

How benefits of expressive writing vary as a function of writing instructions, ethnicity and ambivalence over emotional expression

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Written emotional disclosure has been reported to confer a variety of benefits on physical and psychological well-being. However, variable findings suggest that outcomes may vary systematically as a function of specific parameters of the experimental design. This study aims to investigate the unique and combined effects of disclosure instructions focusing on emotional expression and instructions facilitating cognitive reappraisal and to examine how ambivalence over emotional expression and ethnicity moderate the effects of these writing instructions. Seventy-one Asian and 59 Caucasian undergraduates ($N = 130$) with at least minimal physical or depressive symptoms were randomly assigned to one of the four writing conditions: emotional disclosure (ED), cognitive reappraisal (COG), the combination of ED and COG, or a control condition. Self-reported physical symptoms, positive affect (PA) and negative affect were assessed at baseline and three follow-ups spanning 4 months. Mixed linear models revealed that COG writing reduced physical symptoms, ED buffered a decrease in PA over time, and the combination of ED and COG (i.e. self-regulation; SR) was most effective. Asians and highly ambivalent participants benefited most from expressive writing. Findings contribute to the development of a SR moderator model and carry implications for designing expressive disclosure studies, particularly for ethnic minorities.

Keywords: expressive writing; emotional disclosure; self-regulation; ambivalence over emotional expression; Asian; ethnicity

Introduction

Over the past two decades, the effects of expressive disclosure through writing have received considerable empirical attention. As developed by Pennebaker (Pennebaker & Beall, 1986), a typical written emotional disclosure experiment is to assign participants randomly to write about their deepest thoughts and feelings related to stressful experiences, or to write about a neutral topic. Meta-analyses demonstrate that emotional disclosure through writing confers a variety of benefits, including

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increased physical and psychological well-being (Frattaroli, 2006; Frisina, Borod, & Lepore, 2004; Smyth, 1998). However, one meta-analysis revealed 'no clear evidence to demonstrate the efficacy of the emotional disclosure interventions reviewed' (Meads & Nouwen, 2005, p.153) and Frattaroli's (2006) meta-analysis demonstrated significant heterogeneity on many outcomes. The variable effects of expressive writing suggest that its effects vary as a function of experimental parameters, including the specific psychological processes targeted in the experimental task, outcomes assessed and individual differences. It is essential to understand the conditions under which expressive writing works and how to maximise its benefits.

The first goal of this study was to test a theoretical model of expressive writing by prompting specific psychological processes during the writing and assessing their effects on physical and psychological health. Pennebaker (1985) proposed that confiding feelings associated with a traumatic event allows for integration or cognitive reorganisation of the event, ultimately reducing physiological activation associated with inhibition and obsessive thinking. Lepore, Greenberg, Bruno, and Smyth (2002) suggested that expressive writing facilitates three key components in the emotion regulation process: directing attention, facilitating habituation and aiding in cognitive restructuring. King (2002) discussed self-regulation in expressive writing from a goal perspective and suggested that writing about topics that facilitate learning about one's needs and desires produces health benefits. These models have advanced our understanding of why expressive writing produces health benefits; however, the essential components conferring benefits and for whom it works are not clear.

Building on previous theoretical frameworks, we developed a self-regulation moderator model of expressive writing to guide this research. This model emphasises the essential role of cognitive reappraisal of stressful events, the facilitative role of emotional disclosure in producing health benefits, and the moderating role of individual differences in enhancing, decreasing or even reversing the effects of writing. Cognitive reappraisal (COG) is defined as a *positive* change in the evaluation of *stressors and/or the self*. According to stress and coping theory (Lazarus & Folkman, 1984), stress influences health outcomes via appraisal. Thus, cognitive reappraisal is postulated as a critical pathway in reducing the impact of stress and producing beneficial effects through expressive writing. By spurring a stressor and attendant goals into attention, promoting habituation and prompting efforts to manage demands associated with the stressor, emotional disclosure (ED) is likely to facilitate COG, but might not be necessary to produce physical health benefits. COG, combined with ED, constitute a self-regulation (SR) process in which thoughts and emotions are regulated through reappraisal of stressors and the self. Thus, the combination of COG and ED is hypothesised to produce maximal health benefits.

