (10.4)	11.59 (7.9)	13.85 (9.1)
Physical symptoms				
PILL	100.09 (28.1)	98.54 (25.8)	99.11 (23.7)	99.80 (25.7)
Anxiety				
BSI anxiety	2.76 (3.3)	4.05 (4.5)	3.86 (4.4)	4.53 (4.7)
BSI somatic	2.38 (3.4)	3.02 (4.4)	3.20 (4.6)	3.71 (5.5)
DASS anxiety	5.02 (6.4)	2.50 (3.1)	4.96 (6.0)	2.46 (3.2)
Moderators				
EAC-EE	2.49 (.9)	–	2.40 (.7)	–
EAC-EP	2.78 (.8)	–	2.80 (.7)	–
EEQ	4.69 (.9)	–	4.67 (.6)	–
AEQ	2.73 (.8)	–	2.85 (.8)	–

Note: BSI, Brief Symptom Inventory; DASS, Depression Anxiety and Stress scale; BDI, Beck Depression Inventory; CES-D, Center for Epidemiologic Studies Depression Scale; PILL, Pennebaker Inventory of Limbic Languidness; EAC-EE, Emotional Approach Coping-Emotional Expression; EAC-EP, Emotional Approach Coping-Emotional Processing; EEQ, Emotional Expressiveness Questionnaire, AEQ, Ambivalence over Emotional Expressiveness Questionnaire.

Addition of this option did not affect final results, and therefore results from models without corrected standard errors were presented.

Results

Preliminary analyses

Differences between writing groups at baseline were tested with χ^2 for demographic characteristics (gender and ethnicity: White, Asian, other), and multivariate ANOVA for baseline dependent variables (anxiety, depressive symptoms, PILL), and continuous moderators (EE and EP subscales of the EAC Scale, EEQ, and AEQ). No significant group differences on demographic variables, dependent variables, or moderators were found, suggesting successful randomization. Table 1 contains descriptive statistics for Time 1 and Time 2 dependent measures and Time 1 moderators before outliers were Winsorized. Table 2 displays correlations between moderators and baseline dependent measures. Due to high correlations between the EE subscale of the EAC Scale (situation specific) and the EEQ (dispositional), an emotional expressivity composite was created using the same method as the depression and anxiety composites (see Method section). Although the EP subscale was highly correlated with the EE subscale and EEQ, we analyzed emotional

Table 2. Correlations between moderators and dependent measures at Time 1.

	EAC-EE	EAC-EP	AEQ	EEQ	Anx.	Dep.
EAC-EP	.77***					
AEQ	−.28***	−.14				
EEQ	.50***	.48***	−.48***			
Anx.	.12	.07	.27*	−.06		
Dep.	−.14	−.21	.48***	−.34***	.59***	
PILL	.13	−.05	.11	−.02	.42***	.34**

Note: *$p < .05$, **$p < .01$, ***$p < .001$; EAC-EE, Emotional Approach Coping-Emotional Expression; EAC-EP, Emotional Approach Coping-Emotional Processing; AEQ, Ambivalence over Emotional Expressiveness Questionnaire; EEQ, Emotional Expressiveness Questionnaire; Anx., Anxiety symptoms; Dep., Depressive symptoms; PILL, Pennebaker Inventory of Limbic Languidness.

processing separately because it represents a conceptually distinct facet of emotional coping.

For each dependent measure, we first tested the moderating effects of the Time 1 value of the dependent measure itself using linear regression with the dependent measure at Time 2 predicted from the dependent measure at Time1, Group and the Group × Time 1 dependent variable interaction. The dependent variable at Time 1 did not interact significantly with Group on any outcome. We also assessed whether gender or ethnicity (Asian/white) interacted with Group to predict outcomes. There were no significant moderating effects of gender or ethnicity.

Essay ratings

Table 3 displays descriptive statistics on participants' ratings of their writing experience at Time 2. Multivariate analysis of variance with Group as the independent variable revealed significant Group differences. Examination of underlying regression coefficients revealed significant Group differences across all measures except negative effect of writing, on which both groups reported low negative effects. As expected, participants in the expressive writing group revealed significantly more personal information and emotion and reported significantly

Table 3. Participant ratings of writing experience at Time 2.