A second goal of the present study was to examine whether the effects of the intervention varied as a function of pre-existing resources of the participants. In order to guide research to maximise benefits of expressive writing, the self-regulation moderator model suggests that individual differences in emotional expression moderate the effects of expressive writing. In the current study, we selected ambivalence over emotional expression, which is defined as a conscious desire to express feelings accompanied by a failure to do so (King & Emmons, 1990), as a putative moderator. Norman, Lumley, Dooley, and Diamond (2004) found that greater ambivalence over emotional expression predicted reduction in daily and

physical disability among chronic pelvic pain patients assigned to an emotional disclosure condition, whereas ambivalence predicted an increase in daily and physical disability among controls. Individuals who are ambivalent about expressing feelings might benefit most from expressive writing, as hypothesised in the current study, because the perceived safety of expressing oneself in writing should reduce the conflict between the desire to disclose and the failure to do so.

A third goal was to examine the efficacy of expressive writing among Asians and how the benefits of expressive writing differ as a function of ethnicity. Very few studies of expressive writing have been conducted in Asians (e.g. Kim, 2008). In her meta-analysis, Frattaroli (2006) found that the proportion of Asian participants did not significantly moderate effects of expressive writing, but only 7% of participants across studies were Asian. Asian Americans have the lowest rates of mental health service use among ethnic populations (US Department of Health and Human Services, 2001), attributable in part to factors such as shame and stigma accompanying mental health service use (Sue & Sue, 1999). In many Asian cultures, harmony serves as the cardinal value that guides an individual to pursue a conflict-free interpersonal relationship (Chen & Chung, 1994). Disclosing emotional events (particularly negative emotions) to others may potentially damage harmony. Through interpersonal disclosure, expressive writing interventions might serve a facilitating function for Asians to express emotion without threatening harmony with others. Promoting exploration of stressor-related thoughts or feelings in a private context, as is done in expressive writing, may be an approach suited to this population. Findings that Asians suppress negative emotions to a greater degree than European Americans (Gross & John, 1998; Kim, Atkinson, & Umemoto, 2001) led to our hypothesis that Asians have higher levels of emotional ambivalence and might benefit more from written emotional disclosure than Caucasians.

In this experiment, we attempted to test the unique and combined health effects of COG and ED on prompting adjustment to a stressor and to examine how the effects of expressive writing vary as a function of ambivalence and ethnicity. We employed a 2 (ED: emotional disclosure *vs.* no emotional disclosure) \times 2 (COG: cognitive reappraisal *vs.* no cognitive reappraisal) \times 2 (Ethnicity: Asians *vs.* Caucasians) factorial design. Outcomes included self-reported physical symptoms, positive affect (PA) and negative affect (NA).

Method

Participants and procedure

The study was approved by the UCLA institutional review board. Undergraduates at UCLA were recruited to participate in a study on 'writing style and health'. We screened potential participants ($n = 783$) in an introductory psychology class or through an on-line survey for those who were not in the class. Inclusion criteria were: (1) self-reported experience of a current stressful event, indicated by a score above zero on a rating of one's current most stressful event (0 = 'not stressful at all' to 4 = 'extremely stressful'); (2) at least minimal self-reported physical and depressive symptoms, indicated by a score above zero on the Physical Symptoms Checklist and on the depression subscale of the Brief Symptom Inventory (Derogatis, 1993); (3) no reported diagnosis of post-traumatic stress disorder (PTSD); (4) self-identified as Asian or Caucasian; and (5) self-reported comfort writing in English. In total,

783 individuals were screened, 222 (28.4%) were eligible and were invited to participate. Recruitment stopped when the number of participants reached 136, the pre-determined sample size.

Experimenters (the first author and another experimenter) met with potential participants individually and explained the study procedure. After providing informed consent and completing baseline questionnaires, 136 participants were randomly assigned to one of the four groups (stratified by gender and ethnicity): control group, emotional disclosure group (ED), cognitive reappraisal group (COG), and self-regulation (SR, combination of ED + COG). Participants engaged in 20-min writing sessions on 3 days within a week individually in the lab, according to writing instructions inside an envelope given by experimenters who were unaware of participants' condition assignment. At the end of the 20 min, an experimenter entered the room, reminded participants to finish their last sentence, place the writing into an envelope and seal it, and deposit it in a box. The procedure was repeated when participants returned for Sessions 2 and 3. Immediately after the final writing session, participants indicated the extent to which their essay was 'meaningful', 'personal' and 'emotion-revealing' and 'how sad/depressed' they had felt over the three writing sessions (Pennebaker, Colder, & Sharp, 1990). Questionnaires to assess self-reported physical symptoms and psychological outcomes were administered individually in person at baseline and through on-line surveys for the three monthly follow-ups at 1 month, 2 months and 4 months after the final writing session. Participants were debriefed after the final follow-up. Participants either earned class credits or up to \$25 for participation.

Six participants (4%) withdrew from the study before finishing the writing sessions and did not complete follow-up assessments (2 control, 1 ED, 1 COG and 1 SR). Reasons for withdrawing were lack of time and dropping out of the psychology course. The 130 participants (99 females and 31 males)¹ who remained in the study and participated in the follow-up assessments had a mean age of 19.97 years ($SD = 2.22$, range = 18–32). There were 71 (54.6%) Asians and 59 (45.4%) Caucasians. Among the 130 participants, 126 completed all three writing sessions and four completed two writing sessions. Six participants (4.6%) did not complete the Month 1 follow-up, 3 (2.3%) did not complete the Month 2 follow-up and 26 (20%) did not complete the Month 4 follow-up. At the Month 4 follow-up, many students had finished their required class credit, likely accounting for the larger percentage of missing data compared with early follow-ups.

Experimental conditions

Participants assigned to the control group were instructed to write as objectively as possible about 'what you have done today since you woke up this morning, and what you plan to do after you finish the experiment' in the first session, following Pennebaker et al. (1990). Participants were asked to write about 'what you plan to do for the next week' in the second session, and 'what you plan to do for the next month' during the third session.

Participants assigned to the ED group were instructed in each session to write about 'your deepest emotions about your current most stressful experience that has affected you and your life. Really let go and explore your feelings and thoughts about it'. The instructions were based on Pennebaker (1997) and were modified to be

similar to King and Miner (2000) and King (2001), in that instructions to prompt cognitive reappraisal were not included.

Participants assigned to the COG group were instructed in each session to write about positive and negative consequences of a current most stressful event, their perceptions of the stressful event, challenges and opportunity arising from the event, cognitive reappraisal of their coping strategies (to prompt appraising the self as being resourceful and competent in dealing with stressor) and their positive thoughts about the stressors.

Participants assigned to the SR group were given the same instructions as the ED group in the first session, and were given the same instructions as the COG group during the second and third sessions. The intention was to promote self-regulation by spurring stressors, emotions and goals into awareness at Session 1, and then by regulating thoughts and emotions through reappraising stressors and coping efforts in Sessions 2 and 3.

Outcome measures

Physical symptom checklist

A 10-item symptom questionnaire was used to assess the number of days during the last 30 days which participants had felt symptoms of acute illness such as runny nose, difficulty in breathing and soreness during the past month not due to intentional physical exercise.² The average number of days during which symptoms were experienced was used for analysis. This measure was modified from Pennebaker (1982) and King and Emmons (1990). It was correlated with number of medical appointments for cancer-related morbidities in a trial of expressive writing in breast cancer patients (Stanton et al., 2002). In the current study, internal consistency (Cronbach α) of the scale was 0.71.

Positive and negative affect

Positive and negative affect were assessed through a 20-item version of the PANAS (Watson & Clark, 1994) on a 5-point scale. The PANAS assesses positive and negative mood (e.g. 'cheerful', 'afraid', 'excited', 'strong') during the past month, and provides reliable, valid, and largely independent measures of PA and NA. NA at baseline was assumed to represent trait NA (Watson & Clark, 1994; Watson & Tellegen, 1985). At baseline, internal consistency for NA was 0.84 and for PA was 0.89. PA and NA were not correlated ($r = 0.04, p > 0.05$).

Ambivalence over emotional expression

Ambivalence over emotional expression was assessed at baseline with the AEQ (King & Emmons, 1990, e.g. 'I want to express my emotions honestly but I am afraid that it may cause me embarrassment or hurt'). Participants rated each statement on a 5-point scale (1 = 'I have never felt like this' to 5 = 'I frequently feel like this'). Ratings were summed and averaged across items; higher scores indicate more ambivalence. The AEQ has good internal consistency and stability over 6 weeks, predicts poorer health and emotional functioning, and is inversely related to emotional expressiveness (King & Emmons, 1990). In the current study, the internal consistency was 0.93.

Statistical analysis plan

Preliminary analyses were conducted to examine assumptions for statistical analysis, outliers, the distribution of variables, missing data, differential attrition and the successfulness of randomisation and manipulation. The physical symptoms variable was not normally distributed and analyses were conducted on both the non-transformed data and the transformed data. The findings were nearly identical, and the results on the raw data are reported.