Dependent variables	Control mean (SD)	Expressive writing mean (SD)	Difference (95% CI)
Essay was personal	4.32 (1.69)	6.22 (1.03)	1.90* (1.37–2.42)
Revealed emotion in essay	3.50 (1.81)	6.07 (1.00)	2.57* (2.02–3.12)
Writing increased understanding	3.58 (1.71)	5.11 (1.33)	1.54* (.96–2.12)
Writing was valuable	2.91 (1.58)	5.05 (1.10)	2.14* (1.63–2.66)
Writing had a positive effect	3.02 (1.54)	4.78 (1.38)	1.76* (1.21–2.32)
Writing had a negative effect	1.88 (1.16)	1.93 (1.27)	.05 (.41 to .51)

Note: *$p < .001$.

higher levels of increased understanding, value, and long-term positive effects of the writing exercise than participants in the control group.

Analyses on three-month follow-up (Time 2) data

Next, we tested the effect of writing Group (Time × Group) and moderation by the emotional expressivity constructs (Time × Group × moderator). Estimated means, confidence intervals, and effect sizes for each dependent variable at Time 1 and Time 2 are presented in Table 4. Therefore, moderation by Ambivalence over Emotional Expressiveness, Emotional Processing, and the emotional expressivity composite measured at Time 1 were tested.

Analyses revealed no significant Time × Group interaction on depressive symptoms ($p = .462$), and no significant Time × Group × moderator interactions ($p = .143$ to $.809$). Analyses revealed no significant Time × Group interaction on PILL scores ($p = .382$), and no significant Time × Group × moderator effects on PILL scores ($p = .266$ to $.989$). Analyses revealed no significant Time × Group interaction on anxiety ($p = .690$), and no Time × Group × moderator effect of Emotional Processing ($p = .101$)[2] or Ambivalence over Emotional Expressiveness ($p = .260$) on anxiety.

As shown in Figure 2, analyses revealed a significant Time × Group × emotional expressivity composite interaction for anxiety symptoms ($b = -.67$; CI $= -1.07$ to $-.28$; $p = .001$; $f^2 = .073$). Post hoc tests of simple effects revealed that for participants in the expressive writing group, those who reported low expressivity (i.e., 1 standard deviation below the mean) had a significant increase in anxiety from Time 1 to Time 2 (change $= .69$; CI $= .34$ to 1.05; $p < .001$), whereas participants in the expressive writing group who reported high expressivity (i.e., 1 standard deviation above the mean) had a significant decrease in anxiety (change $= -.45$; CI $= -.81$ to $-.09$; $p = .013$). Control group participants showed no change from Time 1 to Time 2, and participants in the expressive writing group with average scores on emotional expressivity showed no change from Time 1 to Time 2 (change $= .12$ to $.17$; $p = .147$ to $.298$).

Table 4. Estimated means, 95% confidence intervals, and effect sizes at Time 1 and Time 2 in the expressive writing and control conditions.

	Control		Expressive writing		
	Time 1 mean (95% CI)	Time 2 mean (95% CI)	Time 1 mean (95% CI)	Time 2 mean (95% CI)	Effect size[a] (*d*)
Dep.	.07 (−.16 to .30)	.14 (−.14 to .43)	−.08 (−.30 to .15)	.13 (−.16 to .42)	−.15
PILL	99.3 (92.8 to 105.7)	98.1 (91.7 to 104.5)	98.8 (92.4 to 105.1)	100.2 (93.8 to 106.6)	−.11
Anx.	−.12 (−.35 to .11)	.04 (−.19 to .26)	.01 (−.22 to .24)	.12 (−.10 to .35)	.06

Note: Dep = Depression Composite (overall Time 1 mean = 0 and standard deviation = 1); PILL = Pennebaker Inventory of Limbic Languidness (potential range = 54–270); Anx = Anxiety Composite (overall Time 1 mean = 0 and standard deviation = 1).