For hypothesis testing, given the nature of the data with repeated measurements and missing data at some follow-ups, mixed linear models (MLM) analysis in SPSS 12.0.0 (SPSS Inc, 2003), known variously as multilevel modelling (Willett, Singer, & Martin, 1998) or hierarchical linear modelling (Bryk & Raudenbush, 1992), was used to study how health outcomes of expressive writing vary as a function of ethnicity, ambivalence over emotional expression (AEQ), and the experimental conditions. Self-reported physical symptoms, PA and NA at the three follow-ups were the outcome variables and their baseline values were covariates. MLM has advantages over conventional multivariate repeated measures (MRM) methods to handle missing data and to permit flexible specification of the covariance structure among the repeated observations, whereas repeated-measures ANOVA assumes a constant treatment effect for all individuals, an assumption that was violated in the present sample. We first examined the error covariance structure of the multilevel models and then tested individual growth in the outcomes across three follow-ups.

All continuous variables were centred on the grand mean, following West, Aiken, and Krull (1996). Two experimental conditions (ED and COG) and ethnicity were dummy coded. Preliminary analyses were conducted to examine potential interaction effects. Non-significant interactions were eliminated from the final models. We compared the effects of ED *versus* non-ED conditions and the effects of COG *versus* non-COG conditions. Because those analyses contain potentially 'active' conditions in the non-ED and non-COG groups, it also was important to examine the experimental conditions against the true control. Accordingly, *a priori* planned comparisons were also conducted to compare the treatment effects (i.e. SR, ED and COG) with the control group for the whole sample as well as within each ethnicity using the least significant difference test (LSD). Effect sizes (ES) were estimated using partial eta squared (η_p^2) to describe the amount of variance accounted for in the sample. The values were judged using Cohen's criteria (Cohen, 1988) for small, medium and large effect with $\eta_p^2 = 0.01, 0.059$ and 0.138 , respectively (corresponding to Cohen $d = 0.2, 0.5, 0.8$). Alpha level was set to 0.05 for two-tailed tests.

Results

Preliminary analyses

Missing data at the last follow-up were examined for their relation with treatment condition and baseline measures using logistic regression. No differential attrition occurred as a function of experimental group membership or baseline values on the dependent variables. A multivariate analysis of variance (MANOVA) was conducted to determine whether the experimental conditions differed on baseline physical symptoms and PA and NA. No significant differences emerged between ED *versus* non-ED and COG *versus* non-COG conditions, or among the four groups, suggesting successful randomisation. Ethnic differences were also compared on

baseline measures. Asians had a higher level of ambivalence over emotional expression ($M=2.90, SD=0.71, n=70$) than Caucasians ($M=2.57, SD=0.73, n=59$), $F(1, 121)=7.56, p=0.007$. Asians did not differ from Caucasians on physical symptoms, or PA and NA. At baseline, the average stressfulness rating for the current most stressful experience was 2.8 (± 0.9) on a scale of 0 (no stress) to 4 (extremely stressful).

A judge unaware of assigned experimental condition evaluated whether participants followed the writing instructions by assigning each written essay, ordered randomly (and not grouped by participant), to a particular instruction. Correct assignment to the control group was 100%, the ED group 97% and the COG group 93%. In the SR group, 94% of participants followed ED on day 1, and 90% and 88% followed COG on day 2 and day 3 respectively, suggesting successful experimental manipulation. ED, COG and SR groups rated their essays to be significantly more emotion-revealing, personal and meaningful than did the control group. The ED and SR reported being significantly more sad/depressed than the control group, but there was no significant difference between the COG and the control. There were no significant main effects of ethnicity, or two-way and three-way interactions between ethnicity and condition on those items. Descriptive statistics on the dependent variables are presented in Table 1 for the four experimental groups. Compared with the baseline levels, positive affect was lower at the three follow-ups, NA was lower at Month 2 and Month 4 follow-ups and physical symptoms were lower at Month 4.

Table 1. Descriptive statistics on outcomes in the four conditions and baseline outcomes correlations.

Time	Groups	Physical symptoms			Positive affect			Negative affect		
		<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>
Baseline	Control	3.46	2.34	26	2.93	0.88	32	2.45	0.80	32
	ED only	3.12	2.91	26	2.95	0.61	32	2.47	0.74	32
	COG only	3.53	2.92	23	3.03	0.70	32	2.46	0.65	32
	SR	3.37	2.28	26	2.87	0.75	33	2.57	0.72	33
Month 1	Control	3.90	3.00	30	2.16	0.56	30	2.38	0.48	30
	ED only	3.18	2.74	29	2.22	0.47	30	2.59	0.54	30
	COG only	3.73	2.70	33	2.16	0.53	33	2.43	0.51	33
	SR	3.06	2.42	31	2.34	0.47	32	2.61	0.46	32
Month 2	Control	3.19	2.50	31	2.55	0.89	31	2.05	0.70	31
	ED only	2.73	3.07	30	2.69	0.81	30	2.03	0.61	30
	COG only	3.00	2.53	33	2.65	0.7	33	2.12	0.76	33
	SR	2.75	2.48	31	2.74	0.75	32	2.28	0.71	32
Month 4	Control	2.33	1.98	24	2.47	0.90	24	1.96	0.60	24
	ED only	1.90	2.11	25	2.90	0.60	25	1.91	0.74	25
	COG only	2.18	1.80	26	2.66	0.76	27	2.08	0.82	27
	SR	2.25	1.70	28	2.74	0.74	28	2.16	0.78	28
Correlation:		Physical symptoms			Positive affect			Negative affect		
Positive affect		-0.12								
Negative affect		0.28**			-0.04					
Emotional ambivalence		0.10			0.08			0.47**		

Note: ED = the emotional disclosure group, COG = the cognitive reappraisal group, SR = the combination group (ED + COG), ** $p < 0.01$ (two-tailed).

Effects on physical symptoms

The MLM³ revealed that COG ($M=2.68, SE=0.25$) reduced physical symptoms compared with non-COG ($M=3.44, SE=0.25$) at Month 1, ($F(1, 91)=6.13, p=0.01, \eta_p^2=0.06$) and Month 2 ($F(1, 93)=4.22, p=0.04, \eta_p^2=0.04$), but not Month 4. No significant main effects for ED and no ED \times COG interaction on physical symptoms emerged across the follow-ups. Planned comparisons revealed that compared with the control group, the SR group decreased physical symptoms at Month 1 ($t=-2.41, p=0.03, \eta_p^2=0.05$) and Month 2 ($t=-2.27, p=0.02, \eta_p^2=0.05$), but not at Month 4. The COG and ED groups had small and non-significant effects on physical symptoms compared with the control group.

After ethnicity, ethnicity \times COG, ethnicity \times ED were entered into the MLM model as additional independent variables, the effect of COG remained significant at Month 1, $F(1, 90)=4.39, p=0.04, \eta_p^2=0.04$, and was marginally significant at Month 2, $F(1, 92)=2.94, p=0.09, \eta_p^2=0.03$. These effects of COG on physical symptoms were qualified by significant Ethnicity \times COG interactions at Month 1 ($F(1, 92)=6.50, p=0.01, \eta_p^2=0.06$) and Month 2 ($F(1, 92)=6.80, p=0.01, \eta_p^2=0.07$), such that Asians in the COG conditions had fewer physical symptoms than Asians in non-COG, $M_{\text{difference}}=-1.57, SE=0.46, df=91, p<0.001, 95\% CI=[-2.49, -0.65], \eta_p^2=0.11$ (estimation was based on Month 2), and there was no significant difference among Caucasians (Figure 1). No significant interaction of ED \times Ethnicity appeared.

Planned comparisons were conducted to examine which experimental condition benefited Asians most. Asians benefited from both the SR condition and the COG condition. Compared with the control group, the SR condition had a significant large effect at Month 1 ($B=-2.68, t=-3.05, p<0.001, \eta_p^2=0.14$) and Month 2 ($B=-2.01, t=-3.17, p<0.001, \eta_p^2=0.17$), and had a marginally significant and medium effect at Month 4 ($B=-1.34, t=-1.85, p=0.07, \eta_p^2=0.08$). COG had significant medium to large effects at Month 1 ($B=-2.22, t=-2.62, p=0.01, \eta_p^2=0.12$) and Month 2 ($B=-1.47, t=-2.38, p=0.02, \eta_p^2=0.10$), and a small, non-significant effect at Month 4. The effects of ED were small ($\eta_p^2<0.01$) and non-significant. Within Caucasians, no significant effects were revealed for the experimental groups compared with the control group, and the ES of group differences ranged from 0 to 0.02.

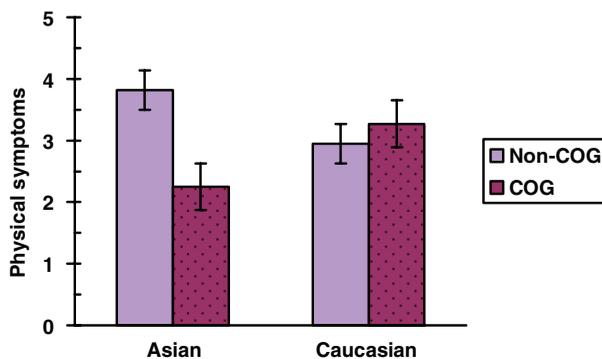


Figure 1. Interaction of COG and ethnicity on physical symptoms at the follow-ups.