[a]Negative effect sizes indicate greater increase in symptoms in the expressive writing compared to the control group and positive effect sizes indicate greater reduction in symptoms in the expressive writing compared to the control group.

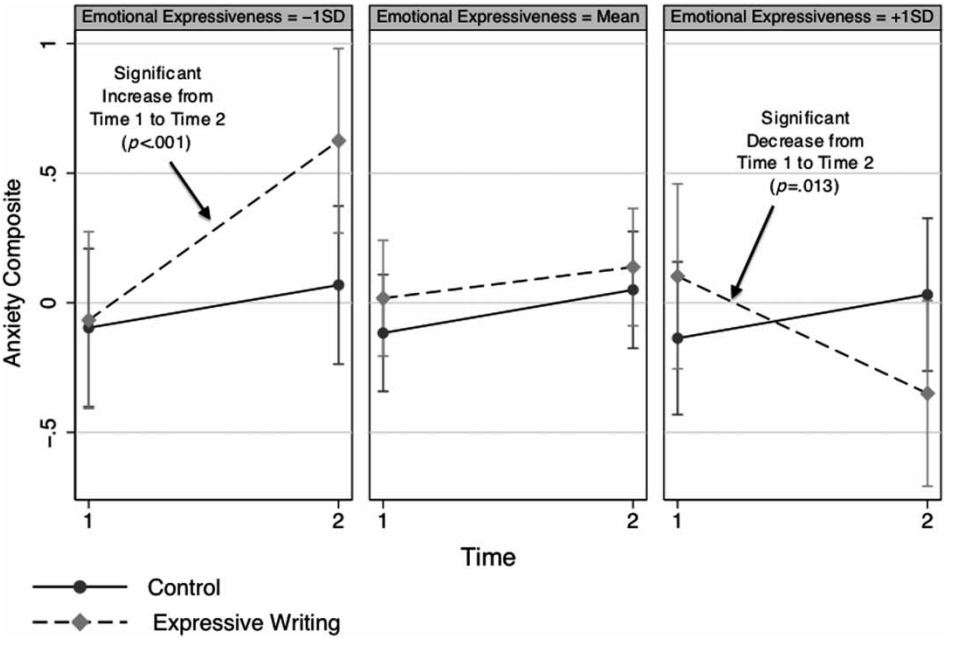

Figure 2. Effect of writing group on anxiety symptom composite at Time 1 and Time 2 at varying levels of emotional expressivity. −1SD = 1 standard deviation below the mean; + 1SD = 1 standard deviation above the mean.

Discussion

The aim of the current study was to examine main effects and moderators of expressive writing. Of particular interest were moderators related to emotional expressivity as research findings have been inconsistent on whether lower emotional expressiveness predicts better or worse outcomes from the writing paradigm (Austenfeld & Stanton, 2004; Kraft et al., 2008; Lu & Stanton, 2009; Lumley, 2004; Páez et al., 1999; Solano et al., 2003; Stanton et al., 2000). Moderators assessed included emotional expressivity, stressor-specific emotional processing, and dispositional ambivalence over emotional expression. In addition, we assessed gender and ethnicity as moderators, which did not yield meaningful effects.

Main effects analyses revealed that participants in the expressive writing group did not evidence significant improvements in symptoms of anxiety, depressive symptoms, or physical symptoms compared to those in the control condition. However, emotional expression emerged as a significant moderator of the effect of expressive writing on anxiety. Expressive writing produced an anxiety improvement in participants relatively high on emotional expressiveness, whereas participants low on expressiveness showed increases in anxiety following expressive writing. The control group evidenced no change in anxiety regardless of emotional expressiveness. These findings suggest that for people who already tend to manage emotions through expression, expressive writing may be particularly beneficial in reducing anxiety. However, for those who are less expressive, written expressive disclosure may be contraindicated.