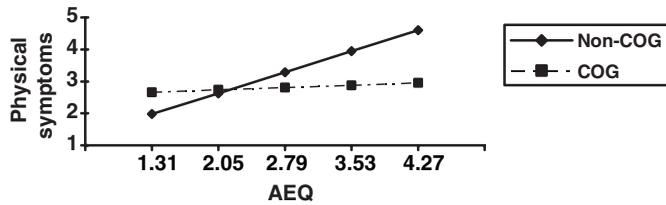


Figure 2. Interaction of COG and ambivalence over emotional expression on physical symptoms at the follow ups.

Mixed linear models were also performed to test the effect of AEQ and its interaction with experimental conditions on physical symptoms. In these analyses, the main effect of COG and Ethnicity \times COG remained significant. A significant AEQ \times COG interaction appeared at month 1, $F(1, 104) = 4.98$, $p = 0.03$, $\eta_p^2 = 0.05$, such that AEQ was positively associated with physical symptoms in non-COG conditions ($\beta = 0.32$, $p < 0.001$), but it was not associated with physical symptoms in COG conditions ($\beta = 0.04$, $p > 0.05$) (Figure 2). The AEQ \times COG interaction was not significant at the Month 2 and Month 4 follow-ups.

Effects on PA and NA

Mixed linear models revealed that ED ($M = 2.72$, $SE = 0.07$) produced higher PA compared with non-ED ($M = 2.57$, $SE = 0.07$), $F(1, 125) = 4.04$, $p = 0.05$, $\eta_p^2 = 0.03$, across the three follow-ups⁴. No significant main effect for COG or ED \times COG interaction on PA emerged. Planned comparisons revealed that compared with the control group, the SR group had a higher level of PA across all follow-ups ($t = 2.00$, $p = 0.05$, $\eta_p^2 = 0.03$). The COG and ED groups had small and non-significant effects on PA compared with the control group. No significant interactions for ethnicity or AEQ with experimental conditions emerged on PA.

No significant effects for ED, COG or the ED \times COG interaction on NA emerged. Planned comparisons did not reveal that the control group differed on NA from the other three groups. MLM with ethnicity and its interaction with experimental conditions as additional independent variables revealed a significant interaction of ED \times COG \times ethnicity on NA, $F(1, 117) = 4.06$, $p = 0.05$, $\eta_p^2 = 0.03$, such that COG produced less NA compared with the combination among Caucasians ($M_{\text{difference}} = 0.37$, $SE = 0.16$, $df = 115$, $p = 0.03$); no significant differences appeared for Asians. A marginally significant AEQ \times ED interaction also emerged on NA, $F(1, 116) = 3.63$, $p = 0.06$, $\eta_p^2 = 0.03$, such that AEQ had a marginally significantly stronger association with NA in the non-ED conditions ($\beta = 0.67$, $p < 0.001$) than that in the ED conditions ($\beta = 0.47$, $p < 0.001$). No significant interaction for AEQ \times COG emerged on NA.

Discussion

Although not entirely consistent, findings suggest that effects of expressive writing varied as a function of writing instructions, ambivalence over emotional expression and ethnicity. Some evidence emerged to support the suggestion that the combination of emotional disclosure (ED) and cognitive reappraisal (COG) may

yield the most benefits. As hypothesised, the combination of ED and COG reduced physical symptoms at Month 1 and Month 2 (but not at Month 4) and buffered the decrease in PA across the three follow-ups compared with the control group, with ES of $\eta_p^2 = 0.05$ and 0.03 , respectively. These ES are similar to or greater than ES revealed in three meta-analyses: $r = 0.21$ (corresponding to $\eta_p^2 = 0.04$) in healthy samples (Smyth, 1998), $r = 0.1$ (corresponding to $\eta_p^2 = 0.01$) in clinical samples (Frisina et al., 2004) and $r = 0.075$ (corresponding to $\eta_p^2 = 0.006$) based on 146 expressive writing studies (Frattaroli, 2006). The finding on physical symptoms is consistent with our theoretical model, which posits that combining ED and COG will produce the greatest benefit on health outcomes. Combining ED and COG in a programmatic way may facilitate self-regulatory processes by promoting the development of a representation that coherently integrates beliefs, emotions and experiences (Cameron & Nicholls, 1998), by enhancing the shift from somato-sensory and affective memory modes to cognitive and explicit memory modes (Gidron et al., 2002), by facilitating post-traumatic growth (Ullrich & Lutgendorf, 2002), and by boosting cognitive capacity to find meaning in the event (King & Miner, 2000).

Findings regarding COG also partially support our theoretical model in predicting physical health outcomes. COG reduced physical symptoms compared with conditions without COG at Month 1 and Month 2 (but not at Month 4); ED did not significantly decrease physical symptoms. The findings are consistent with previous studies suggesting that ED alone is insufficient to produce physical health benefits (Greenberg & Stone, 1992; Smyth, True, & Souto, 2001) and that writing about the perceived benefits of a traumatic event in the absence of negative emotional disclosure can improve physical health (King & Miner, 2000; Stanton et al., 2002). On the other hand, ED was more beneficial for PA compared to conditions without ED. Although existing written expressive disclosure experiments provide little evidence that ED bolsters PA, the present findings are consistent with research on emotional expression that uses methods other than written expressive disclosure (King & Emmons, 1990; Mendolia & Kleck, 1993; Stanton et al., 2000a; Stanton, Kirk, Cameron, & Danoff-Burg, 2000b).

Findings also offered some support for hypotheses regarding individual differences and ethnicity. Consistent with available literature (Norman et al., 2004), AEQ predicted who benefited from expressive writing. Those who had greater ambivalence about expressing their emotions showed the most improvement in physical symptoms after COG and the most improvement in NA after ED compared with those who were in low ambivalence. These findings support our theoretical model, which posits that individual differences in emotion expression moderate the effects of expressive writing. In line with King and Emmons' (1990) finding that emotional ambivalence was positively associated with somatisation, we found positive associations between emotional ambivalence and physical symptoms in conditions without COG and the lack of their association in conditions with COG. These findings suggested that cognitive reappraisal buffered the negative effects of emotional ambivalence on health outcomes by reducing the association between emotional ambivalence and physical symptoms. On the other hand, it was ED that helped highly ambivalent individuals to decrease NA, perhaps by reducing the conflict between personal desire to express feelings and social-environmental constraints discouraging such expression. It is not clear why highly ambivalent individuals benefited from different instructions in reducing physical *versus*

psychological distress. Nonetheless, our findings suggest the potential utility of choosing targeted writing instructions for individuals who are high in emotional ambivalence based on the primary symptoms they present. If those who are highly ambivalent report physical symptoms, then cognitive reappraisal may be helpful, and if they present with psychological distress, then emotional disclosure may be more appropriate.

As expected, Asians benefited more from COG in decreasing physical symptoms than Caucasians. The combined ED and COG condition, and COG alone, had fairly robust and large effects ($\eta_p^2=0.17, 0.12$, respectively) on decreasing physical symptoms in Asians, suggesting that these interventions are recommended if physical well-being is the outcome of central interest. As predicted, Asians were more emotionally ambivalent than Caucasians. Although ethnicity and ambivalence were related, they had unique effects on outcomes. The findings that Asians benefit more from COG than Caucasians could not be explained by the ethnic differences in emotional ambivalence alone. Asians tend to somaticise to a greater extent than Caucasians (Lin & Cheung, 1999), and perhaps cognitive reappraisal improves physical symptoms by reducing somatisation.

Ethnicity and ambivalence are two related but independent moderators. Our findings suggest that regardless of being Asian or Caucasian, individuals who are highly ambivalent over emotional expression are likely to benefit from expressive writing. Our unique study sample or its subgroups possesses characteristics which have been proposed to enhance the health benefits of expressive writing (Lumley, 2004; Lumley, Tojek, & Macklem, 2002): experiencing an event as sufficiently stressful to have something to disclose; being internally motivated to disclose and consciously inhibiting emotion; or being in a social environment discouraging disclosure. By including an ethnic minority group who are more likely than their Caucasian peers to experience conflict between the desire to disclose and the social environments discouraging emotional disclosure, this study uniquely contributes to an evolving program of research examining expressive writing and moderators involving facets of emotional regulation (Austenfled, Paolo, & Stanton, 2006; Austenfled & Stanton, 2008; Cohen, Sander, Slavin, & Lumley, 2008; Esterling, Antoni, Fletcher, Margulies, & Schneiderman, 1994; Kraft, Lumley, D'Souza, & Dooley, 2008; Lumley, 2004; Norman et al., 2004; Paez, Velasco, & Gonzalez, 1999; Stanton et al., 2002; van Middendorp & Geenen, 2008).