These findings add to a growing body of literature that supports the matching hypothesis, which purports that a contextually induced coping strategy will be most effective when it is consistent with a person's natural coping tendency (Engebretson et al., 1989). It should be noted, however, that significant moderation by emotional expressiveness was found only on anxiety. Previous studies have revealed significant moderation by emotional expressiveness on depression (Austenfeld et al., 2006; Lumley, 2004) and physical symptoms (Kraft et al., 2008) in samples of healthy and physically symptomatic participants. These findings were not replicated in the current analyses. Perhaps the particular stressful situations that participants were managing were linked more strongly to anxiety than to other outcomes, but this is not testable in the current research.

The finding that participants low in expressiveness report higher levels of anxiety three months after expressive writing should concern researchers studying the utility of incorporating writing into treatments for psychopathology. Researchers and clinicians treating affective disorders have begun to incorporate writing into clinical interventions for posttraumatic stress disorder (Esterling, L'Abate, Murray, & Pennebaker, 1999; Sloan & Marx, 2004; Smyth, Hockemeyer, & Tulloch, 2008) and depression (Hayes et al., 2007). Including measures of expressiveness and identifying whether it is a consistent predictor of psychological outcomes following writing should be a priority in this line of research.

Limitations and future directions

Though this study adds valuable insight into the growing body of literature shaping expressive writing as a therapeutic strategy, it is not without limitations. All outcomes and moderators were self-report; however, all measures have demonstrated reliability and validity. In addition, results may not generalize to other groups given that Caucasian and Asian young adults were the majority of the sample. The current study included participants who were physically and mentally healthy and score distributions were positively skewed. Compared to other studies that have assessed the effects of expressive writing, the sample size was large (113 participants), attrition was low, and power calculations indicate sufficient power to detect a small effect. Furthermore, only participants who had experienced a highly stressful event were selected to participate. However, limited variability in dependent measures may have impacted our ability to find an effect of writing. Because participants were already reporting low levels of anxiety, depression and illness, the amount of improvement that could occur was limited. In addition, restricted variability on outcome measures limits statistical power.

Of the studies on expressive writing in healthy college students included in Frattaroli's meta-analysis (Frattaroli, 2006), six studies found a significant benefit from expressive writing and 32 studies found no significant effects. It is likely that many of the studies on healthy participants with null findings suffered from similarly restricted ranges and positively skewed data on physical and psychological symptoms, thereby limiting the statistical power and room for improvement. Although some investigations find that expressive writing is beneficial, its effects are clearly not unequivocal, which highlights the importance of identifying who will benefit and who will not. Clearly, conditions exist in which expressive writing can improve physical and psychological health (e.g., Bernard, Jackson, & Jones, 2006;

Halpert, Rybin, & Doros, 2010; Smyth et al., 2008), and identifying those conditions will help establish expressive writing as a consistently therapeutic strategy (for further discussion, see Smyth & Pennebaker, 2008).

Potential directions for future research include studies that experimentally manipulate expressiveness prior to expressive writing and that further explore the experience of expressive writing for those low in expressiveness. Experimental manipulation could include allowing those low in expressiveness to practice and become more comfortable with emotional expression before engaging in expressive writing, and testing whether this improves the benefits of writing. It may also be useful to collect further information from participants about the experience of expressive writing. For example, participants could report how stressful, frustrating, embarrassing, or unnatural the writing experience was, and these variables could be used to predict psychological and physical outcomes after writing.

In conclusion, the present study revealed a positive effect of expressive disclosure specifically on anxiety and specifically for young adults who were highly emotionally expressive. These findings point to the importance of including measures of moderators related to emotional expressiveness in future tests of expressive writing. Before expressive writing can be used effectively for clinical intervention, it is necessary to know who will benefit most from the exercise and whether there may be cases in which expressive writing is contraindicated.

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Notes

1. The scan was included to test relations of neural parameters to the outcomes of expressive writing and to other variables. These results will be published in a separate manuscript.
2. Emotional processing was a significant moderator ($p = .043$) when analyses were conducted on non-Winsorized data; however, this p value did not reach the Bonferroni-corrected level of .006, and therefore, simple effects were not analyzed.

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