A limitation of this research is that we relied on participants' self-report to assess physical and psychological health outcomes. Because cultural norms can shape self-reports of distress (Okazaki, 1997, 2000), additional research with objective physical health outcomes is essential. Another limitation is that we did not intentionally suppress the COG process for the ED conditions, or suppress the ED process for the COG conditions. All three groups reported that writing was emotionally revealing, suggesting that participants might have engaged in ED in the COG condition. However, the design of comparing COG *versus* non-COG and ED *versus* non-ED reduced possible contamination, and a manipulation check performed by an unaware judge suggested that writing closely corresponded to experimental instructions. Assessment of online processing of emotions during writing will be informative to illustrate group differences. Furthermore, although we performed careful sample size calculation based on primary hypotheses, we had insufficient power to detect small to medium-sized effects, particularly for Caucasians. Due to limited sample size, we did not compare SR with COG or ED directly.

The interaction of COG and ED was not significant despite findings that SR was superior to the control group. Definitive conclusions regarding the superiority of SR compared with COG or ED require a larger sample. Finally, although participants experienced stressful events and were not free of distress or physical symptoms, our sample was not a clinical sample. However, the ES revealed in this study were comparable or larger than the ES revealed for clinical samples (Frisina et al., 2004).

In an attempt to maximise beneficial effects of writing and identify for whom it works, we discovered that the effects of writing were not constant, but rather varied as a function of writing instructions, outcomes assessed (physical or psychological), and individual differences. This study offers some evidence for the promise of matching individual characteristics with particular psychosocial interventions. For some individuals, emotional inhibition and stoicism under stress may be personal values that are highly regarded by the self and/or the social group (Consedine, Magai, & Bonanno, 2002). Without changing these values individuals cherish, written emotional disclosure might effectively reduce conflicts between personal desire to express feelings and social-environmental constraints discouraging such expression. As our findings have suggested that expressive writing can be an effective intervention for Asians, further work is warranted to identify cultural and social contexts in which emotional disclosure is likely to be fruitful or counterproductive in other ethnic groups, particularly those who have lower income, are less acculturated and are in non-English speaking communities.

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Notes

1. The sample contained too few males for reliable analysis of differential effects of condition by gender, but males were evenly distributed among experimental conditions and between ethnic groups.
2. An incorrect version of the Physical Symptoms Checklist was administered to the first 29 participants, and thus the sample size for analyses was smaller ($n = 101$) for this measure.
3. Baseline physical symptoms, NA, and perceived control over stressors (assessed by items in the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983)) were used as covariates because they were associated with physical symptoms reports in previous research (Pennebaker, 1982; Watson & Pennebaker, 1989). The model with these covariates revealed similar results (a significant main effect of COG) and demonstrated significantly better model fit (Model_{difference} $\chi^2(2, N = 102) = 20, p < 0.01$) compared to a model without these covariates.
4. It should be noted that average PA decreased from baseline to the follow-up for the whole sample, perhaps because the follow-ups were close to midterms and finals. Thus, rather than boosting PA, ED appeared to buffer a decline in PA.

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Appendix

Writing instructions

Participants engaged in writing sessions on three days within a week.

Control group

In today's session, I would like for you to write about exactly what you have done today since you woke up this morning, and what you plan to do after you finish the experiment. For example, you went to class, met your friends at lunch, plan to finish your homework, and so forth. It is important that you describe things exactly as they occurred. In order to do this, your description should be as objective as possible, focusing on specific events rather than on your thoughts or feelings about them. It is completely anonymous and it is confidential. The only rule we have is that you write continuously for the entire time in 20 minutes. Don't worry about grammar, spelling, or sentence structure. Don't worry about erasing or crossing things out.

Emotional disclosure group

In today's session I would like for you to write about your deepest emotions about your current most stressful experience that has affected you and your life. Really let go and explore

your feelings and thoughts about it. Whatever you choose to write about, however, it is critical that you really let go and explore your very deepest emotions and thoughts. It is completely anonymous and it is confidential. The only rule we have is that you must write continuously for the entire time in 20 minutes. Don't worry about grammar, spelling, or sentence structure. Don't worry about erasing or crossing things out.

Cognitive reappraisal group

In today's session, I would like for you to write about your current most stressful experience that has affected you and your life. Focus on how it happened and the consequences that have resulted. Stressful events often carry both positive and negative consequences. What positive and negative consequences have you experienced? Some questions you may want to write about are: What kind of changes in your life have you made as a result of this experience? How have you modified your perception of the stressful event or your perception of other parts of your life? How have your experiences opened up new opportunities for you? What strategies have you used to deal with the events? How would you use these strategies in other aspects of your life or future stressful events that you may encounter? In your writing, you may also focus on the positive thoughts that you have experienced during your stressful event. It is completely anonymous and it is confidential. The only rule we have is that you must write continuously for the entire time in 20 minutes. Don't worry about grammar, spelling, or sentence structure. Don't worry about erasing or crossing things out.

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